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We would like to dedicate this book to Mark Wolery for his extensive influence on the field of early intervention/early childhood special education and the generations of students he has mentored. The impact of his work on children with disabilities, their families, and the practitioners who work with them is immeasurable.

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Erin E. Barton, Ph.D., BCBA-D is an Assistant Professor in the Department of Special Education. Her primary line of inquiry focuses on identifying evidence-based behavioral interventions that teachers and parents can implement in natural and inclusive settings. Dr. Barton has conducted several studies examining effective practices for increasing play skills in young children and is currently refining the intervention package and examining implementation features. She also examines best practices for using performance-based feedback to increase early childhood professionals' use of recommended practices. She teaches courses in single case research design, assessment, and social and behavioral interventions and works with children with multiple and severe disabilities. Dr. Barton also serves on multiple editorial boards and is an Associate Editor for the *Journal of Early Intervention*. She is on the Executive Board of the Division for Early Childhood of the Council for Exceptional Children and currently serves as the board president.

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Part I

Historical Context and Foundations

A History of Early Childhood Special Education

1

Mary McLean, Susan R. Sandall, and Barbara J. Smith

The field of Early Childhood Special Education (ECSE) is relatively new. It emerged from early childhood education (ECE) and special education and has been influenced by psychology, child development, sociology, health sciences, and many other fields. A complete history of ECSE would fill many volumes. Instead of providing a complete history, the purpose of this chapter is to provide an overview of major events that have impacted services for young children with disabilities and their families including major influences from policy and legislation, the establishment and influence of the professional organization for ECSE – the Division for Early Childhood, and the application of advances in research to services for children and families.

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Early Services for Young Children

The field of ECSE today is closely linked to the field of ECE. Services for both typically developing young children and young children with disabilities, however, were relatively late to be established in our country. Among the earliest developments in ECE in the USA was the establishment of kindergartens with the goal of supporting social and emotional readiness for formal schooling. The idea of providing programs for very young children had originated in Europe before making its way to the USA. The first kindergarten in the USA was founded in Watertown, Wisconsin, in 1856, and the language spoken in this kindergarten was German (Watertown Historical Society, 2014). In 1873, the first public kindergarten was established in St. Louis. By 1883, every public school in St. Louis had a kindergarten classroom. The women's suffrage movement in the early 1900s brought other forms of ECE programs. Nursery schools were established primarily by and for middle-class families. They focused on education and social-emotional development of young children and served as informational resources for parents (Peterson, 1987).

As theories of child development advanced, efforts grew to show effective ways of teaching young children. In the 1920s, the National Association of Nursery School Educators was founded. In 1927, the National Committee on

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Nursery Schools recommended a 4-year college degree for nursery school teachers (Darragh, 2010).

In the 1930s and 1940s, the Great Depression created high unemployment and with World War II came the need for women to work outside the home to fill jobs left by men in the military. The Works Progress Administration (WPA) in 1933 supported nursery schools so that out-of-work teachers could have jobs. The federal government provided funding for childcare so that women could work in war-related industries (Bauer, Johnson, Ulrich, Denno, & Carr, 1998). Interest in ECE and the availability of ECE settings continued to evolve with the women's equity movement. The Equal Pay Act of 1963 and Titles VII and IX of the Civil Rights Act of 1964 ushered in federal equal rights for women and girls in education and employment as well as a growth in childcare opportunities (Darragh, 2010).

While ECE began to flourish, however, young children with disabilities received little attention (Peterson, 1987). We all remember stories from the middle of the twentieth century of a mother who stayed at home year after year, caring for her child who had become disabled during a difficult birth, or another mother, almost in secret, helping her child with Down syndrome learn to walk and say a few words. These parents and many others, along with their family members, often argued with their physicians and others to simply be able to keep their child in the family home rather than place their child in an institution.

During this time, almost all public schools denied an education to children with disabilities, and families were turned away from the schools even when their child turned school age. Many families didn't try to enroll their child in school because they knew the child would be refused services. Some families with babies and preschoolers, though, began to gather in private homes, church basements, empty public spaces, and sometimes in specialty clinics. What they were doing didn't have a name yet, but mothers, fathers, and a few professionals and advocates began to insist that children with disabilities be allowed to live at home rather than in an institution and that services be provided. Parents played essential roles in the creation of advocacy organizations such as United Cerebral Palsy, Easter Seals, and The Arc. The Council for Exceptional Children (CEC) was founded in 1922 as a meeting place for those interested in "special children" and to establish professional teaching standards (Kode, 2002). These organizations sponsored programs that provided services and supports to children and families while they pushed for advances in research, public policy, and access to public schools.

What did the early supports and services for the youngest children look like? Teachers and therapists learned on the job. They did what seemed to work. Over time, child development and rehabilitation research began to inform their practice. As a result of these early efforts, the last half of the twentieth century became an exciting period of advances for young children with disabilities and their families.

Federal and State Policy

Evolving federal and state policy has improved the field of ECSE and services for young children with special needs and their families. The early objective of federal policy was the stimulation of local services and model practices to improve outcomes for children living in poverty and children with disabilities (Hebbeler, Smith, & Black, 1991). Hebbeler and colleagues described the early period (prior to 1974) as a model for "purposeful improvement of services" through federal policy (p. 105).

Head Start

Head Start is part of the legacy of President Lyndon Johnson's War on Poverty. In October 1964, the Congress passed and President Johnson signed the Economic Opportunity Act. When R. Sargent Shriver was appointed to lead the War on Poverty, he soon recognized that an essential component of this effort must focus on young children living in poverty and their families. He convened a group of academic leaders and civil rights activists and directed them to identify the means to

"break the cycle of poverty." They outlined the need for a comprehensive early education program for young children in low-income families to meet their emotional, social, health, nutritional, and psychological needs. Head Start was launched.

Head Start began as an 8-week summer program in 1965, serving over a half million children. It soon became clear that a summer program prior to kindergarten was not sufficient to achieve kindergarten readiness for the children. Head Start has grown and expanded over the years to become a school year program for 3- and 4-year-old children.

In 1972, legislation was enacted that mandated that at least 10 % of the national enrollment of Head Start consist of children with disabilities. Thus, Head Start became the major public early childhood program providing inclusive services at that time.

Education Funds for Children with Disabilities

In 1965, in the interest of improving the lives and outcomes of young children with disabilities, the Congress, under P.L. 89-313, the 1965 amendments to the Elementary and Secondary Education Act (ESEA), provided for payments to states for educational services in state-operated programs for children with disabilities, birth through age 20.

Handicapped Children's Early Education Program

In 1968, P.L. 90-538 established the Handicapped Children's Early Education Program (HCEEP), a momentous event for ECSE. Enacted by the Congress, it was aimed at discovering new and better approaches to working with young children with disabilities. In passing this legislation, the Congress recognized that one reason there were so few services for young children with disabilities was the shortage of effective models of programs. HCEEP was the first federal education program focused entirely on young children with disabilities. This legislation authorized the Commissioner of Education, through the Bureau for the Education of the Handicapped (BEH) in the Office of Education, to award funds for "experimental preschool and early education programs for handicapped children which show promise of promoting a comprehensive and strengthened approach to the special problems of such children" [Sec. 2 (a)].

In addition to research, the HCEEP initiative was seen as "seed money" to stimulate model programs. The US Representative Carl Perkins described the intent as "… a model demonstration program not as a service program; however, programs that show promise of providing meaningful answers for the education of handicapped children should at the appropriate time be evaluated for permanent legislative approval" (Roy Littlejohn Associates, 1982, p. 1). BEH funded the first 24 demonstration projects in 1969-1970. DeWeerd and Cole (1976) reported that by the mid-1970s, there was at least one HCEEP project in every state, and by 1975, 20,000 young children with disabilities and their families were served either directly or through collaboration. HCEEP also collaborated with the Office of Child Development in providing specialized help for children with disabilities in Head Start (DeWeerd & Cole, 1976).

Some of the early demonstration projects were the University of Washington Down Syndrome Project, the Portage Project in Wisconsin serving rural areas, and the Rutland Center at the University of Georgia at Athens serving young children with emotional disabilities. The Regional Intervention Program (RIP) in Nashville, Tennessee, first funded by HCEEP in 1969, has served families of young children with severe challenging behavior since then and continues to expand services to other states and countries. Since 1974, 27 certified RIP programs have been established in 24 communities in Tennessee, Connecticut, Ohio, Washington, Kentucky, Iowa, Canada, Brazil, and Venezuela.

The body of research, demonstration programs, scientific literature, and a national network of advocates that resulted from the HCEEP program led to (a) widespread awareness of the effects of early intervention; (b) advocacy groups

that included family members, researchers, and service providers; and (c) ECSE teacher certification programs established at universities across the nation. This network of scientists, family members, university faculty, and service providers created a groundswell of interest in ECSE that resulted in a national multipronged trend toward state policies and state and local services.

Education of the Handicapped Act

In 1970, the Congress passed P.L. 91-230, which consolidated several small programs related to educating children with disabilities into one legislative authority, the Education of the Handicapped Act (EHA). This law provided grants to states for the education of handicapped children at the preschool, elementary school, and secondary school level. Funds could be used for the identification and assessment of children under the age of 3 years. EHA continued the legacy of P.L. 89-313 in the use of federal funds to provide and expand services for young children with disabilities. EHA also provided funding for research and development in effective educational services and practices including a broad research program as well as the HCEEP program. In 1983, outreach projects were funded to disseminate the innovative models from the demonstration projects to states and localities with the goal of implementing the effective models on a large scale and with state and local resources.

Equal Protection Court Cases

While HCEEP helped develop the knowledge base for ECSE, other important sociopolitical events were happening. By the mid-1970s, it was estimated that one million school-aged children with disabilities were not receiving an education (Weintraub & Abeson, 1976). Building on the 1954 Supreme Court ruling in *Brown vs. Board of Education* which established a right to equal education for all children regardless of race, several other court cases and policies advanced the right to education for children with disabilities (Table 1.1).

Table 1.1 Timeline of events

1856	The first kindergarten in the USA opens in Watertown, Wisconsin
1920s	The National Association of Nursery School Educators is founded
1922	The Council for Exceptional Children is founded
1939	Skeels and Dye demonstrate changes in the cognitive development of children as a result of a change in environment
1965	Head Start begins as an 8-week summer program for young children growing up in poverty
1968	Handicapped Children's Early Education Program (HCEEP) is established to develop experimental preschool programs for children with disabilities
1971	*Pennsylvania Association for Retarded Children vs. Commonwealth of Pennsylvania* lawsuit establishes the right to an education for all school-age children with mental retardation
1972	Head Start mandates 10 % of openings in Head Start should be for children with disabilities
1973	The Division for Early Childhood is established as a division of the Council for Exceptional Children and serves as the professional organization for Early Childhood Special Education
1975	P.L. 94-142 mandates services for all school-aged children with disabilities and is permissive for services for children with disabilities from birth
1986	P.L. 99-457 mandates services for all preschool children with disabilities and provides incentives for serving children from birth
1988	All states opt to participate in the birth-to-three option

In 1971, the landmark *Pennsylvania Association for Retarded Children vs. Commonwealth of Pennsylvania* lawsuit established the right to an education for all school-age children with mental retardation. In 1972, in *Mills vs. Board of Education*, the court in the District of Columbia established the right to an education for all children with disabilities of school age. These court cases ruled that under the equal protection clause of the 14th Amendment to the US Constitution, if education is provided by the state to one group, it must be provided to all (Smith & Rous, 2011). Soon, through state legislation and other court cases, children with disabilities were winning the right to an education; to due process during important decisions such as assessment, diagnosis, and placement in special education; and to services provided in the "least restrictive environment."

Education for All Handicapped Children Act of 1975

In 1975, the Congress passed the landmark federal policy for the education of children with disabilities, ages 3–21. Building on the requirements in the ESEA Amendments passed in 1974, which required states to plan for educating all children with disabilities and plan for providing education within the least restrictive environment, the EHA was amended, creating the Education for All Handicapped Children Act of 1975 (P.L. 94-142), which established a free appropriate public education (FAPE) by September 1, 1980 for all eligible 3–21-year-old children and students with disabilities. This new law was voluntary for states but required that if a state applied for and accepted funding under the law, it must ensure a free, appropriate public education to all children with disabilities, ages 6–18, in the least restrictive environment and according to a written Individualized Education Program (IEP).

However, P.L. 94-142 contained a provision limiting the "mandate" to children 3–5 and 18–21 years of age. The provision read: "except that, with respect to handicapped children aged 3–5 and 18–21, inclusive, the requirements… shall not be applied… if such requirements would be inconsistent with state law or practice, or the order of any court, respecting public education within such age groups in the state" [Sec. 612 (2) (B)].

Thus, unless state policy provided public education for children 3–5 or 18–21, the state did not have to provide it for children with disabilities in the age range. Most states did not provide public education to children 3–5. Therefore, P.L. 94-142 did not actually require states to serve very young children. However, it did provide financial incentives to states to provide preschool education to children with disabilities younger than age six through preschool incentive grants.

State Implementation Grants

In 1976, BEH created the first grant program directed toward state planning for the expansion of services for young children with disabilities, the State Implementation Grants (SIGs). SIGs were awarded competitively to states and supported state activities such as conducting need assessments, convening planning groups, developing plans to disseminate research findings and information about effective services and models, providing personnel development, and developing program and personnel standards and guidelines and data collection (Roy Littlejohn Associates, 1982).

By 1984, 43 states and territories had received SIG awards. SIGs had several outcomes, including development of state capacity to initiate planning and creation of structure for state services. States indicated that the SIGs were crucial to this capacity building (Hebbeler et al., 1991; U.S. Department of Education, 1984).

Research Institutes

In 1977, BEH created research institutes within HCEEP. Between 1977 and 1990, 14 research institutes on early childhood services for young children with disabilities and their families were funded. The research institute initiative provided practices and knowledge in areas such as home-based services, inclusive/typical classroom services, instructional practices, assessment practices, and methods of identifying and intervening with children at risk for disability. Also, through support of graduate students, the number of ECSE researchers in the field was increased.

In 1984, based on research findings on the efficacy of early intervention services and the social value of supporting families and children, and building on the state capacity-building work under SIGs, the Congress established a new program under HCEEP, P.L. 98-199, providing federal funds to states for planning, developing, and implementing statewide services for children with disabilities birth to 5 years. Again, this was not a mandate, but an incentive program states could apply for and thus continue expansion of state policy for comprehensive services. It also served as a notice to states that the next step in this policy evolution would likely be a requirement to serve young children with disabilities as

a condition of continued federal funding under EHA. In 1984, about half of the states had public policies for providing education services to some portion of the population of young children with disabilities, ages 3–5, with ten states providing some services from birth (Smith, 1988). P.L. 94-142 had opened the possibility for publicly funded encouragement to explore ways to organize the services as well as a research base on which to base the profession and the work.

Landmark Legislation in 1986: P.L. 99-457

In 1986, the landmark early childhood legislation for young children with disabilities and their families was passed. Building on federal and state policy efforts, and based on an accumulation of the federally funded efficacy research and development of effective practices and services under HCEEP, the Congress, under the leadership of Senator Lowell Weicker and Representative Pat Williams, passed, P.L. 99-457, the EHA Amendments of 1986.

These amendments created Part B, Section 619 for preschool-aged children with disabilities and Part H (now known as Part C) for infants and toddlers with disabilities. This law required states to lower the age from 6 to 3 for a FAPE under Part B. It also established a voluntary early intervention program of services for children with disabilities or at risk for disabilities from birth through age two under Part H.

A unique and important feature of Part H was that the state could select the "lead agency" at the state level to implement the program. Previously, all services under EHA had been delivered by state education agencies. In doing this, the Congress responded to requests from states to allow for state identification of a lead agency for services to the birth-three age group as these services had been historically provided by a variety of agencies including health and education.

Robert Silverstein, a Congressional staff person involved in the writing of P.L. 99-457, gave a speech in 1988 (Silverstein, 1989) in which he talked about how findings from the HCEEP program helped to lay a foundation for the passage of P.L. 99-457. Silverstein said: "Studies of the effectiveness of preschool education for the handicapped have demonstrated beyond doubt the economic and educational benefits of programs for young handicapped children. In addition the studies have shown the earlier intervention is started, the greater is the ultimate dollar savings and the higher is the rate of educational attainment by these handicapped children" (p. 10).

It is clear that a policy requiring states, as a condition of funding, to provide services to all eligible young children with disabilities was built upon an evolution of policies that first provided funding for research into effective services and then provided incentives to states to provide services.

Services After P.L. 99-457

The passage of P.L. 99-457 was followed by a flurry of activity as states established systems of services for infants and toddlers and their families and expanded services to preschoolers in order to meet the requirements of the new law. In 1985, the year before the passage of P.L. 99-457, only six states were serving children with disabilities across all disability conditions from birth, one was serving children with disabilities from age two, and 11 states were serving children with disabilities from age three (U.S. Department of Education, 1985). By 1988, all states had opted to participate in the new "Part H" program (Smith, 1988).

P.L. 99-457 impacted more than just the public schools and other agencies who would be providing services to infants, toddlers, and preschoolers with disabilities. Many states had no teacher certification for the new service area of ECSE and, even more challenging, no teacher preparation programs. In addition, related service areas such as speech-language pathology, occupational therapy, and physical therapy realized a need for additional training relative to serving young children and working with families. School psychologists and social workers also needed additional training to appropriately determine eligibility and provide services. In summary, many professionals needed

additional training, and many services needed to be established. Fortunately, due to programs like HCEEP, information did exist relative to effective service delivery models.

Current Federal and State and Policy

In the decade following the passage of P.L. 99-457, attention was focused on the state policies needed to implement the new early intervention and preschool requirements. As noted earlier, in 1984 only about half of the states had any ECSE policies for children ages 3–5 with disabilities. Even fewer had policies regarding serving children birth to three (Smith, 1988).

While P.L. 99-457 was initially voluntary for states, once a state applied for funding, they had to meet all the requirements for all children birth to five. By 1988, all states had opted to participate and had applied for funding assuring that within 5 years, services would be available to all eligible infants, toddlers, and preschoolers (Smith, 1988). Since P.L. 99-457 was passed, there have been few major federal initiatives in the early intervention arena other than attempts to gain adequate funding for current initiatives. A primary exception is that Early Head Start was established in 1995 for birth to 3-year-olds and contains the same 10 % enrollment of children with disabilities requirements as the Head Start program for 3- to 5-year-old children.

In 1990, the EHA was reauthorized and renamed the Individuals with Disabilities Education Act (IDEA). Another major milestone in 1990 was the passage of the Americans with Disabilities Act (ADA). These two legislative initiatives underscored the social value that people with disabilities are "people first" and that policy should reflect this value through "people-first" language. Thus, both IDEA and ADA incorporate people-first language (e.g., "individuals with disabilities" and "Americans with disabilities" rather than "disabled individuals" or "disabled Americans"). While the ADA is not early childhood legislation, per se, it bans discrimination in public services such as childcare and other early childhood settings. Many children with disabilities have gained the right to natural settings and environments through the ADA.

HCEEP had been reauthorized by P.L. 99-457 in 1986 and renamed the Early Education Program for Children with Disabilities (EEPCD). In the mid-1990s, the Clinton administration's reinventing government initiative to reduce the budget and size of the federal government led to the repeal of several programs, one of which was EEPCD. In his speech unveiling the initiative, President Clinton said the purpose of the initiative was "to bring about greater efficiency and lower cost of Government" (Clinton, 1993). The repeal of EEPCD left the country without a federal program solely dedicated to funding ECSE research and development. Research and development has traditionally been seen as an appropriate role of the federal government as it benefits all states.

In 2002, the Education Sciences Reform Act, P.L. 107-279, was passed with the intention of strengthening research in education by creating an independent research arm of the US Department of Education (Kuenzi & Stoll, 2014). The Institute of Education Sciences (IES) was established as the source of funding for research in the Department of Education. The Education Sciences Reform Act directed IES to support research involving experimental designs using random assignment (randomized clinical trials) for efficacy studies (Snyder, 2011). Research in special education was not initially supported through IES but was added in 2004 when the National Center for Special Education Research (NCSER) was established through the reauthorization of IDEA (P.L. 108-446). Research was no longer funded under IDEA. In 2006, NCSER began funding research in early intervention and early learning for children with disabilities.

A number of amendments to IDEA have refined some of the early childhood provisions. The Congress passed the most recent amendments in December 2004, with final regulations published in August 2006 (Part B for school-aged children) and in September 2011 (Part C, for infants and toddlers) (Smith & Rous, 2011). Funding for IDEA and Head Start has increased over the years, but the federal funding for both

programs remains insufficient to appropriately serve all eligible children.

A Professional Organization

As policy supporting services for young children and their families began to move to the forefront of both federal and state government agendas, another movement that would greatly influence the field was also beginning: a professional organization for ECSE within the CEC.

The task of establishing a new division was not easy. The initial proposal to the CEC governing board to establish a division for young children was not successful; the board decided against adding another division. At the time, CEC's existing divisions represented separate categories of disability, for example, the Division of Visual Impairments and Deaf-Blindness; the Division of Physical, Health and Multiple Disabilities; and the Division of Communicative Disorders and Deafness. Rose Engel, then chairperson of CEC's Early Childhood Education Committee, believed strongly that a division for young children should be non-categorical rather than divided along categorical lines.

In spite of the fact that they had been turned down initially, the DEC founders would not give up. A group led by Eileen Allen set up a pro-DEC booth at the next CEC conference—without the authorization of CEC. The booth was staffed for 3 days by volunteers from HCEEP projects who handed out materials and lobbied conference goers about the need for a Division for Early Childhood (DEC). The exact reason behind CEC's change of heart is not clear; however, what *is* certain is that in 1973, the Board of Governors of the CEC approved a tenth division—the DEC.

The fledgling division moved quickly to establish services for its members. In 1974, the first issue of the newsletter, the *DEC Communicator*, was published. The first DEC subdivision was established in Minnesota in 1974, and the first issue of the research journal, the *Journal of the Division for Early Childhood* (later renamed the *Journal for Early Intervention*), was published in 1978 under the editorship of Merle Karnes. In 1980, DEC and the Office of Special Education Programs (OSEP) cosponsored the first annual HCEEP conference.

By 1984, HCEEP informed DEC that no more conferences would be supported with federal money. Under the leadership of Bea Gold, DEC then stepped up to the task of continuing the annual conferences and, along with CEC, cosponsored its first annual conference in Denver in 1985. By 1986, the new division had 4000 members and was one of the largest divisions in CEC.

DEC also developed political action skills. In 1982, DEC took over management of CEC's Early Childhood Political Action Network. In 1985, DEC joined CEC to make recommendations on bills to create birth to five services under the EHA, and in 1986, DEC testified before the Congress on S. 2294, the Senate bill precursor to P.L. 99-457.

When P.L. 99-457 was passed in 1986 and the need for services grew, the role of the DEC also grew. By 1987, DEC had 4578 members with 30 state subdivisions and ten more in progress. By 1989, membership had increased to more than 6000. In 1987, DEC issued a series of position papers related to P.L. 99-457 on the topics of case management, eligibility, personnel standards, program standards, family services and the IFSP, and a continuum of services. In 1990, DEC established an executive office and hired its first executive director.

As the country faced the task of preparing professionals and establishing programs to serve young children with disabilities and their families, it became clear that guidance was needed to identify quality practice. In 1991, DEC addressed its responsibility as the professional organization for ECSE to identify and disseminate guidance to the field in the form of recommended practices. This first effort to produce DEC Recommended Practices (Odom & McLean, 1996) resulted in 415 practices and was based primarily on the knowledge and wisdom of the field gathered through stakeholder focus groups. In 1999, the organization renewed this effort with financial support from the U.S. Department of Education. With grant funding, the organization was able to conduct a review of the research literature as a basis for identifying

recommended practices. This review, complemented with the recommendations from stakeholder focus groups, resulted in 240 practices (Sandall, Hemmeter, Smith, & McLean, 2005). In 2012, DEC undertook another effort to identify practices associated with quality programs and positive outcomes for children and families. This process resulted in 66 Recommended Practices that were disseminated to the field in 2014 (http://www.dec-sped.org/recommendedpractices). Work continues by DEC members on updating and disseminating the newest set of recommended practices as well as many other products designed to promote and sustain quality early intervention services for young children with disabilities and their families.

Research

Research in special education is often traced back to the French physician Jean-Marc Gaspard Itard (1775–1838) who believed that learning is affected by the environment and also by physiological stimulation, rather than being determined primarily by genetics. Itard's famous work with Victor of Aveyron was significant because of the individualized nature of the intervention Itard provided. Itard's student, Edouard Seguin (1812–1880), who later moved to the U.S., continued this work and developed a method of assessing individual strengths and weaknesses with a corresponding plan for intervention (Shonkoff & Meisels, 2000). Seguin's work prompted the establishment of residential institutions in the U.S. that were designed to focus on teaching individuals with disabilities. Unfortunately, with the growth of the eugenics movement in the early 1990s, belief in the effectiveness of intervention waned, and residential institutions became places primarily used to segregate individuals with disabilities from society.

Nature–Nurture Debate and the Behavioral Movement

During this same time period, the nature–nurture debate was growing in the field of child development. A major champion on the nature side was Arnold Gesell, who is perhaps best known for his observational studies of child development and for gathering a large amount of normative data on early child development (Gesell, 1925; Gesell & Armatruda, 1947). Gesell believed that maturation and development in children are determined biologically and that the impact of experience on development is minimal.

Also during this time period, the behavioral movement was beginning. In contrast to the maturation perspective, the behaviorists believed that for most children, development is largely a product of the child's experience and environment (Watson, 1928). The work of the early behaviorists—Watson, Thorndike, Skinner, Hull, Spence, and others—formed the foundation of behavioral science that significantly impacted and continues to impact intervention strategies for children with disabilities (Bijou & Baer, 1961).

Effect of Environmental Factors

As the nature–nurture debate continued, researchers began to investigate the impact of environmental factors on child development. A classic study by Skeels and Dye (1939) was one of the first to show changes in the cognitive development of children as a result of a change in environment. Skeels, a psychologist, had observed a remarkable increase in the IQ scores of two little girls who had been moved from an orphanage where they had very little adult interaction to the ward of an institution for the mentally disabled where they received much more attention from the women in the ward. As a result, Skeels and Dye arranged to move 13 children from an understimulating orphanage environment to the ward of the institution. There they were assigned to surrogate mothers and had access to toys. Skeels and Dye collected IQ data on the children who were moved and on the children who remained in the orphanage. Every child in the experimental group showed an increase in IQ points when they were tested 18–36 months later, while every child who remained in the orphanage, except one, demonstrated a decrease in IQ (Skeels & Dye, 1939). This study and others triggered more research over the next decades that demonstrated

the importance of a stimulating environment to child development (Bloom, 1964; Hunt, 1961; Spitz, 1945).

Nature and Nurture

Eventually it became clear to many that development was better explained by considering both biological and experiential influences on the young child and could not be explained by only one or the other. Piaget's theory of cognitive development (Piaget, 1950, 1960) became very prominent in the field of child development in the middle part of the twentieth century and included consideration of both biological and experiential influences on child development. Piaget's delineation of stages of cognitive development provided a framework for observing cognitive skills in the young child and highlighted the importance of providing appropriate interactions and experiences based on the child's level of cognitive development.

The importance of the environment for the development of infants and young children, including those with disabilities, became more evident and more prominent in child development research during the 1960s and 1970s. A transactional perspective of child development that views development as a result of the dynamic interaction between child behavior, adult behavior, and environmental influences gained prominence in the 1970s. As proposed by Sameroff and Chandler (1975), the "continuum of caretaking causality" identifies the importance of adult-child and environmental interactions on the development of the child. Sameroff and Chandler suggested that biology does influence child development but identified the caretaking environment as having the most influence on developmental outcomes.

The transactional model of child development co-occurred with the growing recognition in the USA that institutionalization and segregation do not support the development of children and adults with disabilities. As a result of the deinstitutionalization movement of the 1970s, services for individuals with disabilities were seen as being more appropriately provided in the community rather than in an institution. The "normalization principle" (Nirje, 1976) further suggested that individuals with disabilities should have "patterns of life and conditions of everyday living which are as close as possible to the regular circumstances and way of life of society" (p. 231).

Ecological Model

For infants and young children with disabilities, then, caretaking environments both in home and out of home become an important focus of opportunities for intervention. The work of Bronfenbrenner (1977, 1979) broadened the transactional perspective to consider more than the immediate adult-child environment interactions. Bronfenbrenner proposed an ecological model of child development where developmental outcomes are viewed as a function of ecological systems within which the child is situated and how these systems affect each other.

Ecological systems include the formal and informal social subsystems of the child and family and are described by Bronfenbrenner as including microsystems (home, child care center, and other environments where the child spends time), mesosystems (parent-professional and professional-professional relationships), exosystems (local, state, and federal agencies, social groups, medical services, etc.), and macrosystems (agency regulations, state legislation, federal legislation, societal attitudes, etc.). The ecological model proposes that intervention must consider the interrelatedness of all systems that impact the child and caregivers rather than only considering the child and caregiving adults.

Summarizing the Early Research

As described earlier, the federal HCEEP and other demonstration projects served as applied research laboratories that eventually led to the passage of P.L. 99-457 in 1986. Researchers, teachers, therapists, and parents demonstrated that very young children with disabilities, including children with

significant disabilities, could be taught to move, communicate, take care of their needs, and solve problems. And, they could learn within their families and alongside their typical peers. Now, decades later, it is in the "history" chapter of our textbooks that we read about those remarkable findings. Very young children with Down syndrome were taught basic developmental skills and demonstrated milestones at or near expected ages (e.g., Hanson & Schwarz, 1978; Hayden & Haring, 1976). Parents learned and implemented teaching programs at home and taught their children important skills (e.g., Shearer & Shearer, 1976). Infants who were blind increased their mobility and exploration skills (e.g., Fraiberg, 1975). Team-based, comprehensive services made a difference for children with neurodevelopmental disabilities (e.g., Haynes, 1976). Researchers began demonstrating that children with disabilities made good progress when taught in "integrated" or "mainstream" classrooms, i.e., classrooms with children without disabilities (Allen, Benning, & Drummond, 1972; Bricker & Bricker, 1971; Guralnick, 1976). With increased rates of survival of premature and low birth weight babies, early intervention practices in the hospital and at home became the subject of much attention (e.g., Bennett, 1988).

Reviews of this early research (e.g., Dunst & Rheingrover, 1981; Simeonsson, Cooper, & Scheiner, 1982) documented that young children with disabilities who were enrolled in intervention programs made progress. The research was hampered by weaknesses in methodology but still provided support for real change in individual child behavior, the importance of family involvement, and helped set the stage for changes in public policy.

Research and Development After 1986

The policy work of the 1970s and 1980s granted young children with disabilities *access* to services. The policies also provided guidance for how those services should be delivered. However, the definition and parameters of "quality services" are defined by research and professional practice. Research questions after the passage of P.L. 99-457 focused on the services, models, and specific practices that promote good child and family outcomes.

Research in Head Start

Numerous studies document the educational, economic, and health benefits of Head Start for children and families who are at risk due to poverty. Yet there have been long-simmering debates over the long-term impact of Head Start on children's development.

The controversy began when the first evaluations of Head Start asked the global question of whether or not Head Start is effective using measures of children's intelligence to measure the effects of the program (e.g., Westinghouse Learning Corporation & Ohio University, 1969). These evaluations documented short-term positive effects; the children indeed made gains during program attendance. However, differences between those who attended Head Start and those who did not were generally not observed by third grade, at least as measured by intelligence tests. Unfortunately, reliance on intelligence measures does not capture the full range of possible outcomes from a comprehensive program of services (Zigler & Styfco, 2004).

To counter the claims that programs such as Head Start were ineffective, Lazar and Darlington (1982) reported on a consortium of well described and implemented early education programs for children from low-income homes. When researchers moved beyond the use of IQ scores, they found that such programs had long-lasting effects on school competence, abilities, children's attitudes and values, and the family.

More recent research studies have continued to document the progress that Head Start children make during and shortly after their Head Start year(s). Data show that, by the end of kindergarten, Head Start graduates are performing at national norms in early reading and writing and close to norms in early math and vocabulary (Zill, Sorongon, Kim, Clark, & Woolverton, 2006).

Recent studies also document positive outcomes on such important markers as reduced grade repetition, referral to special education, and completion of high school. Further, studies show that participation in Head Start is associated with improved health for children and families.

In the 1998 reauthorization of Head Start, the Congress mandated that the US Department of Health and Human Services determine, on a national level, the impact of Head Start on the children it serves. This unique and ambitious study involved a nationally representative sample and random assignment. It began in 2002. Overall, the impact study demonstrated that access to and participation in Head Start has positive impacts on several aspects of children's school readiness during their time in the program (Puma et al., 2010). In comparison to the control group, children in Head Start showed greater cognitive skills including language and early literacy skills. Children in Head Start demonstrated positive impacts on social-emotional measures. There was also an impact on access to dental care in the health domain and a positive impact on parenting practices.

However, the study also reports that in comparison to the non-Head Start children, by the end of first grade, many of the advantages that the Head Start children had when they began kindergarten had been lost (Puma et al., 2010). There are serious discussions as to the meanings of these findings. We know that graduates of Head Start programs are likely to enter elementary schools that are disadvantaged and under-resourced. Access to quality elementary schools, teachers, curricula, and continued support of family engagement are fundamental to school success. Continuing provision of high-quality education into the school years is essential to maintaining the gains made in the early childhood years (Gibbs, Ludwig, & Miller, 2011). Data analysis continues in order to understand the nature of the impacts of Head Start as well as to make substantive recommendations for how best to serve the nation's poorest children.

In 1995, Early Head Start began to provide services for children birth to age three and pregnant women. Early Head Start began small and incorporated a research component from the beginning. Results from the Early Head Start Research Consortium showed that children in Early Head Start showed greater gains in cognition and receptive language and some measures of social-emotional development. Positive impacts were seen with parents. Results also showed that measures of implementation were associated with better outcomes (Love et al., 2005).

In its 50-year history and enrollment of more than 27 million children, Head Start has experienced periods of expansion and retrenchment. Throughout, Head Start has not lost sight of its goals for economically disadvantaged children and families. Head Start continues in its quest to offer quality, comprehensive early education programs for children and supports for families that lead to social competence, school readiness, and successful lives.

Second-Generation Research

In his 1997 book on the effectiveness of early intervention, Guralnick provided an answer to the question, "Does early intervention work?" by proposing that it was time to stop asking the question of global effectiveness. Guralnick argued that the passage of P.L. 99-457 which mandated services to children with disabilities from birth through age five had essentially changed the nature of research that is needed. While acknowledging challenges with the methodology of early research on the effectiveness of early intervention for children at risk for disabilities and those with established disabilities, Guralnick cites meta-analyses (Casto & Mastroprieri, 1986; Shonkoff & Hauser-Cram, 1987) and his own review of effectiveness research (Guralnick & Bennett, 1987) as supporting the finding that early intervention is effective. Rather than continuing to investigate a global question about the effectiveness of early intervention, he suggests researchers move past the "first-generation" research and instead focus on "second-generation" questions such as what works, for which children, and under what conditions. Answers to "second-generation" questions

would be able to facilitate the translation of research into practice by providing guidance for intervention with individual children and families in relation to specific goals or outcomes and specific characteristics of programs.

However, the translation of research into practice has proven to require additional efforts beyond the completion of high-quality, focused research to ensure the implementation of research results on a large scale. One example of the failure to bridge the research to practice gap is the practice of serving young children with disabilities in typical ECE settings alongside their nondisabled peers. The "inclusion" conundrum is described below.

Inclusion

For over 30 years, research has shown that providing services for young children with disabilities in settings with their typically developing peers benefits both children with disabilities and typically developing children (Barton & Smith, 2015). Similarly, federal programs such as IDEA and Head Start have encouraged educational services for children with disabilities to be delivered where those services are delivered for typically developing children. The concept of "inclusion" has been a focal point of ECSE for the past 30 years (Odom & McEvoy, 1988). One of the major implications of the inclusion movement has been to bring the fields of ECSE and ECE together not as one field but as two coordinated fields of knowledge necessary to meet the needs of all children (Smith & Bredekamp, 1998).

The two early childhood professional associations, the DEC of the CEC and the National Association for the Education of Young Children (NAEYC), have worked together since the early 1990s to establish a shared vision of inclusion and to produce personnel and program recommendations for how to teach all children together. In 1993, DEC and NAEYC issued a position statement about the importance of inclusion. Subsequently, they worked together to help early educators blend the approaches and to see the teaching strategies as a continuum of effective strategies that depend on the needs of the child. In 2009, DEC and NAEYC updated and reissued the joint statement on inclusion (DEC/NAEYC, 2009).

Three federally funded research institutes (Odom, 2005; Strain et al., 1983; Strain, Sainato, Goldstein, Kohler, & Cordisco, 1993) and numerous reviews of the literature document that inclusion is an effective early childhood practice. Belonging, participating, and forming positive social relationships are important child outcomes that may be accomplished in inclusive school and community settings (Odom, Buysse, & Soukakou, 2011). However, even with research and policy supporting early childhood inclusion, there has been very little progress in establishing inclusion in practice. According to OSEP Annual Reports to Congress on IDEA, during 1984–1985, a total of 36.8 % of children 3–5 served under IDEA nationally received their special education and related services in a regular early childhood setting (U.S. Department of Education, 1987). In 2012, a total of 42.5 % of children 3–5 served under IDEA received their special education and related services in a regular early childhood setting (U.S. Department of Education, 2014). The practice of providing special education and related services to children with disabilities aged 3–5 years old in regular early childhood settings increased by only 5.7 % in 27 years and is still utilized with fewer than 50 % of the preschool children served under IDEA (Barton & Smith, 2015).

Evidence-Based Practice

Evidence-based practice (EBP) is a term that originated in the field of medicine in the 1990s and has been adopted in related fields including education. A medical definition provided by Sackett, Straus, Richardson, Rosenberg, and Haynes (2000) is often referenced to explain EPB: "Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values" (p. 1). Sackett uses the term "best research evidence," which is an important part of the definition of EPB. Cook and Odom (2013) point out that research evidence requirements behind EPB vary across fields but

typically must meet criterion related to research design, quality, and quantity. Buysee and Wesley (2006) have provided a definition of EPB for ECSE as "a decision-making process that integrates the best available research evidence with family and professional wisdom and values" (p. 12). In her extensive review of "best available research evidence," Snyder (2006) summarized her conclusion by stating, "As the science of ECE continues to evolve, the expectation is that we will thoughtfully and appropriately blend scientifically valid evidence with experiences and values to engage in EBP for the ultimate benefit of children, families and society" (p. 65).

Considerable effort has been spent and continues to be spent on identifying EBPs for ECSE. Federal legislation has supported the use of EBP. In 2001, the No Child Left Behind Act included an emphasis on scientifically based research, and in 2004, the reauthorization of IDEA, P.L. 108-448, included similar wording about the use of scientifically based research. "Scientifically based research" is typically interpreted to mean research using an experimental or quasi-experimental research design that has been obtained under controlled conditions (see chapters by Reichow and Dunst in this volume), although single-case design research is now being included. In 2002, the US Department of Education established the What Works Clearinghouse (www.ies.ed.gov/ncee/wwc/) as a resource for informed decision-making for educators. The WWC identifies and reviews studies that provide evidence of the effectiveness of a given practice, program, or policy. These reviews are available on the WWC website. While not initially included, the WWC does now include studies in the area of ECE for Children with Disabilities.

Implementation Science

As the focus on identifying EBPs has grown, EBPs by themselves have not closed the gap between research and practice in special education (Cook & Odom, 2013). It has become clear that much more is needed than identifying practices and related research (see Boyd chapter, this volume). To address this need, researchers are currently investigating strategies from implementation science. Eccles and Mittman (2006) defined implementation science as "the scientific study of methods to promote the systematic uptake of research findings and other EBPs into routine practice" (p. 1). Implementation science focuses on strategies for facilitating the sustained implementation of EBPs by practitioners. Researchers and leaders in EI/ECSE who are working to make changes in the services provided to individual children and families will not only need to be concerned with research leading to EBPs but also with the strategies that will be most successful in assuring implementation of those practices. The reader is referred to the chapter by Duda and Blase in this text for more information on implementation science.

Conclusion

ECSE is a relatively new field that experienced rapid growth and development in the last half of the twentieth century. A perfect storm of research, policy, and advocacy combined in the mid-1980s to create a universal system of state-delivered services. While the establishment of services in 1986 may have seemed to many as if the really hard work had been accomplished, in many ways, the work was just beginning and continues today. Services had to be established for a population of children who had previously not been served in many states. Teacher certification programs had to be established, and teachers needed to be prepared. Professionals from a number of disciplines who were responsible for delivering services needed professional development and guidance about effective practices.

The questions asked by researchers changed relatively quickly from "Is early intervention effective?" to "What works for which children and under what conditions?" Many thought that answering these "second-generation" questions would lead to improved services for children and families as the results of more focused research were identified. A term from the field of medicine, "evidence-based medicine," led to the

search for "EBPs" in ECSE that would combine research evidence with family and professional experiences and values to generate practices which would lead to best outcomes for young children with disabilities. In the beginning of the twenty-first century, federal legislation mandated the use of "scientifically based research" in funded programs. More recently, it has become clear to many that the identification of EBPs will not by itself lead to the use of those practices. Knowing the best available evidence must be paired with strategies for implementing the practices that are based on that evidence.

It has now been 30 years since the passage of P.L. 99-457, and the work continues. As a field, we still need that perfect storm of research, policy, and advocacy to do our best work. The following chapters of this book provide information that will help us move forward.

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The Role of Theory in Early Childhood Special Education and Early Intervention

2

Samuel L. Odom

"*In these days of cultural crisis we are made increasingly aware of the social origins and the social consequences of modern science. Science not only transforms society. It is itself transformed by the very civilization it shapes. We are in the midst of a world re-orientation which will necessitate… the purposeful creation of a science of child development adequate to new patterns of living, and to new modes of conduct. Such a science will be part of a broader science of man*" (Gesell & Ilg, 1949, p. vii).

In this distant but interestingly contemporary forward to his book on child development, Arnold Gesell proposed that science will lead us forward as a civilization, with one basis being science related to how children learn and develop. Such a science of child development and its application is based on theory. Theory is a belief system about the way the world works, for example, the way young children learn and develop. Theory is designed to explain rather than change the world, although teachers may use theory to guide their actions that lead to learning and development of children. In the early history of early intervention, leaders envisioned practitioners being the implementers of developmental science (Stedman, 1977), although early research also found that practitioners knew very little about the theoretical underpinnings of curriculum implementation (Miller, 1992). A key feature differentiating professionals from technicians is understanding the theoretical knowledge that underlies effective action. In this chapter, theoretical knowledge means the theoretical/conceptual framework that underlies effective teaching and leads to children's learning and development.

Theories may be formal, in the sense that they are based on scientific experiments and observations (like the laboratory experiments of Skinner or the careful observations of Piaget) and the elaboration of those findings to explain the way phenomena like children's learning works. In its relatively short history (McLean, Sandall, & Smith, this volume), a variety of formal theories or theoretical frameworks have influenced early childhood special education. In the USA, most have been seated in psychology, applied behavior analysis, and developmental science, although sociology, systems theory, and neuroscience also influence practice (Odom & Wolery, 2003).

Practitioners also have informal theories of practice that guide their work, in our case their work with children and families (Odom, 1987). Practitioners' informal theories may draw from single or multiple formal theories, practical experience, as well as other sources of information. These informal theories of practice may be well documented, as in conceptual frameworks or theories of change that programs sometimes develop, or they may be tacit in that they reside in

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the belief systems that practitioners have about children's learning.

In this chapter, the author will review the formal theories or integrated bodies of scientific findings that currently underlie practice in early childhood special education. This review will begin with a discussion of the "classical" theories or theoretical systems in psychology that have influenced early childhood special education, such as behaviorism, constructivism (focusing mainly on Piaget), psychodynamic/psychoanalytic theory, sociocultural theory (which also draws from anthropology), and the maturationalist/biological theories of development (including neuroscience). Programs of research from the field of sociology have also influenced features of early intervention and early childhood special education as has the broader, cross-disciplinary systems theory, and both will be described. Examples of applications of theories to early intervention and early childhood special education will be identified. Specific sets of practices that have emerged from different theoretical frameworks at times are procedurally similar; these will be described and their implications for practice will be discussed. The concept of a personal theory of practice will be proposed and its implications for early intervention and early childhood special education will be offered. The chapter will conclude with the proposal that teachers need to understand their own theory of practice and the formal theoretical/conceptual underpinnings of their practice, will introduce the concept of a "technical eclectic" approach in early childhood special education, and will discuss the possible relationship between theory of practice and evidence-based practices.

Formal Theories and Their Applications

Scientists develop formal theories to explain the phenomena in which they are interested. That is, they may have a theory about how the brain works, or how children develop language, or how the supply and demand for teachers may (or may not) affect teacher salaries. Technically, theories cannot be proven, but predictions (hypotheses) can be made from theory that can be supported by data collected in a systematic way. The formal theories that have relevance for early childhood special education are scientific in that they are based on collection of information in a systematic way that supports the theory. A variety of formal theories form the basis for practices in early childhood special education. In this section, the author will briefly describe the tenets or main points of theoretical or conceptual frameworks and provide examples of how they have been applied in early childhood special education or early intervention.

Behaviorism

Behaviorism is one of the major classical theories that serves as the basis for early childhood special education practice (Strain et al., 1992). The primary thesis of behaviorism is that individuals' behavior is a product of their environment. There is an explicit interest in discovering principles that lead to understanding and predicting observable behavior. Classical conditioning and operant conditioning are the two primary forms of behaviorism. Originating with Pavlov (1927/1960), in classical conditioning, a behavior (for Pavlov, this was a dog salivating) may be paired with both a stimulus that elicits the behavior (seeing meat powder) and a neutral stimulus (a bell ringing) so that the neutral stimulus eventually elicits the behavior in the absence of the original stimulus. Although used sometimes in behavior therapy, classical conditioning is used less often (than operant conditioning to be described next) as the basis for practice in early childhood special education.

Operant conditioning and its variations, proposed originally by Skinner (1953), is the main behavioral approach used in early childhood special education. In operant conditioning, an event or context (e.g., a mother looking expectantly at her baby) signals that a response (the baby smiling at the mother) will be followed by a reinforcing event (the mother smiling back, saying the baby's name, tickling the baby). The rein-

forcing event increases the probability that the behavior will occur again in similar contexts. Applied behavior analysis (ABA) (Baer, Wolf, & Risley, 1968) moved the application of the principles of behavior out of the laboratory and into human services programs such as ECSE/EI. Bandura (1969) extended the conceptualization of behaviorism to include observational learning and eventually social learning theory (Bandura, 1977) concepts such as self-regulation.

Some early childhood curricula and comprehensive treatment programs for children with certain types of disabilities (e.g., Lovaas, 1981, for young children with autism spectrum disorder) have adopted a very structured ABA approach (i.e., a high level of individual instruction delivered by a teacher and/or service provider using a technique called discrete trial training). Other researchers have designed programs to teach parents to use ABA with their children who have disabilities. A prime example of this approach is the Regional Intervention Program, which has now nearly a 40-year history of working with families and children (Strain & Timm, 2001).

ABA has, over the years, also evolved into an approach that recognizes the importance of contextual variables (Odom & Haring, 1994). In fact, a wide array of naturalistic behavioral interventions, to be discussed more later, have emphasized implementing intervention procedures when children are in natural and preferred activities and routines during the day. These techniques go by different names, such as incidental teaching (Hart & Risley, 1975), enhanced milieu language training (Kaiser & Roberts, 2013), embedded learning opportunities (Horn, Lieber, Li, Sandall, & Schwartz, 2000), activity-based intervention (Losardo & Bricker, 1994), and pivotal response training (Koegel, Koegel, Harrower, & Carter, 1999). The common features of these approaches include selecting activities that are interesting for the child, organizing the material and environment that will lead the child to initiate the behavior or skills to be learned, providing support when needed but minimizing direct adult teaching, and making sure there is a reinforcing event after the child engages in the skill or behavior to be learned.

In addition to naturalistic behavioral interventions that are designed to promote the acquisition of behavior, a system of behavioral strategies called positive behavior intervention and support (PBIS) has been designed to address children's challenging behavior (Dunlap et al., 2006). Based on a tiered system of intervention, behavioral strategies are first put into place to prevent a challenging behavior from occurring (e.g., having a child engaged in interesting and meaningful activities rather than in boring, inactive activities). For children whose behavior continues to be problematic or challenging, increasing levels of intervention supports are provided (e.g., perhaps more structured learning activities at a second level; a formal behavioral plan with a functional behavioral assessment, extinction, and/or reinforcement at a third level). A widely used example of a PBIS-like intervention approach is the Pyramid Model (Fox, Hemmeter, Snyder, Binder, & Clarke, 2011).

Constructivism

Constructivism, as a theory of children's development, is similar to behaviorism in that a central premise is that children's interactions with the physical and social environments are the basis for learning and development. It differs from behaviorism in that it focuses on the development of cognitive structures and the child's roles as the active participant in constructing a new and more mature understanding of the world. Piaget (Piaget & Inhelder, 1969) is often identified as the founder of constructivism, in that his career-long work established a theory of cognitive development that continues to have a profound influence on early childhood education. Specifically, his theory that children's development progresses through stages (i.e., sensorimotor, preoperational, concrete operations and formal operations) that consist of qualitatively different thinking processes led to a major emphasis on early childhood education during the 1960s (Hunt, 1961). The key concepts of

Piaget's theory that contribute to early education practice are (a) the emphasis on children's physical engagement with a stimulating physical environment, (b) the development of symbolic representation and language, (c) the development of symbolic play, and (d) the delineation of feature of the preoperational period.

A variety of other prominent educational psychologists, philosophers, and even physicians have contributed to this constructivist perspective on learning and development (e.g., Dewey, Montessori, Bruner). And, it is safe to say that constructivism has had more influence on contemporary early childhood education than any other formal theoretical framework. Examples of major early childhood education curriculum models based on the constructivist approach are the HighScope Curriculum (Hohmann & Weikart, 2002), the Creative Curriculum (Teaching Strategies, LLC, 2010), and the Reggio Emilia model (Cadwell, 2002). In its history, the early childhood education community, through the National Association for the Education of Young Children (NAEYC), adopted a constructivist approach that they have termed "developmentally appropriate practice (DAP)" (Copple & Bredekamp, 2009).

For the most part, constructivist approaches have been designed for children who are typically developing, and researchers and scholars have had spirited discussions about whether the constructivist approach is individualized and/or intense enough to promote learning and development for young children with disabilities (Carta, Schwartz, Atwater, & McConnell, 1991). Although that question remains open for debate, and in many ways is an empirical question, there have been efforts by NAEYC and the Council for Exceptional Children's Division for Early Childhood (DEC) to issue joint vision statements about ways in which children with disabilities may benefit from enrollment in classes following an NAEYC/DAP model (DEC/NAEYC, 2009). In addition, a prevailing early childhood special education perspective is that DAP curriculum approaches are necessary but not entirely sufficient to support the learning needs of many children with disabilities (Odom & Bailey, 2001). In such cases, there may be supplemental and complementary intervention plans that may need to be implemented in inclusive/DAP classroom settings (Winton, this volume).

Some early childhood special education leaders and researchers, however, have adopted a decidedly constructivist approach in intervention programs that involve parents. For example, Mahoney and colleagues (Mahoney & Perales, 2003; Karaaslan & Mahoney, 2013) have developed a responsive teaching intervention that focuses on developmentally pivotal behaviors that lead to growth and development of young children with disabilities.

Sociocultural Theory

Although having similarities to constructivism with its focus on cognitive and language development, sociocultural theory emphasizes the critical importance of understanding the influence of cultural and historic context on children's development, as well as the role of social processes in mediating the learning and development of children. Much contemporary sociocultural theory is based on the work of the Russian psychologist Vygotsky (1978). Vygotsky, although sometimes grouped in the constructivist camp, differed from Piaget in his emphasis on adults or more advanced peers as mediators of children's understanding and learning. Vygotsky specified that children are motivated to learn when learning experiences are within their "zone of proximal development," that is, at a slightly more advanced cognitive level than their current level. He and followers proposed that adults and more advanced learners are social mediators of children's learning in that they may assist the child in interpreting such new information or concepts through a strategy called "scaffolding" (e.g., carefully planning activities, conversations, modeling). Also, Vygotsky proposed that culture affects the form of social mediation that occurs in child development. Following the tradition of Vygotsky and building on the mediated learning work of Feuerstein (1980) and Klein (2003), Schertz, Odom, Baggett, and Sideris (2013) have

developed a parent-mediated model for promoting joint attention of toddlers with ASD in which parents follow a set of mediated learning principles.

Sociocultural theory also draws from anthropology in its interest in practices within and across cultures that relate to child development. Rogoff (2003) has applied sociocultural theory more directly to child development by proposing (as did Vygotsky) that children learn in social contexts through observing and imitating adults, and much of this learning often occurs in everyday activities and routines (Rogoff et al., 2007). Although a psychologist, she has examined these constructs across cultural contexts (Rogoff, 2011).

Extending this concept, Lave and Wenger (1991) discussed the concept of *situated learning* that occurs during everyday activities and in communities of practice. Novices or less-abled individuals may learn the necessary skills through a process called *legitimate peripheral participation*, which means that individuals learn through observing, participating in a part of a practice or activities, and gradually using skills in full participation. The concept of peripheral or partial participation with increasing independent participation across time, adult mediation of social experiences, and learning through engagement in activities that are personally interesting to the child all underlie inclusive early childhood education for children with disabilities (Palmer et al., 2013).

Having even deeper roots in anthropology, ecocultural theory also proposes that developmental pathways for children are made up of everyday activities and routines (Weisner, 2002). Within cultures there are *niches* (i.e., specific routines or settings) that provide the basis for learning and development, and for young children these niches are within families and communities. The ecocultural approach has been the basis of much research on families of children with intellectual and other disabilities (Skinner & Weisner, 2007) and has long been established as a positive basis for establishing family-centered programs (Bernheimer, Gallimore, & Weisner, 1990; Dunst, Bruder, Trivette, & Hamby, 2006). In an ambitious program of research, Dunst and colleagues (Dunst, Hamby, Trivette, Raab, & Bruder, 2000) surveyed over 3300 parents to identify the potential everyday natural learning experiences that occur for young children with disabilities and documented the association of natural learning opportunities on optimal child behavior change (Dunst et al., 2001). The practice of situating learning in everyday activities in the home and community, as reflected in this work and suggested by sociocultural theory, is a central feature of the current practice in early intervention and early childhood special education (DEC, 2014).

Psychodynamic Theory

Sigmund Freud was the father of psychodynamic theory (Schimmel, 2014). Best known for his development of psychoanalysis as a clinical treatment of mental health disorders, Freud's theory of the stages of psychosexual development resulted in increased interest in the early years of life, and the relationships formed then, as having a lasting impact over the adult years. With regard to early childhood special education, Freud's influence on the field has come through individuals he in fact influenced, such as Erikson (1950) and Bowlby (1958) and the attachment theorists (Grossmann & Waters, 2005). In turn, their emphasis on mother-infant interaction and attachment leads investigators to examine the different forms of attachment that may exist for children with developmental delays (Emde & Brown, 1978) and visual impairment (Fraiberg, 1975). Researchers have developed intervention approaches to promote positive, reciprocal interactions between parents and children who are "at risk for development delay" with the intent of building strong and positive attachment (Berlin, 2012). Much of this intervention work can be traced to the interest in the early years that gained momentum with Freud's work. However, it is also important to point out at least one application of psychodynamic theory that was iatrogenic for mothers who had children with autism. In the 1950s, Bettelheim (1967) theorized from a psychodynamic perspec-

tive that autism was caused by cold, non-nurturing relationships between mothers (i.e., he called them "refrigerator mothers") and their children, with the treatment being to remove the child from the home and into a residential setting.

Biological and Neuroscience Theory

Some theories of child development are seated within the biology of the child. That is, there is a belief that the child's development will follow a specific course, determined by his/her genetic and physical makeup as long as he/she is healthy. On the preverbal "nature vs. nurture" continuum of perspectives on child development, behaviorism, constructivism, and psychodynamic theories lie close to the nurture end of the continuum. Biological and neuroscience theory (at least up to this point) lie more closely to the "nature" end of the continuum.

Maturationist Theory

Arnold Gesell and colleagues (Gesell & Ilg, 1949) proposed one of the earliest and most influential theories of child development and it is the classic representation of a maturationist perspective. They propose that children's development follows a very predictable pattern and that given adequate health and presumably social experiences, children will acquire skills through maturation. Such maturation is genetically determined, with the influence of the environment playing a smaller role. Gesell's work was critically important in focusing attention on early development, "mapping" of the normative developmental sequence, and providing a standard for determining, especially during the early years, when children's development was off course (Gesell & Amatruda, 1941).

Several applications of Gesell's work in early childhood special education are apparent. In specifying expectations for normative behavior and skills at specific ages, Gesell and colleagues were able to set "readiness standards" for school (i.e., the skills children need to have when they begin public education), and quite a number of school readiness assessments have followed in that tradition (e.g., Bracken, 2007). One educational practice following from this work was to advise parents to delay children's school entrance if they did not have the skills identified as preparing them for the school curriculum, or assigning the children to a transitional kindergarten or qualification for special education services. Alternatively, the precise mapping of young children's development allowed for the creation of early screening tests and diagnostic instruments that are now used for identifying infants and young children with developmental delays. Another practical influence of Gesell's work has been the development of a variety of criterion-referenced assessments [e.g., the LAP-3 (Chapel Hill Training and Outreach Project, 2008), the Hawaii Early Learning Profile (Warshall, 1995)] that practitioners frequently use to determine the learning needs of young children with and without disabilities and their goals.

Critical Periods

Emerging primarily from the field of ethology and animal behavior as well as neuroscience, there has been a common belief that children may be particularly susceptible to learning or in need of sensory or social experiences during certain times in their lives in order to fully develop. The theory is that for the brain to develop normally, such sensory experiences must be present—these are called *experience-expectant* forms of development (Bruer & Greenough, 2001), and it occurs in basically the same way for all infants and young children. For example, if an infant is deprived of visual stimuli during the first year of life, he/she will lose visual perception even if visual stimuli are restored later (Horton, 2001). Also, during the second year of life, children begin to acquire vocabulary and use words to communicate. Researchers believe that language deprivation (e.g., through a hearing impairment, otitis media, or other forms of deprivation) during that period of life may lead to ongoing language problem.

However, Bruer and Greenough (2001) propose that much of children's learning and development is *experience-dependent,* meaning that individual experiences affect children. For example, early animal research demonstrated the effect of complex and isolated environments on brain development (Green, Greenough, & Schlumpf, 1983). Although researchers do not agree entirely on the specific applicability of the critical period theory to human children (Bailey, Bruer, & Symons, 2001), the conclusion that much of human development is experience-dependent is widely accepted and has implications for early childhood special education.

The belief in critical/sensitive periods underlies practice in early childhood special education. At the most basic level, a major rationale for early intervention is that it will have a lasting and important effect on children's development, and the belief in the importance of such early experiences is prevalent across cultures (Odom, Hanson, Blackman, & Kaul, 2003). For very young children with hearing impairments or deafness, there are great efforts to screen and identify the disability early so that it can either be corrected before the formative period for language acquisition during the second year of life or there can be a different language system provided (American Academy of Audiology Clinical Practice Guidelines, 2012). The assertive "child-find" provision of Part C of IDEA and the massive efforts by the Centers on Disease Control and Prevention to identify infants and toddlers with autism spectrum disorder are also based on the general belief that intervention at an early age will produce greater effects than will occur later.

Neuroscience and Brain Development

One could call the twenty-first century the Era of Neuroscience. Although researchers have long acknowledged the malleability of children's neurology and recovery from early insult or deprivation (Gallagher & Ramey, 1987), the publication of the National Academy of Sciences report *From Neurons to Neighborhoods* (Shonkoff & Phillips, 2000) elevated interest in early brain development. A major recommendation from that report was that there be a stronger integration of the basic science of human development and early childhood intervention (p. 405). The very precise delineation of brain development during the early years (Kagan & Herschkowitz, 2005) is an interesting parallel to Gesell's mapping of children's behavioral development in the twentieth century and provides promise that principles of brain development might guide intervention or educational practice. Major initiatives have built their argument for early intervention impact on experiential factors, such as "toxic levels of stress," that may negatively affect brain development and factors that may buffer such effects (Shonkoff et al., 2012). The arguments are persuasive and with advancing neuroimaging technology, the promise is real. At this point, however, little information generated by neuroscience has been translated into intervention programs or procedures that have then been validated through efficacy trials. There are examples where developmental-behavioral interventions have produced changes in brain activity, with one of the best examples being Dawson's and Rogers' detection of EEG changes resulting for young children with ASD and their families participating in the Early Start Denver Model (Dawson et al., 2012). The more frequent occurrence has been program developers making unsubstantiated claims that their intervention program is effective or evidence based because it follows principles of neuroscience [e.g., Brain Gym® (http://www.braingym.org/index)]. The Doman and Delacato program prominent in the 1960s and 1970s is a classic example of a program based on neurological development that has been discounted (American Academy of Pediatrics, 1982).

Sociology and Anthropology

A variety of theories and/or conceptual frameworks fall loosely under the topic of sociology and anthropology. Theory within sociology has also influenced the concepts of social integration and inclusion, which are major factors in early

childhood special education. The impact of the child on the family, effects of having a child with disability and stress, and theory of loss and grief all focus on family issues and have had implications for practices. As noted previously, there is an increasing recognition of the sociocultural perspective on child development, which spans the disciplines of anthropology and psychology.

Social Integration and Inclusion

The concept of social integration, a cornerstone of successful inclusion, flows directly from the work of Emile Durkheim, the father of modern sociology (Berkman, Glass, Brissette, & Seeman, 2000). He conceptualized social integration as interaction among members of groups in society that leads to mutual understanding. Although his early work addressed social integration of socially isolated individuals in society and associations with health, the theme of integration was present in Nirje's (1969) classic paper on normalization, which had such a great influence on the normalization and inclusion movement in the USA (Wolfensberger, 1972). The Least Restrictive Environment provision of IDEA could also be seen as a reflection of the effort to promote social integration and inclusion in educational settings and has led to major inclusion efforts in the USA (Odom, Buysse, & Soukakou, 2011). For young children with disabilities, the Joint Statement on Inclusion developed by DEC and NAEYC (DEC & NAEYC, 2009) reflects these very themes in that one of the desired results from inclusion for children with disabilities is the development of friendships and social relationships with typically developing children.

Family Sociology and Family-Centered Programming

Sociology of the family examines the family as a unit of socialization and an institution within American society (Cohen, 2014). Sociological research and theory have influenced current early childhood special education practice. These include transition to parenthood (Odom & Chandler, 1989), the integration of a child with severe disabilities into the family (Farber, 1959), and the ABCX (Hill, 1949) and double ABCX (McCubbin & Patterson, 1982) models of families' reactions to crisis and coping strategies that buffers stress (Adams, 1988), particularly when there is a child with disabilities (Bristol, 1987). The awareness of family functioning, the disequilibrium that sometimes occurs when there are young children with disabilities enter the family, and the family needs that underlie the nurturing environment that families provide for children are some of the bases for establishing a family-centered approach to early intervention and early childhood special education (Dunst & Espe-Sherwindt, this volume). It should be noted that many of these issues overlap with systems theory conceptualization of families and influence, but the sociological perspective on family integration generally preceded systems theory applications.

Systems Theory

General systems theory is a conceptualization of principles that potentially run across disciplines (e.g., biology, engineering, psychology, education) and explain the interacting influences of features of different environments or elements of their environments (von Bertalanffy, 1968). Although an oversimplification, the adage that "a system is more than the sum of its parts" conveys the general systems theory idea that the interrelationship of active elements within, and even across, systems may have a stronger influence on outcomes that the individual variables within systems. A number of theories or conceptual frameworks that affect early childhood special education are based on general systems theory. These include the ecological theory of child development, family systems theory, and some models of implementation science.

Ecological Systems Theory

Bronfenbrenner's (1979) ecological systems theory has been one of the most important theoretical influences on early childhood special education. Bronfenbrenner proposed that a child exists within *microsystems* like the home or a classroom that directly affect her/his development. Individuals within this system (e.g., mother, teacher, siblings, peers) directly affect the child (e.g., through talking, teaching), and the child also exerts a reciprocal influence on the other members of the system. A child participates in multiple microsystems. Those microsystems and individuals within them have influences on other microsystems. This cross-system influence is called a *mesosystem*. For example, the communications that teachers have with parents about a child's performance when they are in a classroom is a mesosystem influence. The micro- and mesosystems exist within a large system of influences that exist outside of the environments in which the child participates but has influences on those environments. Bronfenbrenner called this the *exosystem.* With regard to early childhood special education, this could be seen as school district policies that affect teachers' practices with the child, with the policies sometime being affected in a reciprocal way by teacher influences (e.g., communications with supervisors, teacher unions). In turn, the exosystems are themselves seated within a larger societal and cultural context, which is the *macrosystem*. An example of a macrosystem influence is the change in demographic trends in the USA that leads to modifications in school practices to be responsive to children and families who do not have English as a first language. In his later writings, Bronfenbrenner and Morris (2006) extended the ecological systems model to include the *biosystem* (e.g., genetic, health, and other biological influences on the child, with Down syndrome being one example) at the center of the ecological systems model and the *chronosystem*, which acknowledges that ecological systems and their interrelated influences change across time (e.g., changes that occur when a child moves from preschool to elementary school).

As noted, the ecological systems model is frequently employed to understand and plan services and programs in early childhood special education. For example, in a program of research spanning 5 years, Odom and colleagues conducted an ecological systems study of preschool inclusion to determine facilitating factors and barriers that affected the provision of inclusive services (Odom, 2002), the stability of those services across time (Odom, Wolery, Leiber, & Hanson, 2002), and the transitions of children receiving those services into elementary school (Hanson et al., 2001). An ecological systems conceptualization of factors influencing implementation of preschool inclusion appears in Fig. 2.1 (Odom et al., 1996). Outside of early childhood special education, researchers have applied ecological systems

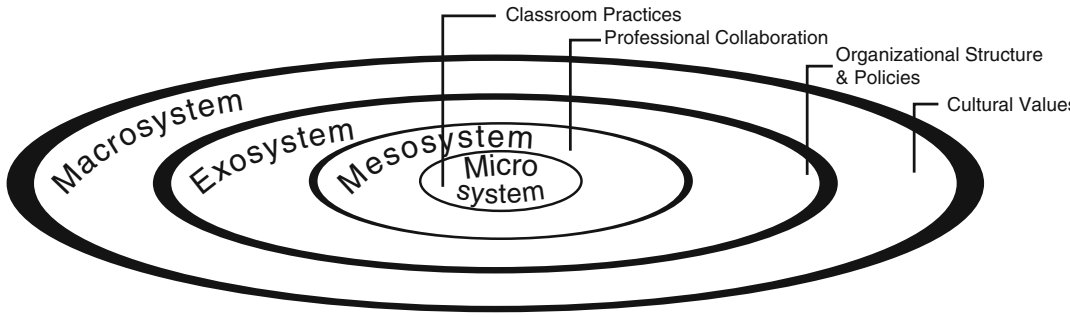

Fig. 2.1 Bronfenbrenner's ecological system framework and factors affecting the implementation of inclusion

theory to such diverse issues as understanding childhood obesity (Boonpleng et al., 2013), working with migrant families (Paat, 2013), and transitions of children from child welfare to the criminal justice system (Marshall & Haight, 2014).

Family Systems Theory

Similar to the previous discussion on family sociology, family systems theory is the application of the general systems theory model to understanding the inner workings of families (Broderick, 1993). It focuses on the interactions within families, the mutual influences exerted by family members, and the inclusion of a new family member (i.e., such as a child with disability) on family members interactions and functioning. In early childhood special education, viewing the family as a system has been instrumental in informing intervention work in the home with primary caregivers and bringing other family members into the intervention process (Seligman & Darling, 2007). For example, being sensitive to the fact that when a practitioner works with the mother to support the communication skills of a child with disabilities in the home, it may affect the mother's relationship and interactions with the father and the child's siblings (e.g., the mother could gain expertise that leads to the father's resentment, the siblings may experience less attention from the mother). In addition, family systems theory should raise the sensitivity of the practitioner to cultural variations among families. For example, although the mother may be the primary caregiver, from some cultural backgrounds the father may want to be the spokesperson for the family in the individual education plan (IEP) meeting.

Implementation Science

Researchers in implementation science study features of organizations, such as schools, that affect the adoption and use of innovative and effective practices (Aarons, Hurlburt, & Horowitz, 2011; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). It has emerged as a primary influence in early childhood special education and the larger field of special education in the last decade (Boyd, Kucharczyk, & Wong, this volume; Cook & Odom, 2013). Scholars have proposed different models of implementation science, but a characteristic of the primary models is their use of a systems approach to identifying variables that support or interfere with implementation (Odom et al., 2010). Fixsen and colleagues (Fixsen, Blase, Metz, & Van Dyke, 2013) proposed a model of implementation for special education in which the active variables are the organizational leadership (e.g., district or state level special education personnel), external training and coaching support, coaching support within the system, and the implementers themselves. Features of this model that exemplify a systems approach are the importance of "buy-in" from members of all levels of the system (not just the supervisor, principal, or teachers), the "stage-like" process of implementation that goes from exploration to full implementation, the recognition that implementation requires time and ongoing support (i.e., it takes more than just a single workshop), and a feedback loop of information that is shared among the higher levels of the system, middle managers, and the practitioners implementing the program. A primary example of the application of implementation science to early childhood special education is the work by Dunst, Trivette, and Raab (2013) to differentiate implementation and intervention practices and highlight the features of adult learning that may contribute to implementation of important intervention practices with a high level of fidelity.

Practices and Theoretical Foundations

At the outset of the chapter, it was proposed that similar practices may emerge from different theoretical foundations; that in building an intervention approach, developers sometimes draw from different theoretical orientations; and that indi-

vidual practitioners may choose to take a technical eclectic approach that incorporates practices from different theoretical frameworks. Each of these points will be discussed in this section.

Similar Practices from Different Theoretical Perspectives

The "topography" of a teaching practice is the physical and social actions that occur when a teacher, other practitioners, or perhaps the primary caregiver at home arranges the learning experience and interacts with the student to promote the child's learning and development. Teachers following different theoretical or conceptual approaches may, at times, follow very similar topographies. One prime example is the use of prompting from the behaviorist tradition and scaffolding from the constructivist tradition. Both involve the adult (usually) interacting in a way that leads the child to engage in a more advanced (than their current performance) behavior, skill, or understanding. For example, constructivist- and behaviorist-oriented teachers interested in promoting children's communication may both set up the learning activity to create opportunities for using a specific form of communication such as requesting a material using words. If the child requests an object, the teacher may restate (i.e., elaborate) the child's verbalization at a slightly more advanced level and give him or her the object requested. If the child only points to the materials she or he needs, the teacher might wait with an expectant look on her face for the child to use words. If he or she does not respond, the teacher may provide a prompt or scaffold for using a two-word request (e.g., want paste, paste please), which is slightly more advanced than their current level of communication (i.e., in their zone of proximal development).

Other examples for children with ASD, a floortime play activity (Greenspan & Wieder, 2006; Solomon, Van Egeren, Mahoney, Quon-Huber, & Zimmerman, 2014) that comes from a psychodynamic tradition and a developmental-behavioral play activity promoting interaction between adults and child (Dykstra, Boyd, Watson, Crais, & Baranek, 2012), could well have nearly identical topographies. The important point in using these interventions with similar topographies is for practitioners to understand the conceptual framework they are following and the eventual goals toward which they are directing their efforts. This understanding will lead to perhaps slight but important differences in the topographies as the interventions extend across time and may lead to the child accomplishing different goals at the end of the intervention program.

A primary example of this blending of topographies is the development of naturalistic interventions for toddlers with ASD and their families. A variety of intervention approaches have been created based on a naturalistic behavioral approach (e.g., pivotal response training, enhanced milieu language interventions) (Pierce & Schreibman, 1997), a developmental approach (e.g., Wetherby & Woods, 2006), or an approach that employs both behavioral and developmental techniques (e.g., Early Start Denver Model). These models or techniques have some procedural difference but are defined more by the significant overlap in intervention topography. In recognition of the similarities of these approaches and the common goals they have for children and families, investigators representing the different theoretical perspectives proposed creating a blended classification for these approaches as naturalistic developmental behavioral *interventions* (Schreibman et al., 2015).

The recommended practice movement represents another set of examples in which practitioners may select practices that follow different theoretical/conceptual frameworks. For what is now a nearly 25-year tradition, the Division for Early Childhood of the Council for Exceptional Children (DEC) has identified recommended practices in early intervention and early childhood special education (Division for Early Childhood, 2014). The identification of the original practices was through professional and family judgment (Odom & McLean, 1996), and subsequent revisions did build on a thorough review of the empirical literature from the 1990s (Smith et al., 2002). The current edition of the

practices is based on constituent knowledge and values as well as research (DEC, 2014), although the linkage to research is not clearly described in RP materials. The recommended practices are not tied closely or explicitly to theory, and so might be consider eclectic in nature.

In their identification of evidence-based, focused intervention practices for children with ASD, Wong et al. (2015) conducted a thorough review of the empirical literature from 1990 to 2011 using a systematic process and stated criteria to identify 27 evidence-based practices. Although most of the practices were based on ABA techniques, a number of practices had other theoretical or conceptual foundations. Using evidence-based practices as an anchoring feature of their model, Odom, Hume, Boyd, and Stabel (2012) proposed the possibility of following a *technical eclectic* approach in which teachers establish measurable and observable goals for children and used the goals to select individual-focused intervention practices, which could potentially have different theoretical foundations.

Individual Professional Theory of Practice

Early childhood special education is a teaching profession, and teaching practice is based on professionals' beliefs and philosophies of how children develop and learn and how to best promote that development and learning for children with disabilities (Odom, 1987). These theories have been called theories of practice (Argyris, Putnam, & Smith, 1985), practice theories (Zeichner & Liston, 1996), and theories of change (Weiss, 1995). Teachers' individual theories of practices are informed by several sources. Academic or theoretical knowledge is one source, and Zahoric (1986) proposed that this knowledge is most influential for teachers early in their career. As teachers gain more experience in teaching and with different children, they may draw more directly on their own experience, that is, their personal successes and failures.

An exception to this formation of a personalized theory of practice is when teachers adopt a specific comprehensive curriculum model or theoretical approach that has a clearly articulated fidelity measurement. For example, a teacher may choose to use the Incredible Years program for promoting children's social competence (Reinke, Stormont, Webster-Stratton, Newcomer, & Herman, 2012). It has a conceptual framework and an embedded theory of practice that the teacher would adopt also in order to implement the program with fidelity. Similarly, a practitioner may decide to get board certified as a behavior analyst (i.e., a BCBA credential), which would clearly specify a theory of practice (i.e., behaviorism) that the teacher or service provider would follow.

Conclusion

A variety of formal theoretical and conceptual frameworks underlie the practice of early intervention and early childhood special education. Practitioners may adopt a single formal theory to guide their work (e.g., a Vygotskian form of sociocultural theory), or they may draw from multiple theories to form their own theory of practice (Odom & Wolery, 2003). It is important to return to a statement made at the outset—theories are designed to explain, not to change things. In early childhood special education, the application of theory to practice comes through applied educational science in which researchers empirically document the efficacy of practices (based on explicit or implicit theory). Identification, delineation, selection, and implementation of those evidence-based practices, then, are the routes through which teachers and other practitioners base their teaching if they are going to follow a model of instruction based on intervention science. Even when following such a model, practitioners must be vigilant about assessing children's progress toward their goals and using the information to judge utility of their theory of practice.

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Family-Centered Practices in Early Childhood Intervention

3

Carl J. Dunst and Marilyn Espe-Sherwindt

Introduction

The purposes of this chapter are to describe the key characteristics of family-centered practices, review the research foundations for this approach to working with families, and provide illustrative examples of how these types of practices are used as part of early childhood intervention. The term *family-centered* is defined as a particular type of help-giving practice that involves adherence to principles and values that include treating families and family members with dignity and respect, information sharing so that families can make informed decisions, acknowledging and building on family member strengths, active family member participation in early childhood intervention, and the provision or mobilization of supports and resources in response to family concerns and priorities (Dunst, 2002; Espe-Sherwindt, 2008). Family-centered practices are conceptualized as a particular approach to how other child, parent-child, parent, and family interventions are implemented (Coogle, 2012).

The term early childhood intervention (ECI) encompasses both early intervention and preschool special education (Odom & Wolery, 2003). The division of ECI into early intervention (birth to age 3) and preschool special education (ages 3–5) is unique to the United States, whereas ECI in most other countries covers intervention birth to age 6 and in some cases birth to age 8 (e.g., Odom, Hanson, Blackman, & Kaul, 2003; Soriano, 2005).

ECI as used in this chapter includes, but is not limited to, family-centered practices used in home, community, preschool, and childcare settings that promote family member engagement in ECI and practitioners' responsiveness to family-identified priorities (Stepanek, Newcomb, & Kettler, 1996; Warner, 2006). ECI also includes family- and systems-level intervention practices where the family is viewed as a primary source of influence on child behavior, learning, and development, and family-centered practices are considered one of a number of extrafamily factors that can contribute to positive family, parent, and child outcomes (Dunst & Trivette, 2009a; Guralnick, 2011).

Figure 3.1 shows the manner in which family-centered practices are conceptualized as a particular and distinctive way in which other ECI practices are implemented and in turn have hypothesized or expected child, parent, and

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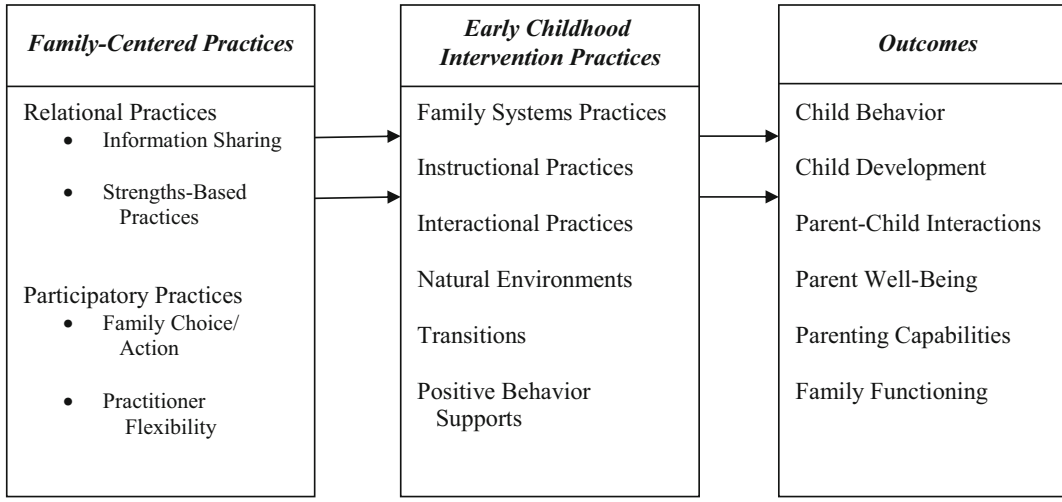

Fig. 3.1 Proposed relationships between family-centered practices, early childhood intervention practices, and child, parent, and family outcomes (*Note*: The practices and outcomes in the figure are illustrative and not exhaustive)

family outcomes. As described in this chapter, family-centered practices include (a) relationship-building practices and (b) practices that actively engage parents and other family members in child, parent-child, parent, and family interventions (Dunst & Trivette, 2009a). These two types of family-centered practices are described, respectively, as relational help-giving practices and participatory help-giving practices (Dunst, Trivette, & Hamby, 1996).

As shown in Fig. 3.1, family-centered practices are viewed as one way in which any or all other kinds of (ECI) practices are used to affect child, parent, and family functioning. Family-centered practices are how ECI practitioners interact with and actively involve family members in different types of interventions in order to affect child, parent, and family outcomes. These outcomes include, but are not limited to, knowledge and skill acquisition, a sense of competence and confidence, and other capacity-building consequences (e.g., Levine, 2013).

At the outset, we note that family-centered practices are often misunderstood as simply "being nice to families" or "giving or doing whatever a family wants." This misunderstanding is unfortunate because such a euphemism overshadows the complexities of family life and the role family-centered practices play in supporting and strengthening meaningful changes in child, parent, and family functioning. Too often, ECI practitioners claim that they use family-centered practices but without a complete understanding of what it means to be a family-centered practitioner.

The chapter is divided into five sections. The first section includes a brief history of family-centered practices to provide a foundation for understanding the origins and evolution of this approach to working with families. The second section includes an overview of the principles, values, and beliefs that are the foundations for family-centered practices. The third section includes a description of the different ways in which family-centered practices have been measured with a focus on the commonalities found by different investigators. The fourth section includes a description of findings from research syntheses that show the manner in which family-centered practices are related to child, parent, and family outcomes. The fifth section includes examples of how family-centered practices have been used to engage parents, children, and families in different types of early childhood and family intervention practices. The chapter concludes with a description of three areas of research and practice that would contribute to advances in understanding and implementing family-centered practices.

Origins and Evolution of Family-Centered Practices

The term family centered first appeared in the published literature in the late 1940s and early 1950s, where the term was used to describe a type of family lifestyle (e.g., Remsberg, 1948) or a type of community outreach by clergy (e.g., Warmer, 1947). One of the first references to family-centered practices in the helping professions was Hamilton's (1947) use of the term to refer to nursing practices that were family rather than nurse centered as a way of improving the outcomes of nursing care. Birt (1956) and Scherz (1953) first used the term family centered to describe different approaches to social work practice.

The terms family-centered practices (Hartman & Laird, 1983), family-centered care (Warrick, 1971), family-centered parent training (Christophersen, 1979), and their variants (Wilson & Dunst, 2004) began to appear in the published literature in the 1970s and the early 1980s. Schaefer (1969) used the term family-centered in a conference presentation to describe an approach to ECI that emphasized both parent involvement and parent-child interactions as a focus of ECI practices. The term family-centered early intervention was first used by Bronfenbrenner (1974) in the published literature to describe the need for a shift in focus from a child-centered to family systems approach to working with parents, their children, and other family members in order to optimize the benefits from ECI.

Different proponents trace the origins of family-centered practices to different sources (e.g., Allen & Petr, 1998; Bamm & Rosenbaum, 2008; Johnson, 2000; Jolley & Shields, 2009). Bamm and Rosenbaum (2008) attributed the origins of family-centered practices to Carl Rogers' client-centered therapy, whereas Allen and Petr (1998) traced the beginnings of family-centered practices to shift toward strength-based approaches in social work, mental health, health care, and education practices. In contrast, Johnson (2000) stated that "the development of family-centered care … is rooted in the consumer and family support movements in the 1960s" (p. 138). Although the origins of family-centered practices have been traced to multiple sources, it was the development of family-centered value statements (Dokecki, 1983), family support principles (Family Resource Coalition, 1981), and guiding belief statements (Center on Human Policy, 1986) about working with families that laid the foundation for a shift in the ways in which different types of intervention practices were conceptualized and implemented.

Contributions of Family Support Principles

The foundations of family-centered practices were first articulated in the mid- and late 1980s as sets of principles, elements, beliefs, and value statements that described the scope of this approach to working with families. Family-centered principles are belief and value statements about how professionals ought to treat and interact with parents, their children, and other family members and how different interventions should be implemented with children and their families in order to have optimal positive benefits and outcomes.

More than a dozen sets of principles were proposed during the mid- and late 1980s (see Dunst & Trivette, 2005, for a list of these principles). The *Elements of Family-Centered Care* articulated by Shelton, Jeppson, and Johnson (1987) by far have had the most influence on understanding the potential value of family-centered practices. The core elements include, but are not limited to, recognizing the family as a constant in a child's life, sharing complete and unbiased information in order for families to make informed decisions, and recognizing and building on family strengths, parent-professional collaboration, parent-to-parent support, and flexible, accessible, and responsive intervention practices. Shelton et al.'s (1987) book and its subsequent revisions (e.g., Shelton, Jeppson, & Johnson, 1989; Shelton & Stepanek, 1994) have been used to describe the core features of family-centered practices in

health care (e.g., American Academy of Pediatrics Committee on Hospital Care, 2003), ECI (e.g., Dunst, 2000), mental health (Friesen & Koroloff, 1990), rehabilitation therapy (e.g., Grady, 1995), social work (e.g., Lotze, Bellin, & Oswald, 2010), and other fields and professions (see, e.g., Dunst, 1995).

Allen and Petr (1996), as part of a content analysis of 28 definitions of family-centered practices, identified a number of key concepts (elements) that proponents of this approach to working with families consider core beliefs and value statements. The elements most often found in the definitions were the family as the unit of intervention, family-professional collaboration, practitioner responsiveness to family-identified needs, family choice and decision-making, and recognizing and building on family member strengths and capabilities. Dunst, Trivette, and Thompson (1990) conducted a content analysis of more than ten sets of family support principles and found that treating families with dignity and respect; valuing family beliefs and diversity; acknowledging and building on family member strengths, family choice, and decision making; responding to family concerns and priorities; and actively involving family members in intervention practices were some of the common elements in most sets of principles. The Allen and Petr (1996) and Dunst et al. (1990) elements are very similar to those articulated by Shelton and Stepanek (1994).

Measuring Family-Centered Practices

The development of a number of different family-centered practice scales in the 1990s led to advances in an understanding of the key characteristics of this approach to help giving (e.g., Dempsey, 1995; Dunst et al., 1996; King, Rosenbaum, & King, 1996; Petr & Allen, 1995). The use of the scales in research and practice permitted analyses and evaluations of a family-centered approach to working with parents and their children. First, the investigators attempted to develop operationalized indicators for different family-centered principles and value statements. Second, the psychometric analysis of the scale items permitted identification of the factor structure of family-centered help-giving. Third, the use of the scales allowed evaluation of practitioner adherence to the use of family-centered practices. Fourth, the use of the scales as part of research permitted investigation of the relationships between family-centered practices and child, parent, and family outcomes. Placed in the context of measurement theory (Babbie, 2009), family-centered practice scale developers were able to take family-centered principles and values (constructs), develop family-centered practices indicators for the principles and values (operationalization), and have parents or other family members evaluate practitioners' use of the practices (measurement).

Family-Centered Practice Scale Items

Table 3.1 shows examples of items on five different family-centered practice scales. The different versions of the *Help-giving practices scale* (Dunst, Trivette, & Hamby, 2006) include between 12 and 26 items. The *Enabling practices scale* includes 24 items (Dempsey, 1995). The two versions of the *Measure of processes of care* (King et al., 1996; King, King, & Rosenbaum, 2004) contain 20 and 56 items, respectively. The *Family-centered behavior scale* includes 26 items (Allen, Petr, & Brown, 1995). The different versions of the *Family-centered practices scale* (Dunst et al., 2006) contain between 8 and 17 items. Each indicator on each scale is rated on a Likert scale by a parent or other family member who judges the extent to which a professional working with a family uses or performs each of the behavior indicators.

The scale developers used different sources of information for constructing their measures, but each set of scale items overlaps considerably and in many cases is identical or very similar. Trivette and Dunst (1994) used results from studies of professional help-giving practices (Dunst & Trivette, 1988) and conceptualizations of empowering processes (Rappaport, 1981,

Table 3.1 Examples of items on family-centered practice scales

Family-centered scales/items
Help-giving practices scale (Trivette & Dunst, 1994)
Staff are honest and sincere with me
Staff listen to what I have to say about my child and family
Staff provide me information about resources and options
Staff are warm and caring toward me and my family
Enabling practices scale (Dempsey, 1995)
Staff accept my family beliefs and values
Staff offer help in response to my family's needs
I am an equal partner in the relationship I have with staff
Staff care about my son/daughter and family
Measure of processes of care (King et al., 1997)
Staff provide opportunities for me to make decisions about [my child's] treatment
Staff give me information about the types of services offered in my community
Staff plan together so they are all working in the same direction
Staff treat me as an individual rather than as a "typical" parent of a child with a disability
Family-centered behavior scale (Petr & Allen, 1995)
Staff help us get all the information we want and/or need
Staff respect our family's beliefs, customs, and ways that we do things
Staff talk in everyday language that we understand
Staff support me making as many decisions as I choose about my child and family
Family-centered practices scale (Dunst & Trivette, 2002)
Staff listen to my concerns and requests
Staff recognize my child(ren)'s and family's strengths
Staff provide me information I need to make good choices
Staff are flexible when my family's situation changes

1987) to develop their scale. Dempsey (1995) developed his scale using 12 different types of enabling and empowering practices (Dunst, Trivette, & Deal, 1988). King et al. (1996) used research on processes of caregiving (e.g., Tugwell, 1979) and parent-"identified behaviors of health-care professionals that were important to them" (p. 759) to generate the items on their scale. Dunst and Trivette (2002) used family support principles to develop their scale items (Dunst et al., 1990).

Inspection of the items shown in Table 3.1 as well as the complete item pools on the scales finds more similarities than differences. The similarities include information sharing so that parents can make informed decisions; respect for family beliefs, values, and preferences; provision of information about supports, resources, and services; responsiveness to family concerns and priorities; and family and professional partnerships and collaboration. A comparison of the scale items with family support principles (Dunst et al., 1990) finds that they may be considered operationalized behavioral indicators of the principles (Dunst, 2005).

Factor Structure of Family-Centered Practices Scale Items

The item pools on three of the five scales listed in Table 3.1 have been subjected to psychometric analyses that included factor analysis to identify scale structure (Dempsey, 1995; King, King & Rosenbaum, 2004; King, Rosenbaum, & King, 1997; Trivette & Dunst, 2007). Three, four, or five subscales were identified on the different scales. Table 3.2 shows the subscales with similar item content aligned in the table to show how they overlap. Despite the fact that different subscale names were used by the different scale developers, the factor analysis results were all very much alike.

Content analyses of the items on the different subscales indicate that there are two discernible categories of family-centered practices: relational help-giving practice indicators and participatory help-giving practice indicators. Relational practices include (a) practitioner behavior typically associated with effective clinical practice including, but not limited to, compassion, active and reflective listening, empathy, and effective communication, (b) practitioner beliefs and attitudes about family and cultural strengths and values, and (c) practitioner sensitivity to these beliefs and values as part of intervention practices. Participatory practices include (a) practitioner behavior that engages family members in informed choice and decision making, (b) practitioner capacity-building practices to promote family members' use of existing strengths and abilities as well as the acquisition of new

Table 3.2 Factor structure and subscales for three family-centered practice scales

Family-centered scales	Relational practices		Participatory practices	
Help-giving practices scale	HG interpersonal skills	HG beliefs and attitudes	Family choice/ action	HG responsiveness
Enabling practices scale	Comfort with relationship		Parent autonomy	Collaboration
Measure of processes of care	General information	Respectful/supportive care	Coordinated care	Enabling/partnership
	Specific information			

HG help giver

capabilities needed to be actively involved in different types of child and family interventions, and (c) practitioner responsiveness to and flexibility in how help is provided to children and their families. The factor analysis results show that family-centered practices include different kinds of practitioner and family-practitioner practices that are intended to have capacity-building (Dunst & Trivette, 2009a), empowering (Dempsey & Foreman, 1997), competency and development enhancing (McIntyre, 2000), and health promoting (Summers et al., 2007) characteristics and consequences.

Measuring Adherence to Family-Centered Practices

The extent to which practitioners interact with, treat, and involve families in interventions in ways consistent with the intent of family-centered practice scale indicators has been the focus of research by a number of investigators. These types of adherence studies allow a determination of how closely ECI professional practices are aligned with family-centered practice indicators. Practitioner adherence to the use of family-centered practices is a measure of fidelity of the use of the practices (Dunst, Trivette, & Raab, 2013a).

Adherence has been typically evaluated in one of two ways. One approach has compared parents' responses to questions asking "how important" is it for practitioners to behave in ways stated on scale items to parents' responses to questions asking "how much" do practitioners who work with a family do so in ways consistent with family-centered indicators (e.g., Applequist & Bailey, 2000). Another approach has been to determine how many family-centered practice indicators are rated as highly consistent with the intent of the indicators (e.g., Dunst, 2005).

Results from studies comparing importance and behavior adherence ratings show, with only a few exceptions, that parents' ratings of practitioner behavior are consistently lower than their importance ratings (see Dunst, 2002). Findings from these studies show, for example, that there are statistically significant differences between items rated as important or ideal compared to items rated as typical or actually used by practitioners (e.g., Dempsey & Carruthers, 1997).

Dunst and Trivette (2005) used a consumer sciences approach to measuring adherence to family-centered practice indicators in one ECI program over a 14-year period of time. Adherence was evaluated separately for relational and participatory family-centered practices and was defined as the percentage of behavior indicators that were rated a five on a 5-point scale which is the standard in consumer sciences research (Reichheld, 2003). The results are shown in Fig. 3.2. As can be seen, there was considerable variability in the levels of adherence across the 14 years, where the dips in adherence were used to implement programmatic changes to improve practitioners' use of both types of family-centered practices. Dunst and Trivette (2005) concluded that adherence is difficult to attain and even more difficult to maintain because of multiple systematic, programmatic, and practitioner factors that interfere with the consistent use of family-centered

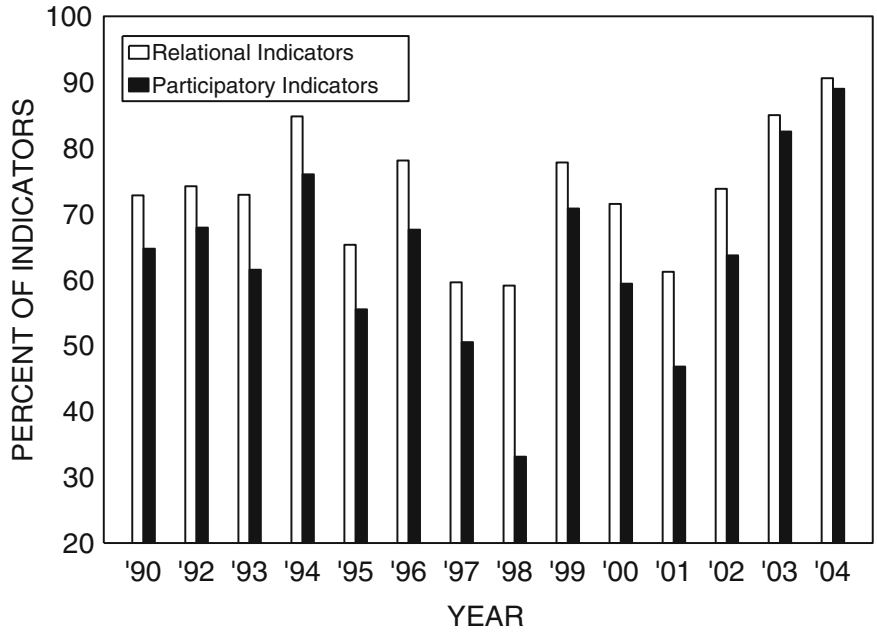

Fig. 3.2 Patterns of adherence to relational and participatory family-centered practices in one early childhood intervention program over a 14-year period of time

practices. The interested reader is referred to Dunst and Trivette (2005) for explanations for the low levels of adherence found across the 14 years of data collection.

Moderators of Adherence to Family-Centered Practices

A review of studies of family-centered practices (Dempsey & Keen, 2008) together with findings from more recent investigations (e.g., Dunst, Bruder, & Espe-Sherwindt, 2014) indicates that adherence varies as a function of a number of moderator variables. These factors include, but are not limited to, program type, program context, and program setting.

Research shows that parents' judgments of practitioner adherence to family-centered practices show a downward trend from early intervention to preschool and into the early elementary grades (Dunst, 2002; Dunst & Trivette, 2009b). This finding is the case, at least in part, because family-centered practices are viewed as less relevant in preschool education compared to early intervention (e.g., Burton, 1992) and less applicable in the early elementary grades compared to the preschool years (e.g., McWilliam, Maxwell, & Sloper, 1999).

The context in which practitioners work with parents also moderates adherence to family-centered practices. Parents rate ECI practitioners' behavior as being more family-centered when practiced on a one-to-one basis compared to working with parents in groups (Dunst & Trivette, 2005). This finding is not surprising since it is simply more difficult to engage and be responsive to families when working with multiple numbers of families at the same time compared to working with only one parent, for example, during home visits.

Another moderator of adherence is the setting in which ECI is implemented. For example, Dunst et al. (2014) found that ECI practitioners used capacity-building participatory practices to involve parents in their children's early intervention only 22 % of the time when interventions were implemented outside the families' home. In contrast, 53 % of parents were involved

in their children's ECI in a capacity-building manner when interventions were implemented in the families' homes. These differences were not unexpected inasmuch as the implementation of ECI on practitioners' "turf" is more likely to result in professionals taking the lead in terms of working with children rather than their parents.

Research on Family-Centered Practices

Advances in an understanding of family-centered practices occurred as a result of studies that examined the influences of this approach to help giving on a number of outcomes of interest. Findings from these studies provide a foundation for determining how and in what manner family-centered help-giving is related to child, parent, and family behavior and functioning.

Literature Reviews and Research Syntheses

The relationship between parents' judgments of practitioner use of family-centered practices and child, parent-child, parent, and family outcomes has been the focus of a number of literature reviews and research syntheses (Cunningham & Rosenbaum, 2014; Dempsey & Keen, 2008; Dunst, Trivette, & Hamby, 2007, 2008; King, Teplicky, King, & Rosenbaum, 2004; Kuhlthau et al., 2011; Shields, Pratt, & Hunter, 2006). The studies in these reviews and syntheses included families of children with different types of disabilities involved in different types of ECI, rehabilitation, and health-care programs in more than 15 different countries. The reviews and syntheses included either or both qualitative or quantitative analyses of family-centered practice studies where the results, taken together, provide evidence about the manner in which this type of help giving is related to a wide range of child, parent, and family outcomes.

Table 3.3 shows the findings reported by Dunst et al. (2007) in terms of the relationships between relational and participatory family-centered practices and parent, child, and family outcomes. The sizes of effect for all the outcomes except one were statistically significant, indicating that greater use of family-centered practices is related to better parent, child, and family functioning. The sizes of effects, however, differ as a function of the particular outcomes that were the focus of analysis. As can be seen in Table 3.3, outcomes directly associated with help giver-practitioner interactions (satisfaction and self-efficacy belief appraisals) are larger than those for outcomes that are the focus of other kinds of intervention practices (e.g., resources and support, well-being, parenting). These findings were not unexpected inasmuch as the conceptual framework guiding the conduct of the meta-analysis posited indirect effects of family-centered practices on more distal outcomes mediated by self-efficacy beliefs (Dunst et al., 2008).

The nature of these indirect effects was the focus of analyses by Dunst et al. (2008) where the relationships between family-centered practices and child behavior, parent and family well-being, and parenting competence and confidence were all found to be mediated by parent self-efficacy beliefs. For example, the average effect sizes for the direct effects of relational and participatory practices on parenting competence and confidence were $B = .04$, $p = .500$ and $B = .13$, $p = .050$, respectively. In contrast, the effect sizes for the indirect effects were $B = .47$, $p = .000$ and $B = .40$, $p = .000$, respectively, mediated by parents' belief appraisals in terms of control over practitioner responsiveness to obtaining program resources. Results from the mediated analyses show that the effects of family-centered practices on outcomes typically the focus of other types of ECI practices (e.g., parent-child interactions) are manifested through other variables and in particular different types of self-efficacy beliefs and personal control appraisals. Graves and Shelton (2007) found the same type of mediated relationship between family-centered practices and changes in children's behavior functioning.

Table 3.3 Effect sizes for the relationship among relational and participatory family-centered help-giving practices and study outcome measures

	Relational help-giving practices					Participatory help-giving practices				
	Number			Effect size[a]		Number			Effect size[a]	
Outcome measures	Studies	Sample size	Effect size	Mean	95 % CI	Studies	Sample size	Effect size	Mean	95 % CI
Participant satisfaction										
All measures combined	10	2128	24	0.64****	0.62–0.65	9	2053	13	0.59****	0.56–0.61
Satisfaction with staff	3	601	4	0.67****	0.63–0.72	2	526	5	0.38****	0.34–0.42
Satisfaction with program	8	1598	20	0.63****	0.62–0.65	8	1598	8	0.67****	0.65–0.70
Self-efficacy beliefs										
All measures combined	16	1765	32	0.61****	0.59–0.63	17	2015	43	0.59****	0.57–0.61
Practitioner control	10	1368	10	0.62****	0.59–0.65	10	1368	11	0.62****	0.59–0.66
Program control	8	754	10	0.70****	0.66–0.73	8	754	13	0.67****	0.64–0.70
Life event control	8	675	12	0.32****	0.26–0.38	9	913	19	0.39****	0.35–0.43
Program resources										
All measures combined	3	347	6	0.36****	0.30–0.43	3	347	6	0.44****	0.38–0.51
Parent/child supports	2	181	4	0.26****	0.17–0.36	2	181	4	0.37****	0.28–0.46
Program helpfulness	2	252	2	0.47****	0.37–0.56	2	252	2	0.52****	0.43–0.61
Child behavior										
All measures combined	3	345	19	0.24****	0.20–0.29	3	345	12	0.27****	0.22–0.32
Positive child behavior	3	345	8	0.25****	0.19–0.31	3	345	5	0.34****	0.27–0.41
Negative child behavior	1	93	8	0.25****	0.18–0.31	1	93	4	0.20****	0.11–0.30
Behavioral competence	2	252	3	0.24****	0.14–0.34	2	252	3	0.18***	0.08–0.28
Well-being										
All measures combined	10	1543	30	0.26****	0.24–0.29	10	1543	20	0.27****	0.23–0.30
Personal well-being	10	1543	26	0.27****	0.25–0.30	10	1543	16	0.26****	0.22–0.30
Family well-being	2	245	4	0.18****	0.11–0.27	2	245	4	0.29****	0.23–0.37
Parenting behavior										
All measures combined	3	331	8	0.13****	0.07–0.19	3	331	11	0.21****	0.16–0.27
Confidence	3	331	3	0.16**	0.06–0.27	3	331	4	0.26****	0.18–0.35
Competence	2	236	2	0.05	–0.07–0.18	2	236	3	0.11*	0.01–0.21
Enjoyment	3	331	3	0.15**	0.05–0.26	3	331	4	0.24****	0.16–0.32

*$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$

[a]Significance Z test for covariation between help-giving practices and the outcome measures

Meta-Analytic Structural Equation Modeling Syntheses

The manner in which the relationship between family-centered practices and parent, parent-child, and child outcomes is mediated by variables in addition to self-efficacy beliefs has been the focus of three meta-analyses (Dunst & Trivette, 2009c; Dunst, Trivette, & Raab, 2013b; Trivette, Dunst, & Hamby, 2010). These research syntheses employed a methodology called meta-analytic structural equation modeling (Cheung & Chan, 2009) to trace the influence of family-centered practices on different types of parent self-efficacy beliefs, parent well-being, parent-child interactions, and child behavior and development. Meta-analytic structural equation modeling is a procedure for combining data (e.g., correlations) from multiple studies (meta-analysis) and using the combined data set to evaluate the fit of a model to the patterns of relationships among the variables in the model using structural equation modeling.

Dunst and Trivette (2009c) found that the effects of family-centered practices on parent well-being were mediated by parents' belief appraisals of control over different life events and that the effects of family-centered practices on child psychosocial behavior were mediated by both life event control appraisals and parent well-being. Both Dunst et al. (2013b) and Trivette et al. (2010) found that the indirect effects of family-centered practices on parent-child and child outcomes could be traced through a number of intervention-related variables, self-efficacy beliefs, and parent well-being in a manner consistent with the family systems theory that guided the conduct of the meta-analyses (Dunst & Trivette, 2009a). Trivette et al. (2010), for example, found that the effects of family-centered practices on parent-child interactions were mediated by family systems intervention practices, self-efficacy beliefs, and parent well-being. Furthermore, they found that the effects of family-centered practices on child development could be traced through three different paths (mediators) in the model guiding the conduct of their analyses.

Role of Mediation in Family-Centered Practices

Identification of the mediated effects of family-centered practices on outcomes germane to ECI helps explain how and in what manner family-centered help giving can be expected to contribute to changes in parent, parent-child, and child outcomes. The mediated relationships detected in the research syntheses and meta-analyses described above highlight the fact that most effects of family-centered practices are indirect, mediated by other variables, and in particular self-efficacy beliefs, in a manner identical to that found in other types of studies (see Bandura, 1997).

The role of mediation is illustrated with findings from a study of parents of preschool children with and without disabilities participating in community-based family resource programs. Parents completed a family-centered practices scale, rated program staff responsiveness to their concerns and the helpfulness of their responses, completed two parent self-efficacy scales, and made judgments of their parenting competence and confidence. Structural equation modeling was used to test the hypothesis that family-centered practices would be indirectly related to parenting competence and confidence mediated by staff responsiveness to parent concerns and self-efficacy beliefs regarding the ability to obtain desired supports and resources from family resource program practitioners.

The results are shown in Fig. 3.3. The three fit indices were all acceptable, indicating an adequate fit of the hypothesized model to the pattern of relationships among the variables in the model. Family-centered practices were indirectly related to the parenting outcomes mediated by both self-efficacy beliefs and staff responsiveness to family concerns and by a combination of both mediators. The indirect effect of family-centered practices on parenting capabilities mediated by self-efficacy beliefs was $B = .24$, $p = .000$, and the indirect effect on parenting capabilities mediated by practitioner responsiveness to parent concerns was $B = .15$, $p = .050$. The total indirect effect of both mediators through all pathways in the model

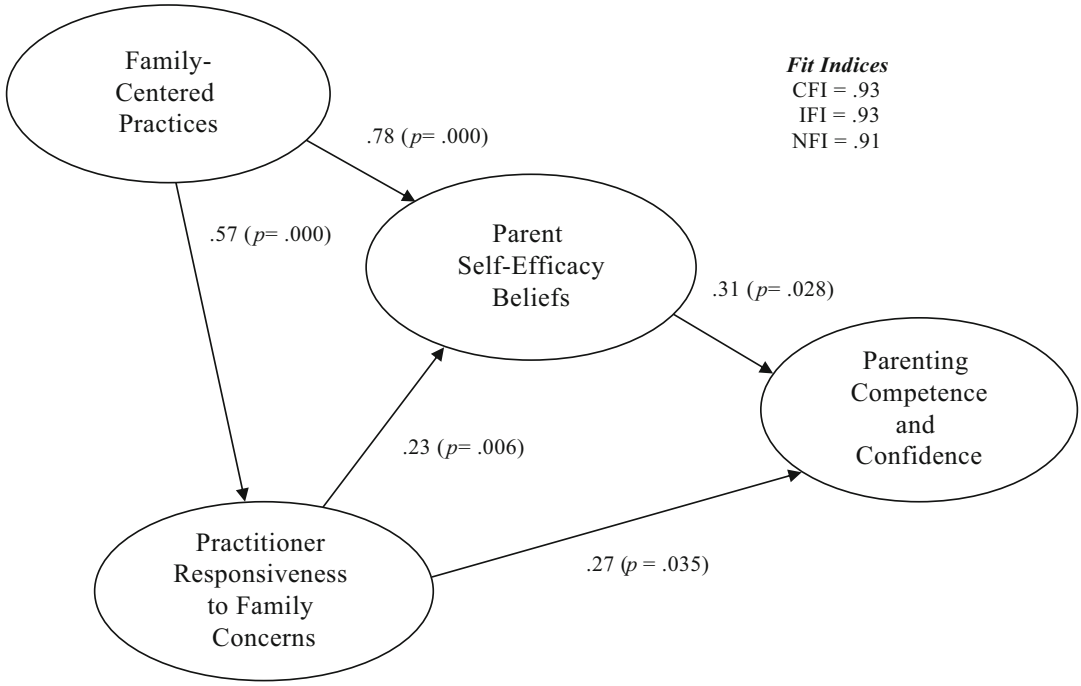

Fig. 3.3 Structural equation modeling results for illustrating the indirect effects of family-centered practices on parenting outcomes mediated by both parents' self-efficacy beliefs and practitioner responsiveness to parent and family concerns (*CFI* comparative fit index, *IFI* incremental fit index, and *NFI* normed fit index)

was $B = .43$, $p = .000$. The results highlight the importance of how mediators explain how family-centered practices are related to outcomes typically the focus of ECI practices.

Family-Centered Early Childhood Intervention

Family-centered practices were conceptualized and operationalized in this chapter as the foundations for other ECI practices (see Fig. 3.1). The manner in which different dimensions or characteristics of family-centered practices have been proposed or used to design and carry out other kinds of early childhood and family intervention practices has been described by a number of practitioners and researchers. Selected examples are used in this section of the chapter to illustrate how one or more dimensions or characteristics of family-centered practices have or could be used to improve the benefits of ECI practices.

Parent-Child Interaction Practices

One of the primary emphases of ECI is supporting and improving parent-child interactions to promote and enhance child learning and development (e.g., Mahoney & Nam, 2011; Marfo, 1988). The use of family-centered practices to support and encourage parents' use of interactional behavior to enhance child competence has been described by a number of practitioners and researchers (e.g., Mahoney & Wheeden, 1997; McCollum & Yates, 1994).

McCollum and Yates (1994) describe the use of capacity-building practices that build on existing parent strengths and promote acquisition of new parenting competencies as a way to support and enhance parenting competence and confidence. In comparison, Mahoney and Wheeden (1997) propose the use of practices to promote parents' understanding of how their interactive behavior influences their children's development as a foundation for improving parent-child interactions.

Natural Learning Environment Practices

The use of different dimensions of family-centered practices to promote parents' use of everyday activities as sources of child learning opportunities has been described by a number of practitioners and researchers (Campbell & Sawyer, 2007; Salisbury, Woods, & Copeland, 2010; Woods, Wilcox, Friedman, & Murch, 2011). Campbell and Sawyer (2007), for example, describe how practitioners who used family-centered competency-enhancing practices with parents during home visits promoted their use of everyday routines and activities as contexts for increasing child engagement with the social and nonsocial environment. Woods et al. (2011) describe how a particular component of family-centered practices (collaborative consultation) can be used to promote parent-implemented interventions in the context of naturally occurring child learning opportunities. In both of these examples, different types of help-giving practices (coaching, supportive guidance, etc.) were used to actively involve parents in using natural environment strategies to improve child outcomes.

Positive Behavior Support Practices

A number of practitioners and researchers have used family-centered practices to promote parents and other caregivers' use of positive behavior supports with children having challenging behavior (e.g., Fox & Dunlap, 2002; Marshall & Mirenda, 2002; Vaughn, White, Johnston, & Dunlap, 2005). One of the main purposes of using family-centered practices to promote parents' use of positive behavior supports is to improve the ecology of family routines and functioning in order to improve child behavior functioning (Spagnola & Fiese, 2007).

Fox and Dunlap (2002), for example, describe how parent-professional collaboration is used to jointly plan, develop, and implement positive behavior support interventions that encourage child prosocial engagement in family activities. Marshall and Mirenda (2002) also describe how relationship-building and parent-practitioner collaboration are used to identify family routines and the positive child behavior that is the focus of intervention in the routines.

Transition Practices

Inasmuch as transitions can be especially difficult and stressful for families of young children with disabilities, it is not surprising that there is a large and rich literature on how family-centered practices have been used to facilitate smooth and effective transitions from hospital to home (e.g., Bruder & Walker, 1990), early intervention to preschool (e.g., Pang, 2010; Podvey, Hinojosa, & Koenig, 2010), and preschool to kindergarten (e.g., Fowler, Schwartz, & Atwater, 1991; Fox, Dunlap, & Cushing, 2002). Bruder and Walker (1990), for example, describe how information sharing and the joint development and implementation of a hospital-to-home discharge plan can facilitate a more smooth transition between settings. Pang (2010) describes how different relational and participatory help-giving practices can be used to actively involve family participation in children's transitions between early intervention and preschool in ways that are supportive and not stressful.

Strength-Based Practices

Acknowledging and building on family member strengths is one of the defining characteristics of family-centered practices. A number of practitioners and researchers have developed or proposed methods for identifying child, parent, and family strengths (e.g., DuBose, 2002; Green, McAllister, & Tarte, 2004) and for using strengths as the building blocks for promoting the development of new competencies (e.g., Swanson, Raab, & Dunst, 2011; Ylvén & Granlund, 2009). Campbell, Milbourne, and Silverman (2001), Gregg, Rugg, and Souto-Manning (2011), and Rugg and Stoneman (2004) describe how portfolios can be used to change the focus of ECI practices from deficit based to strength based. These

kinds of tools as well as strength-based practices can accomplish what Trute, Benzies, Worthington, Reddon, and Moore (2010) describe as accentuating the positive to mitigate the negative.

Family Systems Intervention Practices

Relational and participatory practices are central components of a number of family systems approaches to ECI (e.g., Davis & Gavidia-Payne, 2009; Dunst & Trivette, 2009a; Madsen, 2009; Wayman, Lynch, & Hanson, 1991). These different approaches to family systems interventions each use different dimensions of family-centered help-giving practices to be responsive to family concerns and priorities and to provide or mobilize supports and resources to achieve family-identified outcomes.

Wayman et al. (1991) describe the manner in which parent-professional partnerships based on mutual respect, trust, and open communication, together with sensitivity to family cultural beliefs, values, and practices, are used as the foundations for improving home-based ECI. Dunst and Trivette (2009a) describe how family-centered help-giving practices are used to identify (a) family member concerns and priorities; (b) the resources, supports, and ECI practices to achieve family-identified outcomes; and (c) how help giver capacity-building practices are used to promote family members' use of existing strengths and develop new competencies, to mobilize supports or resources or implement different kinds of interventions.

Family Involvement in Children's Preschool Education

A number of researchers and practitioners advocate for the use of different dimensions and characteristics of family-centered practices to support and strengthen family member involvement in children's childcare, preschool, and early education (e.g., Hamilton, Roach, & Riley, 2003; Knopf & Swick, 2008). Hamilton et al. (2003) proposed the use of a number of family-centered practices to strengthen parent involvement in their children's preschool programs. These include promoting open, respectful, and frequent communication between practitioners and parents (relational practices) and involving parents in meaningful ways in school programs and their children's preschool education (participatory practices). Knopf and Swick (2008) describe the need to adopt a strength-based approach to working with families, responsiveness to family concerns and situations, and providing a range of parent involvement options, to engage parents in their children's preschool education.

Discussion

The focus of this chapter was the evolution, conceptualization, operationalization, measurement, and use of family-centered practices in ECI. The foundations of a family-centered approach to working with parents and their children are family support principles and elements of care that constitute value statements about how professionals ought to treat and interact with family members and how interventions should be carried out with parents and their children. These belief and value statements have been used by a number of researchers to develop behavioral indicators of family-centered elements and principles and to conduct research on the use of practices. Findings from different studies were used to show that family-centered practices include two types of help giving: (1) relationship-building (relational) practices based on mutual trust and respect and (2) participatory (capacity-building) practices that involve family member use of existing strengths as well as the acquisition of new competencies.

The information described in the chapter highlight three particular issues and findings that heretofore have not been emphasized in the ECI research and practice literature. The first is the mechanisms through which family-centered practices influence or are related to outcomes of interest. The second is the lack of information about the degree of adherence to the use of

family-centered practices in both research and practice. The third is the need for studies that relate fidelity of the use of family-centered practices to the fidelity of the use of ECI practices.

Mechanisms of Change in Family-Centered Interventions

Research described in the chapter as well as in related fields (e.g., Graves & Shelton, 2007; Haslam, Pakenham, & Smith, 2006) indicates that the effects of family-centered practices on ECI outcomes are indirectly mediated by different types of self-efficacy beliefs (Bandura, 1997) and personal control appraisals (Skinner, 1995) as well as other variables (e.g., parent well-being). These indirect effects are the rule rather than the exception. Findings described in this chapter indicate a need for research that involves identification and investigation of the mediators that influence the effects of family-centered practices on ECI outcomes of interest. For example, it would be of practical importance to know how and in what manner family-centered practices are related to informed family decision-making and how parents' self-efficacy beliefs about their ability to make such choices are directly and indirectly related to child, parent, and family outcomes.

Adherence to Family-Centered Practices

Findings from adherence studies generally do not support widespread claims that ECI practitioners routinely use family-centered practices or that ECI programs are based on a family-centered philosophy. One possible explanation is that adherence data are typically not collected to determine if practitioner behavior matches or is consistent with the intent of family-centered practice indicators. This type of process evaluation would provide the basis for targeting changes or improvements in practitioner help-giving behavior (see, e.g., Dunst, 2005). Routinely collecting adherence information from parents and other family members could be especially useful for identifying slippages in practitioner help-giving practices and provide the information needed to intervene to take action to improve ECI practitioner work with families.

Family-Centered Practices and Implementation Science

In studies that purport to use family-centered practices to promote parents' use of ECI practices, researchers typically fail to report adherence (fidelity) data about the use of family-centered help-giving practices. This omission is unfortunate since fidelity of family-centered practices would be expected to be related to fidelity of ECI practices and, in turn, variations in fidelity of intervention practices would be expected to be related to differences in outcomes of interest (see Fig. 3.1). Implementation science provides a framework for studying the methods and strategies that influence adoption of evidence-based intervention practices (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). Placed in the context of an implementation sciences (Dunst et al., 2013a), the fidelity of the use of family-centered practices by practitioners is an *implementation* practice, and the fidelity of the use of different ECI practices by parents is *intervention* practices. Studies that include both types of adherence measures would be able to evaluate how family-centered practices are related to the fidelity of parents' use of ECI practices since the latter is expected to have positive effects on outcomes of interest.

Conclusion

The adage that "we have come a long way … but we still have a long way to go," certainly captures the current state of knowledge and research on family-centered practices in ECI. While initially grounded in primarily value statements and elements of care, family-centered practices are now

recognized as a set of capacity-building relational and participatory help-giving practices used to engage parents and other family members in other kinds of ECI practices. Advances have also been made in terms of how family-centered practices are directly and indirectly related to child, parent, and family outcomes mediated by self-efficacy beliefs.

Notwithstanding significant advances, we see a need to continue to expand our understanding of the mechanisms through which family-centered practices are indirectly related to outcomes of interest, research to establish the degree to which and conditions under which adherence to family-centered practices is achieved, and research on how family-centered practices can be used to engage parents and family members in ECI so as to have optimal positive outcomes. Advances in these areas will require, in our opinion, a better understanding of the place of family-centered practices in broader-based social, family, and developmental systems frameworks as well as the adoption of implementation science models for discerning the relationships between systems, family-centered, and ECI practices and the intended or expectant outcomes of these practices.

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Taking Stock and Moving Forward: Implementing Quality Early Childhood Inclusive Practices

4

Pamela J. Winton

The long-standing and widespread support for the concept of inclusion of young children with disabilities is manifest in decades of legislation and policy, strongly held professional and family values, and a large body of research (Guralnick, 2001). In spite of that support, children across the country have uneven opportunities to experience high-quality inclusion in natural environments and regular education settings. Data suggests that progress has stalled in implementing the concept in a consistent and sustainable way (Odom, Buysse, & Soukakou, 2011). To address the current issues related to early childhood preschool inclusion, this chapter begins with a description of this history and current context of inclusive practices within early childhood special education (ECSE). A description of the current implementation of inclusion follows. An approach to addressing the current concerns about early childhood inclusion, using an implementation science framework, identifies the inclusive practices with the strongest evidence, the implementation drivers or levers for change in increasing likelihood that those practices are implemented, and an action agenda for improving the likelihood that young children with disabilities experience high-quality inclusion.

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Support for Early Childhood Inclusion

As mentioned above, support for early childhood inclusion may be drawn from federal and state legislation, societal and professional values, and research.

Legislation and Policy Support

Although inclusion is not specifically defined in law, US federal policies and legislative mandates have been in place to support the concept of inclusion for decades. The basic rights to education and equal opportunity began in 1954 with the Brown v. Board of Education Supreme Court decision. Over the years, these rights were extended and strengthened through legislation to specify children with disabilities. This includes (a) the 1972 amendments to the Head Start legislation, which mandated that each Head Start program reserve at least 10 % of their enrollment for children with disabilities; (b) the Individuals with Disabilities Education Act (IDEA) also known as Public Law (PL) 94–142 (1975), which mandated a free appropriate public education for all children from ages 3–21, provided in the least restrictive environment; and (c) the passage of the American with Disabilities Act (ADA) (PL 101–336) of 1990. The ADA was particularly

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important in clearly supporting inclusion in community-based early care, education, and recreational settings that are not part of public schools, thus opening enrollment for children with disabilities to private preschools, family child care, and after-school programs.

Congressional support for full inclusion of young children in regular early childhood education settings was further strengthened in the reauthorization of IDEA in 1997. Important changes introduced in the 1997 IDEA legislation as identified by McCormick (2014) include the following: (a) giving children greater access to the general education curriculum, (b) strengthening parents' roles and opportunities to participate in their children's education, (c) providing services and supports in general education environments when appropriate, (d) providing incentives to help children before they are identified with a disability, and (e) giving the child's regular education teacher a central role in the individualized education plan (IEP) process. In 2015 the US Departments of Education and Health and Human Services released a policy statement on inclusion whose purpose is "to set a vision and provide recommendations to States, local educational agencies, schools and public and private early childhood programs for increasing the inclusion of infants, toddlers, and preschool children with disabilities in high-quality early childhood programs" (2015, p. 1). Taken in its entirety, the USA has a long history of legislative support for inclusion that provides a foundation for advocacy efforts focused on moving from the promise of policy to the reality of implementation.[1]

Societal and Professional Support

Based on the assumption that public policy is a reflection of societal values, inclusion has widespread public support, and individuals with disabilities are recognized broadly as valued members of society with rights to participate as full citizens in all aspects of life. However, one of the historical challenges related to the inclusion of young children with disabilities in general education settings has been the lack of an agreed upon definition of what this means. Inclusion has been called many things (e.g., integration, mainstreaming) and has been implemented in many different ways (Odom et al., 2004). To address this challenge, a particularly important segment of society—the professionals with responsibility for providing education, services, and supports to young children—demonstrated their support for inclusion by developing a joint position statement (JPS) on early childhood inclusion. The JPS was created over a 2-year collaborative process involving the National Association for the Education of Young Children (NAEYC) and the Division for Early Childhood of the Council for Exceptional Children (DEC/CEC). The members of these organizations are early childhood educators and early intervention/early childhood special educators (EI/ECSE), respectively.

The consensus definition of inclusion in the JPS is as follows (DEC/NAEYC, 2009, p. 1):

"Early childhood inclusion embodies the values, policies, and practices that support the right of every infant and young child and his or her family, regardless of ability, to participate in a broad range of activities and contexts as full members of families, communities, and society. The desired results of inclusive experiences for children with and without disabilities and their families include a sense of belonging and membership, positive social relationships and friendships, and development and learning to reach their full potential."

The JPS on inclusion provides guidance to the field by identifying three essential features—access, participation, and supports—that characterize high-quality inclusive programs and services. *Access* means providing each child with a range of activities, environments, and opportunities, free of structural and physical barriers, for developing and learning within the general curriculum available to their typically developing peers. *Participation* goes beyond access and refers to the intentional use of instructional and intervention practices that support each child's active engagement and participation in activities

[1] For a full accounting of the legislative history of inclusion in the USA, see McCormick (2014).

to which they have access. And the *supports* feature refers to the system-level infrastructure that makes high-quality inclusion possible. This includes professional development for staff, organization structures, incentives, and data systems that support inclusion and collaboration and research and evaluation to learn more about inclusive approaches and strategies that are effective.[2] Having a consensus statement on inclusion developed by the membership organizations that represent many of the over two million early childhood educators in the USA has been an important milestone in moving inclusion from a valued concept to a recognizable set of specific program criteria.

Research Support

Decades of research studies have contributed to a growing body of literature demonstrating the benefits of inclusion for all children. Summaries of that research by Buysse (2011), Guralnick (2001), Henninger and Gupta (2014), National Professional Development Center on Inclusion (NPDCI, 2009), and Odom and Schwartz (2001) have led to the following conclusions:

- Inclusion can benefit young children with and without disabilities, and most families view inclusion in a positive light.
- Certain key factors are critical to inclusion being successful. These include research-based instructional strategies (e.g., embedded interventions) being implemented with fidelity with children with disabilities and strong collaboration among parents, teachers, and specialists in the context of inclusion.
- Professional development on inclusion is a critical need for ensuring that high-quality inclusion services and programs are available for young children with disabilities, yet early childhood professionals may not be adequately prepared in preservice education or supported on the job to implement inclusion.

Much of the early research on inclusion was descriptive in nature yielding important information about perceptions, attitudes, barriers, and facilitators of inclusion (e.g., Bailey & Winton, 1987; Bennett, DeLuca, & Bruns, 1997; Diamond & LeFurgy, 1994; Erwin, Soodak, Winton, & Turnbull, 2001; Kasari, Freeman, Bauminger, & Alkin, 1999; McWilliam et al., 1995; Soodak & Erwin, 2000; Turnbull & Winton, 1983; Winton, Turnbull, Blacher, & Salkind, 1983). Another generation of studies examined effective environmental, instructional, and interactional strategies for teaching and supporting the development of young children in natural and inclusive environments, and summaries of specific practices with the greatest promise in that regard are available (Buysse, 2011; DEC, 2014a; NPDCI, 2011). The most thorough compilation of practices with research evidence that supports inclusion is the *DEC Recommended Practices in Early Intervention/Early Childhood Special Education* (DEC, 2014a). The purpose of this document is "to provide guidance to practitioners and families about the most effective ways to improve the learning outcomes and promote the development of young children, birth through 5 years of age, who have or are at-risk for developmental delays or disabilities" (p. 1). The document highlights "those practices specifically known to promote the outcomes of young children who have or are at risk for developmental delays/disabilities and to support their families in accordance with the DEC/NAEYC (2009) position statement on early childhood inclusion" (p. 3), thus making a strong connection between the recommended practices and inclusion.

The process for identifying the practices was led by a commission of early childhood experts and leaders who did the following: (a) worked with topic experts to examine the research evidence, (b) elicited professional wisdom and perspectives through surveys and facilitated discussions at national meetings, and (c) conducted a field validation of draft practices.

[2] More information about and resources related to the joint position statement on inclusion and each of these essential features can be found on the web site for the National Professional Development Center on Inclusion (http://fpg.unc.edu/sites/fpg.unc.edu/files/resources/reports-and-policy-briefs/DEC_NAEYC_EarlyChildhoodInclusion.pdf).

The end product is a list of 66 practices organized within the following eight broad topic areas: leadership, assessment, environment, family, instruction, interaction, teaming and collaboration, and transition. Certain parameters guided the effort. The practices build on foundational practice guidelines or standards for early childhood settings, such as those developed by the National Association for the Education of Young Children (*Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8*, NAEYC, 2009). They focus on children, birth through kindergarten, who have been identified or are at risk for developmental delays but are not limited to those eligible for IDEA services. They are not disability specific. The practices are observable and can be delivered in all settings including natural and inclusive environments. This published set of practices gives concrete meaning to the concept of inclusion and guides efforts to improve the odds that young children with disabilities, across the nation, have equal access to and support for participation in high-quality inclusive learning opportunities.

What We Know About the Implementation of Inclusion

With the broad foundation of support for inclusion through policy, research, and societal and professional values, one would assume that the extent to which services and supports are provided to young preschool children with disabilities in natural and inclusive environments is on the rise, but this is not the case. Information on implementation, as defined by the percentage of young children receiving services in the least restrictive environment, is available from the yearly report to the US Congress from the US Department of Education, Office of Special Education Programs (US Department of Education & OSEP, 2014). This report provides Annual Performance Report (APR) data, submitted by states, related to demonstrating compliance with IDEA. Data from the most recent report indicated that 65 % of preschool children with disabilities were included in early childhood settings as their primary or part-time placement with 37.1 % spending at least 10 h or more per week in the regular setting and receiving the majority of their special education and related services there. Although some changes in data classifications during the last decade make it difficult to describe trends with precision, it has been asserted that implementation of inclusion is not improving in systematic ways (Odom et al., 2011) with some estimations that the numbers of preschoolers with disabilities receiving services in regular early childhood settings have increased very little from 1985 to 2012 (Barton & Smith, 2014). Without question, implementation is uneven across states; percentages of children spending at least 10 h per week with majority of their services in regular settings vary from 9 to 86 % across states according to the 2014 report to Congress. There is much room for improvements.

Examining Inclusive Practices Within an Implementation Science Framework

Given the emphasis on inclusion in legislation, policies, position statements, and the growing body of supportive research, a reasonable question is why has implementation stalled. As has been demonstrated over time and widely acknowledged, simply having a list of research-based practices, good intentions, and a set of laws does not ensure implementation of desired practices (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). Recognizing that the promise of inclusion has not been met for many children is an important step but not enough to bring change. A fresh set of tactics are necessary to move the inclusion agenda forward—ones that take advantage of the current political interest in improving early childhood education and draw upon frameworks from implementation science, defined as the study of the processes and structures for making changes that are sustainable (Fixsen et al., 2005; Halle, Metz, & Martinez-Beck, 2013).

Recommended Practices Associated with High-Quality Inclusion

A central tenet of implementation science is the importance of clearly identifying the key practices that, if implemented with fidelity, are most likely to lead to the desired improvements (Fixsen et al., 2005). A case can be made that as a field we have a set of practices, as exemplified in the *DEC Recommended Practices in Early Intervention/Early Childhood Special Education* (DEC, 2014a), that serve as goals to guide our efforts to ensure that the three essential features of inclusion—access, participation, and support—are achieved. From an implementation science perspective, there are three infrastructure drivers needed to support implementation of research-based practices: (a) organization, (b) workforce competency, and (c) leadership (Fixsen et al., 2005). In this next section, we examine each of these drivers as they relate to the goal of ensuring that each and every child and his/her family experience practices that promote a "sense of belonging and membership, positive social relationships and friendships, and development and learning to reach their full potential" (DEC/NAEYC, 2009, p. 1).

Organization Drivers That Promote High-Quality Inclusion

As defined by Fixsen et al. (2005), organization drivers are those systems and administrative components that "are necessary to create hospitable community, school, district, and state environments for new ways of work for teachers and school staff" (retrieved from http://implementation.fpg.unc.edu/module-2/organization-drivers). Fixsen identifies systems interventions, facilitative administration, and decision support data systems as organizational factors that contribute to lasting change. Without question, the current national attention on early childhood education by media, governors, and the federal administration provides a context conducive for improving the likelihood that young children will experience high-quality inclusion. These concepts and specific federal early childhood initiatives focused on systems reform that hold promise for affecting organizational drivers related to moving the inclusion agenda forward are described in this next section.

Systems Interventions

The National Implementation Research Network (NIRN) defines systems interventions as the "external variables, policies, environments, systems or structures" that influence or have impact on an implementation process (http://implementation.fpg.unc.edu/module-2/systems-intervention). An example of a potential systems intervention is the federal Race to the Top-Early Learning Challenge (RTT-ELC) program (retrieved from http://www.acf.hhs.gov/programs/ecd/early-learning/race-to-the-top) which attempts to incentivize states to align policy, funding, and "best practices" that lead to improvements in the quality of early learning and development and close the achievement gap for children with high needs. Specifically, the program focuses on five areas of reform, all with implications for inclusion:

(1) Establishing successful early childhood state systems that are well-coordinated across all sectors.
(2) Creating a common tiered quality rating and improvement system (QRIS) to improve program performance and inform parents about program quality.
(3) Promoting common standards for assessing child outcomes that address behavioral and health needs of children and inform and support families.
(4) Supporting the workforce through professional development (PD), career advancement opportunities, appropriate compensation, and a common set of practice standards.
(5) Using data to inform instruction and services.

Although the RTT-ELC initiative falls short of mandating that children with disabilities be

included in their systems reform efforts, the focus in RTT-ELC on high-need children elevates attention to children at risk or with identified disabilities. The emphasis on collaboration and common standards and accountability structures developed by and embraced across state early childhood agencies addresses the long-standing systemic fragmentation that has plagued inclusion (Richardson-Gibbs & Klein, 2014; Winton, Snyder, & Goffin, 2016). That is, inclusion cannot be implemented successfully without the full participation and buy-in from the general early childhood community. Too often inclusion is viewed as a special education issue that will be solved by special education programs and systems.

A number of federal initiatives from the US Department of Education and US Department of Health and Human Services also have the potential for promoting the inclusion agenda. The Preschool Development and Expansion grant program (retrieved from http://www.ed.gov/early-learning) provides incentives to states, local education agencies, and local governments to expand proven early learning programs and build high-quality preschool systems. The Maternal, Infant, and Early Childhood Home Visiting Program (retrieved from http://www.whitehouse.gove/issues/education/early-childhood) provides incentives to states to expand evidence-based home visiting programs that serve vulnerable children and families and connect them to a range of services to meet their needs. The Birth to 5: Watch Me Thrive initiative (retrieved from http://www.acf.hhs.gov/programs/ecd/child-health-development/watch-me-thrive) encourages early childhood programs to conduct developmental and behavioral screening so that children at risk for a developmental delay or disability are identified and provided needed support as early as possible. The reauthorization of the Child Care Development Fund and the Early Head Start-Child Care partnerships (retrieved from http://www.whitehouse.gov/issues/education/early-childhood) provide assistance to states and communities and are designed to boost the quality of early learning opportunities for young children.

In addition to policy initiatives, federal health and education agency support for inclusion has been demonstrated by providing funding for early childhood national centers that focus on active support to states through technical assistance (TA), resources, and tools related to the development of inclusive policies, structures, and practices. These include the Center on the Social and Emotional Foundations for Early Learning (http://csefel.vanderbilt.edu/), Early Childhood Technical Assistance Center (http://ectacenter.org/), National Professional Development Center on Inclusion (http://npdci.fpg.unc.edu/), SpecialQuest (http://www.specialquest.org/), and Technical Assistance Center on Social Emotional Intervention (http://challengingbehavior.fmhi.usf.edu/do/resources.htm).

The opportunity provided through federal incentives for states and communities to engage in systems change to increase the number and quality of inclusive settings is just that—an opportunity that not all states have fully and effectively embraced yet. An examination of the extent to which states have addressed inclusion within the context of their early childhood quality improvement efforts supported by federal initiatives, such as RTT-ELC, provides data on this issue. Horowitz and Squires (2014) conducted research on which states included provisions in their QRISs for promoting accommodations for children with disabilities. QRIS began as a child care initiative in a few states and has expanded to encompass multiple early childhood programs (e.g., Head Start, pre-K) in 42 states. Essentially, it is a set of standards, developed by each of the 42 participating states, for rating the quality of early childhood programs. Because QRIS policy is embedded within federal initiatives, such as RTT-ELC and the Preschool Development and Expansion grants, with each state given the leeway to create their own standards and criteria for assessing the quality of early childhood programs and incentives for program participation, QRIS provides one marker for assessing a state's commitment to improving inclusionary early childhood quality.

Findings from Horowitz and Squires (2014) indicate that only 29 of the 42 states with fully operational QRIS have any "substantive reference to inclusive practices" (p. 2) in their design,

meaning that 30 % states have minimal inclusion provisions (e.g., ensuring open enrollment for all children). Those states that are addressing inclusion in more than a rudimentary fashion vary greatly in how they do that. Four states (GA, IL, MD, and NC) were highlighted in the report as developing a more comprehensive approach to addressing inclusion within QRIS, primarily through a special designation for programs that excel in inclusionary practices; however, no state has a mechanism for parents of children with disabilities "to clearly identify programs that might be considered to have exceptional inclusionary practices through their QRIS" (p. 3). In concluding their report, Horowitz and Squires note that there are some promising approaches emerging from a few states. However, they urge states to do more to promote inclusion within the opportunities they have to refine and further develop their QRIS as part of state systems-building efforts.

Without question the emphasis within the RTT-ELC and other federal quality initiatives on cross-sector collaboration gives participating states opportunities to address critical organizational challenges to inclusion. These include forming effective partnerships in which all early childhood sectors (e.g., Head Start, child care, pre-K, early intervention, preschool disabilities, family support) at all levels (state, regional, local) have shared responsibilities and clearly delineated roles for key activities to promote inclusion. These activities include funding, planning, and delivering early childhood services, programs, professional development, and monitoring and using data to make decisions in ways that ensure the needs of each and every child and family are being met.

Decision Support Data Systems

Decision support data systems are defined by NIRN as "systems for identifying, collecting, and analyzing data that are useful to the teacher, school, district and other implementing environments." (http://implementation.fpg.unc.edu/module-2/decision-support-data-system). In essence, this means structures that support individuals and programs in gathering, analyzing, and reporting various kinds of processes, performance, and outcome data over time and across different levels (program, community, state) where changes can occur. Integrating early childhood data systems in ways that inform decision-making is an acknowledged need and goal within the federal systems-building and quality initiatives described earlier. One of the five key areas for reform in RTT-ELC is directed at "implementing comprehensive data systems and using data to improve instruction, practices, services, and policies" (retrieved from http://www2.ed.gov/programs/racetothetop-earlylearningchallenge/2013-early-learning-challenge-flyer.pdf). As that work moves forward, it is important to consider which data support systems and what data within those systems could be integrated and used to make decisions related to promoting high-quality inclusion.

The longest standing data system related to inclusion is the APR data collected by states each year for the OSEP report to Congress, mentioned earlier, which provides information on the extent to which young preschool children with disabilities are enrolled in and receive services the least restrictive environment. Traditionally, these data, along with other data related to special education services and supports, have been used to monitor and track progress in states' compliance with IDEA. In 2014, OSEP changed the emphasis from compliance to a result-driven accountability (RDA) framework that focuses more intently on states' monitoring and improving functional child and family outcomes through state systematic improvement plans (SSIP).

There are three ways that RDA has potential for going beyond simply documenting whether children have access to inclusive programs to improving the quality of those programs. First, the focus within RDA on functional outcomes, defined as young children being able to use skills to accomplish things that are meaningful to the child in the context of everyday life (Hebbeler & Kahn, 2014), makes it possible for programs to identify sets of child behaviors or skills that provide specific targets for intervention. This has the potential for moving states from a compliance

mentality to more intentionally focusing their resources on supporting programs and staff in implementing with fidelity evidence-based practices and interventions that promote child outcomes in inclusive settings. Second, the SSIP component of RDA has the potential for supporting programs to use data to identify areas and programs where outcomes are not being achieved. Those gaps can serve as targets for reform efforts. And third, the emphasis on collaboration within RDA policy documents (Delisle & Yudin, 2014) is especially relevant given the importance of embedding inclusion within the existing early childhood systems intervention initiatives (http://www2.ed.gov/about/offices/list/osers/osep/rda/050914rda-lette-to-chiefs-final.pdf). Delisle and Yudin (2014) state that it is "critical for a state to develop the SSIP in a manner that is aligned with the state's existing improvement initiatives and reform efforts."

Another potential but not often used data source for examining children's access to inclusive programs relates to data states might gather as part of QRIS. For instance, NC includes a question to programs participating in the external assessment process for the state's QRIS about whether they are currently serving or have served in the past young children with identified disabilities. Calculating the responses to this question can provide one source of data about the number of potentially inclusive programs participating in this process. Additional calculations could address the quality rating for those inclusive programs and monitor changes over time on the quality of the inclusive programs. In addition, in some states, child care resource and referral agencies collect information from all licensed child care programs about whether they are serving a child with a disability—information which can be shared with parents who are searching for inclusive programs.

Several important points need to be made about these data sources. First, the three sources of data described above are rarely, if ever, integrated by state agencies for the purposes of making decisions about inclusion.

Second, if the data were integrated, care would need to be taken in how the data were interpreted. The extent to which inferences can be made about the experiences of young children with disabilities in inclusive environments based on quality ratings within QRIS is limited. The observation tool that programs use most frequently to assess quality is the Early Childhood Environmental Rating Scales-Revised (ECERS-R; Harms, Clifford, & Cryer, 2005; Schulman, Matthews, Blank, & Ewen, 2012). The ECERS-R is not designed to assess the quality of practices that support the individualized needs of young children with disabilities nor is the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008), another observation tool being increasingly used for quality assessments (Isner et al., 2011). As pointed out by Wolery, Pauca, Brashers, and Grant in 2000, it is possible that classrooms could receive ratings of high quality on an early childhood observation tool such as the ECERS-R, while young children with disabilities could experience low-quality instruction and support in the same classrooms. Survey data collected in 2012 indicate that directors of child care programs have this same concern (Schulman et al., 2012).

Third, the OSEP RDA framework has not been fully operationalized across all states. It has been introduced to states with TA being provided by the OSEP-funded DaSy Center (http://dasycenter.org/index.html) to help states learn about and use RDA. An important component of the TA to states will be to support policy-makers, administrators, and practitioners in asking relevant and essential questions about inclusion that draw upon multiple data sources and guide decision-making about the access and meaningful participation of young children with disabilities in quality inclusive programs and the support features (e.g., professional development, collaboration) that facilitate those experiences.

Developing and having available a reliable and valid observation tool that directly addresses the quality of inclusive practices in early childhood settings is an acknowledged measurement challenge related to inclusion (Odom et al., 2011). A promising tool, noted by Horowitz and Squires (2014), meeting these criteria is the Inclusive Classroom Profile (ICP; Soukakou, 2012). The 12-item measure was initially developed and piloted in the UK (Soukakou, 2012)

and has been piloted in 51 early childhood inclusive classrooms in NC providing evidence of its inter-rater reliability, factor structure, and construct and social validity (Soukakou, Winton, West, Sideris, & Rucker, 2015). Proficiency training on the ICP is available (http://pdc.fpg.unc.edu/using-inclusive-classroom-profile-proficiency). Three of the four states identified by Horowitz and Squires as taking promising approaches to promoting quality inclusion within QRIS have sent individuals or teams from their states for this training.

In summary, to capitalize on the opportunities for moving the inclusion agenda forward through organizational change created by the current context of early childhood systems-building initiatives, it is important to focus on several points. First, early intervention and preschool disability sectors must be strong and engage partners in state early childhood systems-building and reform efforts. Second, states should use valid and reliable tools, such as the ICP, for accessing the quality and making improvements in inclusive programs. Third, there needs to be multiple and integrated sources of data to guide decision-making about improvements related to the essential features of inclusion (i.e., access, participation, and support). This will require a concerted effort. Most data systems are designed to collect and support the analysis of effort (e.g., inputs, number of children served, completed documentation); rarely have the necessary mechanisms been established to collect and analyze performance or fidelity data (e.g., quality measures related to early childhood professional practice), and rarely are data systems integrated across sectors.

Competency Drivers That Affect Implementation of High-Quality Inclusion

The definition of competency drivers as provided by NIRN is "the activities to develop, improve, and sustain educator and administrator ability to put programs and innovations into practice, so students benefit." Four components comprise competency drivers: staff selection, training, coaching, and performance assessment (http://implementation.fpg.unc.edu/module-2/competency-drivers). In keeping with the recognition within implementation science of the importance of workforce competence as a lever for change, a central focus for systems reform efforts, such as RTT-ELC, is building the quality of the early childhood workforce "through professional development, career advancement opportunities, differentiated compensation, and incentives to improve knowledge, skills, and abilities to promote the learning and development of young children"(retrieved from http://www2.ed.gov/programs/racetothetop-earlylearningchallenge/2013-early-learning-challenge-flyer.pdf).

For the purposes of this chapter, we use a definition of professional development (PD), initially developed by the National Professional Development Center on Inclusion (NPDCI), a federally funded project focused on developing cross-sector PD systems to support inclusion and inclusive practices for young children with disabilities. NPDCI defines PD as "facilitated teaching and learning experiences that are transactional and designed to support the acquisition of professional knowledge, skills, and dispositions as well as the application of this knowledge in practice" (Buysse, Winton, & Rous, 2009; NPDCI, 2008, p. 3). This definition encompasses factors that affect personnel selection (e.g., career preparation or preservice education, personal characteristics such as good judgment) and ongoing job-embedded preparation and professional growth opportunities (e.g., in-service training, coaching, mentoring, communities of practice, site-based technical assistance, performance assessment). The NPDCI definition emphasizes the alignment of three core and interrelated PD components: (1) *the who*, the individual learners and those who support their learning (faculty and PD providers); (2) *the what*, the content focus of PD; and (3) *the how*, the facilitated teaching and learning experiences used to achieve desired PD outcomes (NPDCI, 2008). In this next section we focus on what is known about the PD needs of the workforce and the content and delivery of professional development (PD) that support the acquisition and application of knowledge, skills, and abilities related to inclusion.

The *Who* (Learners and PD Providers)

Goffin (2013) made a case that a fundamental challenge for the field of early childhood is one of identity—we have not defined ourselves as a professional field of practice with responsibility for developing a competent and accountable workforce, thus making it hard to talk about the *who*. Based on integrated data sets compiled in a report from the Office of Planning, Research, and Evaluation (OPRE, 2013; U.S. Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research and Evaluation (OPRE), 2013), Winton et al. (2016) estimated that two million individuals comprise those working directly with young children (ages 0–5). The field's fragmentation of those two million individuals into different sectors with different funding streams, regulations, accountability, and PD systems (e.g., Head Start, pre-K, child care, ECSE, early intervention) is particularly challenging for implementing high-quality inclusion. Inclusion easily can "fall between the cracks" because it depends upon the full participation and support of multiple sectors. Until all early childhood sectors define themselves as a field of practice comprised of different specialties, as suggested by Goffin (2013), all actively engaged and committed to promoting changes related to inclusion, we are likely to continue to maintain the decades-long status quo.

Effective implementation of inclusion requires integrating and focusing PD efforts on the two components of personnel comprising these multiple sectors of the workforce[3]: (1) those with direct contact with children and families and (2) those faculty and PD providers who deliver the PD to these practitioners, an essential and often overlooked component in ensuring the competency of the workforce. What we know about the needs of the early childhood workforce is available primarily from survey information. Survey research of 2- and 4-year early childhood personnel preparation programs in institutions of higher education (IHEs) identified gaps in coursework and practical experiences related to the learning and development of young children with disabilities; this is the case even when a primary stated mission for the personnel preparation program is to prepare early interventionists or early childhood special educators (Chang, Early, & Winton, 2005; Early & Winton, 2001). Those recruiting and selecting newly minted early childhood undergraduates cannot assume that those new hires are prepared to implement high-quality inclusion (Horm, Hyson, & Winton, 2013; Hyson, Horm, & Winton, 2012). Once employed, evidence suggests that early childhood practitioners do not feel supported to develop confidence and competence in implementing inclusion (Buysse, Wesley, Keyes, & Bailey, 1996). This portrait of early childhood practitioners as being inadequately prepared and supported for implementing inclusion establishes a compelling need for increasing the quality and quantity of PD activities and resources on inclusion for learners and faculty/PD providers. It also requires examining the teaching conditions, such as time, class size, facilities, and resources (i.e., the organizational factors), that affect their ability to implement the desired practices that ultimately promote the learning and development of young children with disabilities in inclusive settings.

The *What* (Content of PD)

The importance of focusing PD on research-based practices is a central theme in the implementation science literature (Fixsen et al., 2005). As stated earlier, the *DEC Recommended Practices in Early Intervention/Early Childhood Special Education* (DEC, 2014a) provide a set of practice standards that could be used as an organizing set of content for PD on inclusion. Table 4.1 provides an example of some of practices most closely associated with inclusion. As mentioned earlier, simply having a list of practices, such as those developed by

[3] We use the following definition of the workforce from Winton et al. (2016): Individuals working directly with children as well as those (faculty and PD providers) who work with early childhood teachers to advance their competence in supporting children's learning and development. This definition, which is inclusive of teachers addressing the learning and development of children from birth to the start of kindergarten in center- and home-based programs, includes child care, Early Head Start/Head Start, preschool/Pre-K, early intervention (birth to three programs for infants and toddlers with or at risk for disabilities under Part C of the Individuals with Disabilities Education Act (IDEA), and early childhood special education for preschool children with disabilities (Section 619 of IDEA).

Table 4.1 Selected *DEC Recommended Practices in Early Intervention/Early Childhood Special Education, 2014,* that promote child-focused inclusive preschool classroom practices

Environment
E1. Practitioners provide services and support in natural and inclusive environments during daily routines and activities to promote the child's access to and participation in learning experiences
E2. Practitioners consider universal design for learning principles to create accessible environments
E3. Practitioners work with the family and other adults to modify and adapt the physical, social, and temporal environments to promote each child's access to and participation in learning experiences
E4. Practitioners work with families and other adults to identify each child's needs for assistive technology to promote access to and participation in learning experiences
E5. Practitioners work with families and other adults to acquire or create appropriate assistive technology to promote each child's access to and participation in learning experiences
E6. Practitioners create environments that provide opportunities for movement and regular physical activity to maintain or improve fitness, wellness, and development across domains
Instruction
INS1. Practitioners, with the family, identify each child's strengths, preferences, and interests to engage the child in active learning
INS2. Practitioners, with the family, identify skills to target for instruction that help a child become adaptive, competent, socially connected, and engaged and that promote learning in natural and inclusive environments
INS3. Practitioners gather and use data to inform decisions about individualized instruction
INS4. Practitioners plan for and provide the level of support, accommodations, and adaptations needed for the child to access, participate, and learn within and across activities and routines
INS5. Practitioners embed instruction within and across routines, activities, and environments to provide contextually relevant learning opportunities
INS6. Practitioners use systematic instructional strategies with fidelity to teach skills and to promote child engagement and learning
INS7. Practitioners use explicit feedback and consequences to increase child engagement, play, and skills
INS8. Practitioners use peer-mediated intervention to teach skills and to promote child engagement and learning
INS9. Practitioners use functional assessment and related prevention, promotion, and intervention strategies across environments to prevent and address challenging behavior
INS10. Practitioners implement the frequency, intensity, and duration of instruction needed to address the child's phase and pace of learning and/or the level of support needed by the family to achieve the child's outcomes or goals
INS11. Practitioners provide instructional support for young children with disabilities who are dual language learners to assist them in learning English and in continuing to develop skills through the use of their home language
INS12. Practitioners use and adapt specific instructional strategies that are effective for dual language learners when teaching English to children with disabilities
INS13. Practitioners use coaching or consultation strategies with primary caregivers or other adults to facilitate positive adult-child interactions and instruction intentionally designed to promote child learning and development
Interaction
INT1. Practitioners promote the child's social/emotional development by observing, interpreting, and responding contingently to the range of the child's emotional expressions
INT2. Practitioners promote the child's social development by encouraging the child to initiate or sustain positive interactions with other children and adults during routines and activities through modeling, teaching, feedback, and/or other types of guided support
INT3. Practitioners promote the child's communication development by observing, interpreting, responding contingently, and providing natural consequences for the child's verbal and nonverbal communication and by using language to label and expand on the child's requests, needs, preferences, or interests
INT4. Practitioners promote the child's cognitive development by observing, interpreting, and responding intentionally to the child's exploration, play, and social activity by joining in and expanding on the child's focus, actions, and intent
INT5. Practitioners promote the child's problem-solving behavior by observing, interpreting, and scaffolding in response to the child's growing level of autonomy and self-regulation

Source: *DEC Recommended Practices in Early Intervention/Early Childhood Special Education 2014*. Retrieved from http://dec.membershipsoftware.org/files/Recommended%20Practices/DEC%202014%20Recommended%20Practices.pdf

DEC, is no guarantee that those practices will be implemented broadly with fidelity; intentional and systematic activities will be important for that to happen. A well-planned strategy is needed for developing and disseminating products and messages for the large number of early childhood practitioners, faculty, and PD providers including non-DEC members who may not know about or look to the *DEC Recommended Practices in Early Intervention/Early Childhood Special Education* (DEC, 2014a) as a guide for their activities and decisions about services, programs, or PD. As Goffin (2013), and Winton et al. (2016) point out, a challenge for the field of early childhood and a roadblock for becoming a professional field of practice is the absence of a set of unified practice guidelines. The fact that the *DEC Recommended Practices in Early Intervention/Early Childhood Special Education* builds on the foundation of the *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8* (NAEYC, 2009) provides a path forward for integrating the two sets of practices and establishing them as part of a set of unified practice standards for the field of early childhood (Winton et al., 2016).

Another important point of alignment when considering PD content on inclusion is between the recommended practice documents developed by the early childhood professional organizations, as described above, and the separate sets of personnel preparation standards that both organizations have developed. In an effort to partially address this challenge, a workgroup of DEC members developed a detailed matrix that aligned the CEC/DEC and NAEYC personnel standards (Chandler et al., 2012). However, this effort does not address the links between the two sets of loosely connected personnel standards and the two sets of recommended practices from the professional organizations, specifically the *DEC Recommended Practices in Early Intervention/Early Childhood Special Education* (DEC, 2014a) and *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8* (National Association for the Education of Young Children (NAEYC), 2009). Ensuring that personnel standards are those with the strongest evidence for promoting the recommended practices identified by the professional organizations is an important alignment task that is sometimes assumed but cannot be taken for granted. In other words, we must do a better job of demonstrating the tight connections between the desired outcomes for inclusion, the recommended practices and personnel standards that promote those outcomes, and the PD that builds the competence of personnel to implement the practices with fidelity.

The *How* (Delivery of PD)

There is no systematic information on how PD on inclusion is delivered across the various contexts and sectors that comprise the field of early childhood. What is known about the delivery of PD in early childhood in general is not encouraging. Survey data from state agencies with responsibilities for implementing Part C and 619 services under IDEA indicates that workshops are the predominant approach to PD (Bruder, Mogro-Wilson, Stayton, & Dietrich, 2009). Workshops, when conducted as onetime, stand-alone PD, are not an effective strategy for achieving the goal of ensuring that practitioners implement with fidelity evidence-based practices that promote the learning and development of children with disabilities in inclusive settings (Whitehurst, 2002).

Based on a review of 32 experimental studies of early childhood PD, Winton et al. (2016) identified certain features of PD interventions as holding promise for developing, improving, and modifying practices that support inclusion. These promising features include "PD events that provide knowledge about and multiple exemplars of interactional or instructional practices that support inclusion; job-embedded, sustained support related to implementing these practices; feedback about practice implementation; and information linking changes in instructional practices to child progress or child progress monitoring" (Winton, Snyder, & Goffin). When practitioners have opportunities to practice new strategies and receive ongoing supportive feedback on their efforts in ways that further builds their skills, their confidence and competence are likely to increase, thus possibly improving their attitudes.

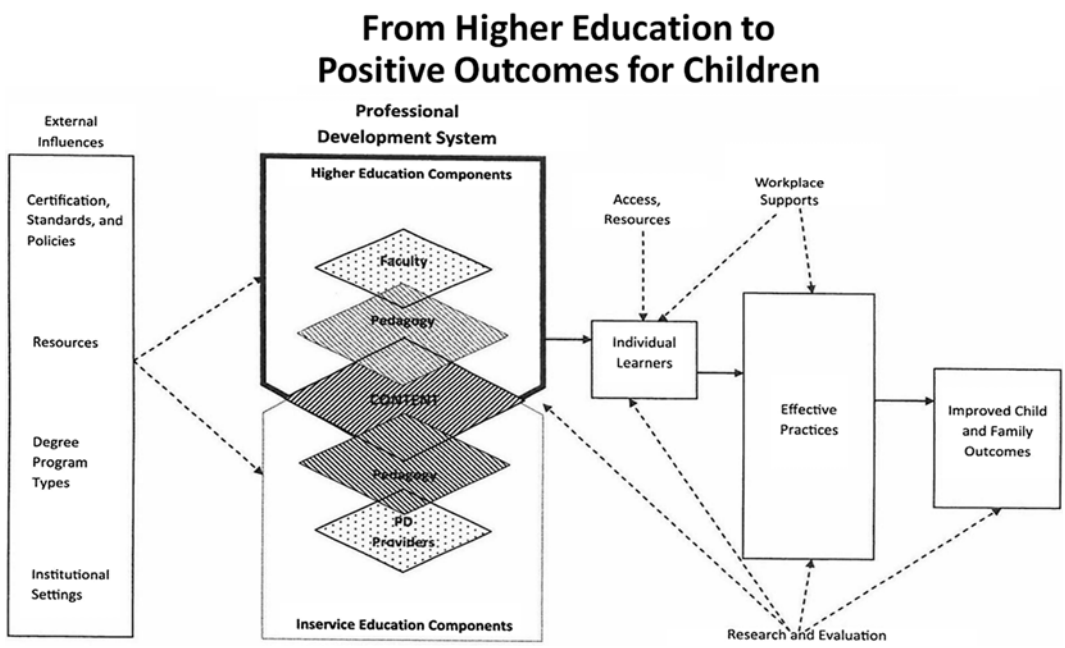

Fig. 4.1 Professional development system, practices, and outcomes: contexts and pathways. The higher education component of the early childhood professional development system is the focus of this chapter

Unfortunately, most practitioners, unless part of an experimental study, are unlikely to experience intensive and expensive PD with these characteristics. Winton et al. (2016) point out that designing PD efficiently requires thinking carefully about desired outcomes for learners. If the desired outcome is that learners implement with fidelity evidence-based practices to support inclusion, then intensive PD approaches are necessary; but these approaches might be integrated with less intense preliminary activities delivered by less expensive methods (e.g., webinars, workshops) to build basic knowledge. The importance of having an integrated plan that meets the individual needs of different subspecialties at the level of impact needed at the time (e.g., raising awareness, acquiring knowledge, building skills) is an efficient and effective approach to PD on inclusion. Figure 4.1 shows an approach for addressing the fit between the how of PD and desired practitioner outcomes (the who and what). Proposing a framework for an integrated approach, Hyson et al. (2012) addressed the *who*, *what*, and *how* within a broader systems context. Intentional and systematic planning of PD on inclusion, using such a framework, is an essential component for moving beyond the plateau that characterizes the implementation of inclusion for the past decades.

PD Resources

Federal agencies have invested in online open-access resources designed to support faculty and trainers in strengthening their PD on inclusion. One exemplary program is the CONNECT project which has developed online modules for faculty and PD providers and self-guided, self-paced courses for practitioners, designed using a 5-step learning cycle to support practitioners to learn about and implement a specific evidence-based practice associated with inclusion (Buysse, Winton, Rous, Epstein, & Lim, 2012; Winton, Buysse, Rous, Lim, & Epstein, 2013) (http://community.fpg.unc.edu/connect-modules/ and http://connect.fpg.unc.edu/connect-courses/). In addition, the Head Start Center on Inclusion has

developed video clips illustrating different practices associated with early childhood inclusion (http://depts.washington.edu/hscenter/); the National Center on Quality Teaching and Learning (http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching) has developed online modules called 15 min in-service suites designed to share information with teachers on effective early childhood practices; the SpecialQuest videos (http://www.specialquest.org/) share perspectives of families, teachers, specialists, and administrators on the importance of inclusion; and the Technical Assistance Center on Social Emotional Intervention provides short videos illustrating teachers using strategies that promote social/emotional development and prevent challenging behavior (http://challengingbehavior.fmhi.usf.edu/do/resources.htm). In addition OSEP has a long-established competitive grant program that encourages interdisciplinary teams of faculty working in IHEs to develop innovative programs for preparing practitioners, specialists, and administrators to support the implementation of high-quality inclusion.

In summary, to take advantage of the opportunities for improving the competence of the workforce related to implementing evidence-based practices that support inclusion, based on PD resources and initiatives currently available, it is important to focus on a set of key tasks. The field of early childhood education must be defined as a professional field of practice, comprised of specialties that include EI/ECSE. One essential element in this professionalization is a set of agreed upon practice standards to guide the field in developing and supporting a competent workforce. This may be accomplished by providing strong incentives to states to create an integrated cross-sector PD system that supports early childhood workforce competency in implementing high-quality inclusion practices. In addition, the field must address the inadequate preparation of early childhood teachers for working with children with disabilities in inclusive settings. Last, all practitioners working in early childhood settings should not only have access but be required to participate in high-quality PD opportunities to learn and grow in their skills to implement with fidelity evidence-based practices that support inclusion.

Leadership Drivers That Affect Implementation of High-Quality Inclusion

While there are different definitions for leadership in the early childhood education community (Goffin & Janke, 2013), Kagan (2013) offers a useful definition, relevant to the challenges of implementing high-quality inclusion, that was cited in the DEC Position Statement on Leadership in EI and ECSE (DEC, 2014b). Leaders engage colleagues in "reflective, dynamic, value-based planning and organizing that provides vision, inspiration, structure and direction" (p. 34). The NIRN organization identifies two types of leadership—technical and adaptive—necessary for implementing change. They define technical leaders as effective in addressing organizational dimensions related to management whereby "there is agreement about the nature of a problem and paths to the solution to the problem are largely known." (http://implementation.fpg.unc.edu/module-2/leadership-drivers). Technical leaders implement steps for managing or solving problems when there is an established procedure to follow. An example of technical leadership is a preschool disability coordinator responding to and resolving a situation in which IDEA regulations related to inclusion are clearly not being followed. Adaptive leadership is called upon when problems and solutions are less defined, technical fixes are not available, and there are few recognized experts. The adaptive leader does not necessarily have a solution but must orchestrate people working together to solve the problem, based on integrating different competing yet legitimate perspectives. Working with a statewide group to develop cross-sector collaboration around resources, policies, and professional development to promote high-quality inclusion is an example of a situation calling for adaptive leadership.

Both adaptive and technical leadership at multiple levels (program, community, state, federal) are needed to promote high-quality early childhood inclusion, especially to address long-standing fragmentation challenges that have a direct impact on inclusion. As stated earlier, responsibility for implementing inclusion has

traditionally been within the EI/ECSE community. Leaders from this community have spearheaded passing legislation, supporting technical assistance efforts, and conducting research. However, until leaders within all early childhood specialties are actively engaged in sharing perspectives and responsibility for promoting changes related to inclusion, we are likely to stay stuck in the current implementation reality. There are more unknowns than opportunities when considering the possible roles of leadership in supporting positive changes that promote implementation of inclusion. Where and who are the adaptive and technical leaders to move forward the inclusion agenda? What are the incentives for leaders across sectors to participate in this effort? What are the leadership roles, responsibilities, and relationships among professional organizations, federal, state, and local agencies, TA networks, and higher education? As already mentioned, the two national professional organizations (DEC and NAEYC) jointly developed the JPS on inclusion, which was an important step forward; however, the organizations did not take additional joint steps to ensure widespread dissemination and translation of the statement into practice. The two organizations continue to have separate sets of personnel preparation standards and recommended practices whose alignment is not clearly delineated for practitioners, faculty, and PD providers. The US HHS and education agencies have played supportive roles in funding TA projects (e.g., NPDCI, Head Start Inclusion Project, SpecialQuest) specifically to promote inclusion; but the funding has not been through a purposeful and intentional collaboration among federal agencies, which could provide a model for state and local entities. At the state level, the APR data on inclusion reported by states to Congress each year visibly demonstrate the differences among states in the extent to which children with disabilities have access to and receive services in inclusive and natural learning environments. States, however, can opt out of voluntary initiatives, such as RTT-ELC, designed to improve the quality of early childhood programs and systems that support high-risk young children—initiatives that potentially could support improvements to their state data related to inclusion.

Research is needed to explore what role leadership plays as a driver of evidence-based inclusion practices and policies to support inclusion. What are the characteristics of individuals who are able to exert power and influence to lead a change process across early childhood specialties important in changing policies that support inclusion? How important are individuals with the technical skills to navigate the logistical barriers such as funding and regulations in contributing to positive changes related to implementation of inclusion policies? The Horowitz and Squires report (2014) designates a few states that have more comprehensive approaches to addressing inclusion within their QRIS as compared to other states with fully operational QRIS. Case study research involving select states who are successful in implementing effective innovative approaches could be conducted to examine and elucidate the constellation of leadership characteristics and other factors that contribute to states' successes. These and other questions about the role of leadership need to be addressed in future research.

Conclusion: An Action Agenda for Change

In conclusion, the following agenda for change is proposed to guide collective efforts of leaders willing to step forward to lead inclusion efforts at federal, state, and local levels. First of all, representatives from EI/ECSE must be active and meaningfully engaged partners in early childhood quality initiatives to ensure that inclusion is a central focus and not a fringe issue. Leadership is needed for creating cross-sector agreement on defining the workforce and an integrated set of practice standards to support implementation of practices that support the individualized learning needs of each and every child. A focus on high-quality, systematic PD for all practitioners providing direct service to children with and without disabilities and those that provide their PD (e.g., faculty, coaches) is essential. The PD must be required, adequately funded, and based on system-wide agreed upon practice standards and recommended practices. Such PD should match the desired level of impact (i.e., knowledge,

skills, dispositions, and application) and needs of learners. To move the field forward, funding is necessary for research on practices, PD interventions, policy innovations, and tools that support the implementation of inclusive practices. Last, cultivating the next generation of leaders in ECE and EI/ECSE is critical.

Only a small percentage of the two million early childhood teachers directly serving children in early childhood settings are trained in EI/ECSE. Yet, these teachers have a large responsibility for ensuring that children with disabilities experience "a sense of belonging and membership, positive social relationships and friendships, and development and learning to reach their full potential" (DEC/NAEYC, 2009, p. 1) in inclusive early childhood settings. Progress in moving the field beyond the status quo in terms of the implementation of inclusion will require a concerted effort by this generation of leaders to work collaboratively across sectors in order to enact systems change. Sustaining such effort will require the cultivation of the next generation of leaders who might remember back to the days when inclusion was thought to be a strictly special education issue.

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Birth to Three: Early Intervention

5

Robin A. McWilliam

Special education can begin no sooner than when a child is born. This is when early intervention for children with diagnosed disabilities can begin. In the USA, federal law defines early intervention as services for children from birth to 36 months (Individuals with Disabilities Education Act, 2004). Children tend to be enrolled in early intervention in two waves: between 6 and 12 months and between 18 and 24 months (Hebbeler et al., 2007). The first group generally have an established condition (e.g., Down syndrome), and the second group generally have a developmental delay. Services for infants and toddlers (birth to three) are provided for almost all disabilities and for some conditions, such as prematurity, that have a high likelihood of resulting in a developmental delay.

Unlike preschool children with disabilities served in Part B of the Individuals with Disabilities Education Act (IDEA), children in early intervention are not classified by their disability type. They are classified as having an established condition or having a developmental delay. Also, in eight states children may qualify for early intervention services under an "at risk" classification (Ringwalt, 2012). The National Early Intervention Longitudinal Study found that two fifths of the children were described as having speech/communication impairment or delay (Hebbeler et al., 2007).

The law requires that states provide 14 services (Individuals with Disabilities Education Act, 2004), with the primary services being family training, counseling, and home visits; special instruction; speech-language pathology; occupational therapy; and physical therapy. As Dunst and colleagues have pointed out, though, a focus on services, rather than resources, might be misguided (Dunst, Trivette, & Deal, 1994). If early intervention is limited to the formal service delivery system, families might not benefit from the resources in their own families, including extended family, and their communities. Twenty years ago, McKnight (1995) warned his readers that "our problem is not ineffective service-producing institutions. In fact, our institutions are too powerful, authoritative, and strong. Our problem is weak communities, made ever more impotent by our strong service systems." (p. ix). Dunst, writing specifically about early intervention, has echoed the problems of a highly regulated approach to early intervention (Dunst, 2000, 2012). The advantages of the law were the provision of funding for states to provide services and some mandates, such as the use of natural environments. The costs were the bureaucratization of "experiences, activities, and learning opportunities used to influence infant and toddler behavior and development" (Dunst, 2012, p. 208).

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By 2012, almost 333,000 children birth through age 2 were served under Part C of IDEA in the 50 states and Washington, DC, which constituted 2.8 % of the resident population of children this age (US Department of Education, 2014). Over 87 % of Part C children have the home as the primary early intervention setting, with 76 % in a community-based setting (e.g., child care), and 5.1 % in another setting (e.g., clinic, class for children with disabilities). Most children in Part C go on to receive Part B services through their school systems.

Early intervention as we know it today in the USA is usually dated from the passage of Public Law 99-452 in 1986. The law mandates what states opting to provide these services, and all states have opted in, must have in place. In terms of service delivery, they must offer the 14 services mentioned earlier, if children are eligible. States can set their own eligibility criteria, although the US Department of Education monitors the percentage of infants and toddlers served by the state, to ensure the state's "child find" activities are adequate. Children and families referred for services must be offered a service coordinator, an assessment in five domains, and an individualized family service plan.

With this background in mind, the focus of this chapter will be on the most common practices in early intervention:

1. *Home visits*, which although not technically a practice, are a service delivery method in common use in the USA.
2. *Family-centered practice*, including addressing family-level needs, ways of interacting with families, and giving families decision-making opportunities.
3. *Coaching*, which might go by different names but involves a collaborative approach with families.
4. *Responsive teaching*, which is a form of parent-child interaction that forms the content of early interventionists' work with families.
5. *Routines-based or embedded interventions*, which again are the content of services.
6. *Service coordination*, which consists of arranging for services, securing resources, and managing the IFSP.
7. *Transition to preschool*, which is regulated and which also includes some recommended practices.

Features of the Early Intervention System

Home Visits

To understand the practices and activities that typically occur in home visits, researchers have examined the ways service providers and family members spend their time during the visit. Home visitors have been documented spending almost half the time directly teaching the child and less than 1 % of the time coaching parents (McBride & Peterson, 1997; Peterson, Luze, Eshbaugh, Jeon, & Kantz, 2007). In an examination of roles during the visit, caregivers were found to be observers in more than half the traditional home visits (Campbell & Sawyer, 2007). In visits classified as "participation based," however, the caregivers' role was that of direct interactions with the child in 100 % of the visits. Nevertheless, this research team found that, when interviewed, providers of either type of home visit did not fully understand participation-based practices (Fleming, Sawyer, & Campbell, 2011). In participation-based visits, one of the principal roles of the provider is promoting children's participation in family or community activities and routines, and the providers did not mention or describe this role during the interviews. Furthermore, the caregiver is expected to facilitate the child's participation and learning, but this role was rarely mentioned. Finally, participants in this study said they would be able to use participation-based visits with only a few families, because family characteristics would be a barrier in the majority of families. Professionals' beliefs about their roles and the caregivers' roles have been found to be aligned with the kinds of services they provide (Campbell & Sawyer, 2009). Beliefs might be an important dimension to assess in home visitors because Campbell and Sawyer found that, among those completing self-study assignments on participation-based visits,

40 % continued to conduct traditional visits. Unless professional development has an impact on beliefs, it might not change practice.

The literature on home visiting is divided between studies with families of typically developing but at-risk young children and families of children with disabilities or developmental delays. Here, we address only the latter. The rapid increase in the prevalence of autism has brought the effectiveness of home-based supports for this disability under scrutiny (Roberts et al., 2011). An intervention for young children with an autism spectrum disorder (ASD) was devised to match four global strategies identified through a literature review as supporting family capacity building (Woods & Brown, 2011): (a) addressing families' informational needs, (b) using their natural environments as the intervention context, (c) engaging parents to be active participants in the intervention process, and (d) supporting caregivers' reflection and self-evaluation. This intervention, Focused Playtime Intervention, was studied with a randomized clinical trial and found to be effective for increasing responsive parental behaviors (Siller, Hutman, & Sigman, 2013). Despite advocates' calls for specialized, center-based programs for toddlers with ASD (Autism Matters, 2014), in fact, a number of parent-mediated intervention practices have been shown to work (Oono, Honey, & McConachie, 2013; Schertz & Odom, 2007; Strauss et al., 2012).

Most of the children in early intervention do not have ASD, but the principles described here apply to all children with disabilities receiving home visits: visits should build families' capacity, should acknowledge families' opportunities to teach their children during the many hours they are with them, and should be directed at the caregiver more than at the child. Considering the prevalence of home visits in the USA, a surprising dearth of literature exists on how to conduct a home visit.

Family-Centered Practices

Even though experts in early intervention early on called for a family-centered approach, the shift away from child-centered or even professional-centered practices has been protracted (Bailey, Winton, Rouse, & Turnbull, 1990; Dunst & Trivette, 1987). The pervasive influence of special education on the field of early intervention (Smith et al., 2002) and Medicaid reimbursement for therapy services (McWilliam, Young, & Harville, 1996) might have contributed to early interventionists' providing direct, hands-on services to children, rather than working with the family.

Family centeredness consists of several elements: having positive relationships with the family, meeting families' needs, and giving families meaningful decision-making opportunities (McWilliam, 2010b). In a qualitative study of early interventionists whose families were extremely supportive, McWilliam, Tocci, and Harbin (1998) found that the early intervention professionals were positive, responsive, oriented to the whole family, friendly, and sensitive (McWilliam et al., 1998). Turnbull et al. (2007), however, have argued that being nice to families is insufficient; their needs must be met. Specifically, they pointed out that the required early intervention services of family training, counseling, social work, and psychology were underused. Support to families is not, however, confined to specific services. Existing services from "developmental therapists" or generalist home visitors, who are often educators by training, can invoke family-centered practices (Bruder & Dunst, 2005). Although having positive relationships might not be sufficient, it is necessary.

Meeting families' needs beyond the development of the child sometimes comes under the purview of service coordination. Where service coordination is performed as a separate activity from service provision (i.e., "dedicated" service coordination), caseloads are often high, and service coordinators function primarily as case managers (Bruder & Dunst, 2006; Harbin, Bruder, Mazzarella, Gabbard, & Reynolds, 2001; McWilliam, 2006). Service coordinators' ability to devote time to helping meet families' needs is thereby limited. These needs range from basic needs such as housing, clothes, food, and diapers to self-actualization needs such as finishing high

school education, time alone, and finding a job (Maslow, 1943). The routines-based interview has been described as one tool early interventionists use to determine families' needs for resources (McWilliam, 2005) as well as for the child's skill attainment (McWilliam, 2011). It also is a method for giving families the opportunity to make meaningful decisions, because it includes families' choosing their outcomes/goals.

Fundamental to family-centered practices is the belief that families and other caregivers intervene with their children between visits from a professional. Dunst (2007)wrote, "The… approach to early intervention… is consistent with the intent of the IDEA early intervention program that places primary emphasis on strengthening parents' capacity to promote their children's learning and development" (p. 162). Routines-based interventions, discussed in a subsequent section, are a primary approach that can be used with families. Its premise is that families have many opportunities to teach their children throughout the week, whereas home visiting or clinic-based professionals have usually 1 h a week (Bailey, Aytch, Odom, Symons, & Wolery, 1999). Because professionals are working with families to enhance their ability to work with the children, work with children birth to three has focused on the coaching of parents.

Coaching

The term "coaching" has gained in popularity in early intervention largely because of the writings and presentations of Shelden and Rush (Hanft, Rush, & Shelden, 2004; Rush & Shelden, 2005; Shelden & Rush, 2010). They have defined coaching as "An adult learning strategy in which the coach promotes the learner's ability to reflect on his or her actions as a means to determine the effectiveness of an action or practice and develop a plan for refinement and use of the action in immediate and future situations" (Rush & Shelden, 2005, p. 3). Although Kemp and Turnbull (2014) have criticized coaching with parents as being inconsistently defined and lacking in evidence, Friedman, Woods, and Salisbury (2012) have actually defined coaching in terms of 12 strategies they have observed in speech-language pathologists participating in a study on family-guided routines-based intervention. The ingredients of coaching included a child-focus, conversation and information sharing, caregiver practice with feedback, demonstration, direct teaching, early intervention, guided practice with feedback, individualized family support plan, joint interaction, observation, and problem solving/reflection. Clearly, not all of these mirror the collaborative nature of working with families; rather, it was an exhaustive list of the activities observed, with some being more family-centered than others.

The way professionals interact with parents of infants and toddlers during intervention sessions is still a notable feature of early intervention, whether called coaching, partnering (Espe-Sherwindt, 1990), or consultation (McWilliam, 2010a). The principles of working with families in a "coaching" way include professionals' use of adult learning principles, a collaborative consultation approach (versus expert consultation), and joint problem solving or solution finding (Dunst & Trivette, 2009; McWilliam, 2010a; Sheridan, Kratochwill, & Bergen, 1996). This approach is contrasted with early interventionists' assessing what families need, giving them directions (perhaps smoothed over as suggestions or recommendations), and returning to see how much they have followed through. That model is known as expert consultation. By taking a more reflective tactic, professionals may build families' autonomy and self-confidence (Boud, Keogh, & Walker, 2013).

Responsive Teaching

What is the optimal way for adults to interact with very young children to promote their engagement and learning? The evidence points to a responsive method. This was first brought to the attention of early intervention with Hart and Risley's (1975) incidental teaching of language, in which objects likely to interest the child were placed out of reach, to elicit the child's preverbal request, such as pointing and making noises.

The adult then prompted verbalizations or approximations of such. Over time, incidental teaching has been applied beyond language to all areas of development (Casey & McWilliam, 2008; Casey, McWilliam, & Sims, 2012). It has also been used with young children with autism (McGee & Daly, 2007; McGee, Morrier, & Daly, 1999).

Mahoney and colleagues have appropriated the term *responsive teaching* for his model, which emphasizes attending to and imitating the child's behaviors and discourages active elicitation of other behaviors, including more sophisticated forms of the behavior (Karaaslan, Diken, & Mahoney, 2013; Mahoney, Perales, Wiggers, & Herman, 2006). Modeling of behaviors, however, is permitted in this model, because that is considered a somewhat passive prompt. The model promotes reciprocity, contingency, nondirectiveness, affect, and interactive match (Karaaslan et al., 2013). In a randomized control trial in Turkey (Karaaslan et al.), responsive teaching was more effective than a control condition in terms of maternal responsiveness and children's pivotal behaviors (attention, initiation), although the families in the experimental group received 3 h of services a week more than families in the control group.

A characteristic of Mahoney's (2006) responsive teaching, contingency, matches to some extent one of the most strongly evidence-based practices in early intervention: response-contingent interactions (Dunst et al., 2007; Dunst & Kassow, 2008; Dunst, Raab, Hawks, Wilson, & Parkey, 2007). Contingent responsiveness involves the systematic application of an adult-delivered stimulus, for the purpose of reinforcing the behavior, when the child produces a desired behavior. Reinforcement, by definition, means it is contingent, *and* it increases the likelihood of future occurrences, including potentially the rate and strength of the behavior. In a review of 22 studies, verbal comments, imitating children's vocalizations, and predetermined nonverbal sounds were all found to be effective in increasing infant vocalizations, when used contingently, but imitation had the biggest effect (Dunst, Gorman, & Hamby, 2010). Dunst and colleagues have synthesized the research on infant contingency learning and developed learning games for this learning (e.g., means-end, control over the environment) (Dunst & Trivette, 2008). Notably, they also conducted a synthesis of research on caregiver responsiveness. The most effective characteristics were caregiver behavior attuned to children's signals and intents to interact, caregiver responsiveness that is prompt and appropriate to the child's behavior, and interactions that are synchronous and mutually reinforcing.

It is perhaps significant that both a constructivist and a behaviorist approach lead to the same conclusion: that adults should be sensitive to their children's cues and should respond to those cues to promote learning. Although nondirectiveness is a feature of responsive teaching, in fact, directiveness might not be the opposite of responsiveness. In a cluster analysis of teachers, based on their teaching styles, responsiveness and directiveness were seen to coexist; that is, an adult can be both responsive and directive within a teaching episode (de Kruif, McWilliam, Ridley, & Wakely, 2000). It is the balance of the two that might need to be individualized for the child. At its simplest, adult interactions can be classified along the two dimensions as (a) highly responsive and highly directive, (b) highly responsive and nondirective, (c) unresponsive and highly directive, and (d) unresponsive and nondirective. Current thinking is that there might be a place for (a), because some children need direction, as long as it is in the context of something they are interested in (i.e., it is also responsive) (McWilliam, Scarborough, & Kim, 2003). Style (b) represents the Mahoney (Mahoney et al., 2006) approach. Style (c) represents the sort of directive teaching, out of context, that the literature does not support. Style (d) similarly would not be endorsed.

Routines-Based Interventions

Where do adults carry out these interactions with children? They implement responsive teaching in everyday routines, whether in the home or in the classroom. Attention to the location and timing of caregivers' interactions with children has

evolved because of the increased realization that these routines, rather than the formal service delivery times, are when learning opportunities are available (Dunst et al., 2001; Dunst, Raab, Trivette, & Swanson, 2010). Like coaching, definitions of "routine" vary. Dunst and colleagues (Dunst, Hamby, Trivette, Raab, & Bruder, 2000) conducted a confirmatory factor analysis of home and family activities to arrive at 11 categories, several having routine as part of the title (e.g., Family Routines, Parenting Routines, Child Routines). McWilliam (2010a) defined routines as times of the day, identified by families. In a measure in which families report children's functioning in their child's day, McWilliam and Younggren (in press) present 13 routines: waking up, meals, dressing, toileting/diaper change, outings, play time with others, play time alone, nap, bath, hanging out/books/TV, grocery shopping, outdoors, and bedtime.

A review of interventions occurring in natural learning environments judged practices as contextually versus noncontextually based, child versus adult directed, and practitioner versus nonpractitioner implemented (Dunst, Trivette, Humphries, Raab, & Roper, 2001). Noncontextual practitioner-implemented practices have "increasingly been emphasized" (p. 48). Blended practices are described as a mix of child- and adult-initiated activities, as the authors found in the literature on embedding goals and objectives in the context of child-adult interactions. The authors point out that even in the natural-environments provision of the law, the implication is that practitioners will implement interventions with the child in natural environments. Dunst et al. note that this direct, hands-on approach has three problems. First, the context might no longer be natural, if the practitioner works with the child out of context with the natural learning environment. Second, the amount of time spent working with the child in the absence of parent participation is so small in the child's week that it is unlikely to have any impact. Third, no studies, in 2001, had shown the efficacy of Part C *services* [authors' emphasis] in natural environments. Therefore, the point of working in the context of natural routines highlights the phrase in *the context of*. This work does not mean working with the child during those routines (Hanft & Pilkington, 2000); it means working with the family (or teacher, in classroom programs) *about* child and family functioning in natural routines.

This subtle but important difference has had implications for another variation on this practice: embedded interventions. The concept of embedding intervention on children's individual goals and objectives in routine, planned, or child-initiated activities was described by Bricker and Cripe (1992) as activity-based intervention. It was subsequently defined as something parents could do as the opportunities arose in "meaningful" activities, which were not articulated (Cripe & Venn, 1997). The locus of embedding then was considered to be daily routines (Fox, Dunlap, & Cushing, 2002; Woods, Kashinath, & Goldstein, 2004). In the face of much decontextualized intervention for children with ASD (Bellini, Peters, Benner, & Hopf, 2007), it is noteworthy that embedding intervention in daily routines has been supported for infants and toddlers who are at risk for ASD (Woods & Wetherby, 2003). McBride and Schwartz (2003) provide an overview of the considerable amount of research supporting the efficacy of embedding instruction into ongoing activities. These authors point out that embedded instruction is sometimes considered "naturalistic instruction." When naturalistic interventions are organized to ensure that they are frequent, context based, and following the child's interest, they are likely to be effective. When "naturalistic intervention" is used to describe a haphazard rate with undocumented quality of implementation (i.e., informal fostering of children's learning), its likely efficacy comes under question (Wolery, personal communication, February 17, 2012).

Service Coordination

IDEA requires that service coordination be offered to every family receiving Part C services. The service coordinator is responsible for ensuring the IFSP is developed, reviewed, updated,

and closed. He or she helps the family find resources to meet their IFSP outcomes (i.e., goals), whether provided by the system or not. That is, unlike the individual education program (IEP), the IFSP lists services required by law (assuming appropriateness for the child) and other resources, such as a parents' morning-out program, a library story hour, or a program offered through the Y. The service coordinator is the individual at the point of a potentially controversial decision: the frequency and intensity of services.

In the development of the IFSP, services are to be decided once IFSP outcomes have been determined. This is sometimes violated, with the "team" deciding on services and the service providers (e.g., therapists) writing discipline-specific outcomes (Jung & McWilliam, 2005). The frequency and intensity of each service is required on the IFSP. If a primary service provider approach is being followed, one professional's service will be frequent (e.g., hourly per week), with other professionals' service less frequent (e.g., hourly every 3 months or 240 min a year). If a multidisciplinary approach is being followed, two or more services will be listed at the same frequency and intensity (e.g., hourly per week). If the family or a professional on the team insists on higher frequency than the service coordinator recommends, that service coordinator now has a potentially difficult situation. If he or she can provide a strong rationale for the primary service provider approach (e.g., it is intervention time that matters, and that is not correlated with service time) and is confident about the decision, all is well. If not, either the service coordinator capitulates or the family (or advocating professional) is left unhappy. This critical point in service delivery requires virile administrative support in both service coordination policy and in managerial support of the service coordinator.

The rationale for dedicated service coordination is twofold, to restrict the mindless piling on of services (McWilliam, 2011) and to have a person separate from the providers, so the family can speak freely about any concerns they have about services. In a study of families of infants and toddlers enrolled in Part C, the dedicated and independent model, where service coordinators were from a different agency from the providers, was associated with fewer services and less frequent contact compared to two other models: service coordination that was dedicated but not independent and blended service coordination (Bruder & Dunst, 2006). Considering the piling on of services that sometimes occurs, as mentioned earlier, it is unclear whether fewer services are a good or a bad outcome.

How service coordination is managed is up to the states. A review of policy infrastructures supporting service coordination identified three dimensions of the infrastructure: the responsibilities of the service coordinator, the IFSP, and policies facilitating a comprehensive and coordinated services system (Harbin et al., 2004). Most states were found not to have a sufficient infrastructure, but these data were collected at the turn of the century. Park and Turnbull (2003) wrote that service *integration* was affected by interpersonal (e.g., openness, sharing information, showing empathy) and structural factors (e.g., funding streams, duplication of services, documentation system). The family-centered practices described earlier apply to service coordination as well as to service provision. In fact, the more service coordinators adhere to a family-centered model, the more satisfied families are with their service (Romer & Umbreit, 1998). Bruder and Dunst (2008), who have undertaken the most complete research on service coordination, found that family-centered practices were the strongest predictor of whether service coordinators performed the services the researchers had identified as important. Blended service coordination was associated with more implementation of the services than was dedicated service coordination. One of the key services provided by service coordinators is preparing the family for the transition from Part C to Part B: preschool services.

Some states have adopted a vendor model, in which "dedicated" service coordinators find independent or agency-affiliated professionals to staff the IFSP team (McWilliam, 2011). In these environments, professionals are competing for the early intervention business. A by-product is lack of accountability through supervision or

practice guidelines, especially for professionals who do not report to supervisors. This situation has become quite pervasive in the delivery of services to children with autism, with independent service providers accountable only for providing the hours stipulated on the IFSP but not for the quality or type of service they provide. Many occupational, physical, and speech therapists working with any children in early intervention have similar freedom, which makes the promotion of evidence-based practices or the implementation of a model challenging.

Transition to Preschool

Most children in Part C services go on to be served by their local school systems' early childhood special education program (Hebbeler et al., 2007). This transition on or near the child's third birthday, which is required by IDEA (with an option to continue the IFSP), can be justified only in terms of history (preschool grants had been given to schools for years before Part H, now Part C, was legislated), politics (state education departments wanted the funds), and beliefs (that school systems were conceptually and practically equipped to provide developmentally appropriate preschool services). In presenting a unified theory of practice, Odom and Wolery (2003) listed three practices for "developmentally instigative adults" (p. 166) to enhance transitions across programs:

- Assessing the demands of the next setting and teaching needed skills (Le Ager & Shapiro, 1995)
- Preparing personnel and/or family for transition to next setting (Wilson, Allen, & Pfalzer, 1996)
- Interagency agreement to smooth transitions (Rosenkoetter, Whaley, & Hains, 2001, p. 166)

The transition from home-based supports to preschool services, which is pervasive at age 3 in the USA, makes parents anxious. In a study of family perceptions of transitions in early intervention, 43 % of families said they were uncomfortable with this transition, but parents were grateful to be entering their children in preschool (Lovett & Haring, 2003). Interestingly, parents liked having more service at 10 h a week of preschool versus 1 h a week in birth-to-3 services. If the 1 h a week was interventionist driven, then the families might have been correct. But again this is an example of confusing service time with intervention time. Almost 25 years ago, concerns families expressed about transition planning were about transfer of parents' friendships with professionals to new people, changes in service delivery (e.g., shift from family-focused to child-focused services), discrepancies in eligibility, and variations in labeling and concerns about social acceptability (Hains, Rosenkoetter, & Fowler, 1991). In a study of the role of independent therapy providers in the transition to preschool, the most commonly reported strategies for participating in the transition were working with families, attending meetings, and communicating with receiving therapists (Myers, 2007). Barriers were identified as lack of time and low support from service coordinators. The low support from service coordinators was mostly not putting therapists on the intervention plan at the rate therapists thought appropriate. All child and family transitions should be planned for, but the age 3 one is especially rough (Fowler, Hains, & Rosenkoetter, 1990). First, the infant-toddler service system is very different from the preschool service system. Second, families have to make the transition when they are still figuring out the accommodations needed because of having a child with special needs. Third, they might have to break off close relationships they have formed with their early intervention professionals.

By no means are these seven practices the only recommended ones in early intervention for children birth to 3 (Division for Early Childhood, 2014), but they represent the major activities of this critical program of supports. The future of early intervention rests on consideration of four aspects.

Considerations for the Future

The delivery of individual services and the dosage of service, the methods of service delivery, the quality of services, and the options available

to the changing population of children in early intervention all demand deliberation. This section of the chapter addresses these issues briefly.

Service Delivery Models

The service delivery model still pervasive in most of the USA and overseas for children birth to 3 is a multidisciplinary one, with practitioners visiting or being visited by children and working directly with the child (Appleton, 2014; Boyer & Thompson, 2014; Shelden & Rush, 2001). The extent to which the parent is an active participant in the session is crucial for identifying the beliefs of the professionals and the likelihood of the interventions being applied, by the parent, after the session is over (Kellar-Guenther, Rosenberg, Block, & Robinson, 2014; Raab & Dunst, 2004). If the professional understood that the child has more chance of benefiting from the intervention if regular caregivers implement it during the week, he or she would presumably concentrate on supporting the caregivers during the session (Friedman et al., 2012). If the IFSP "team" (unfortunately defined simply as the people listed for providing services) believed in building family capacity, they might reconsider each person's visiting the family separately to work with the child (Dunst, Bruder, & Espe-Sherwindt, 2014). The primary service provider approach is a promising practice for improving teamwork (i.e., professionals actually supporting each other as well as the family) and for recognizing that support to families and partnership with them during the visit potentially has a stronger impact than working directly with the child.

Use of Technology

In 2013, the Pew Research Center announced their finding that 56 % of all US adults have smartphones (Pew Research Center, 2013). The USA ranks second in the world, behind China, in the number of internet users, with a penetration of 85.75 % (International Telecommunications Union (Geneva), 2013; U.S. Census Bureau, 2012). The days of reliance solely on face-to-face support to families are fading. Already families are video recording their children to show their early interventionists, professionals and families are exchanging ideas about websites, and professionals are showing videos of interventions to families. Innovations that hold promise for scaling up are (a) iPad apps that teach parents intervention activities (Venkatesh, Phung, Duong, Greenhill, & Adams, 2013), (b) technology-supported performance feedback to families (Marturana & Woods, 2012), (c) virtual home visits via teleconferencing (Olsen, Fiechtl, & Rule, 2012), and (d) coaching parents of children with hearing impairment through telepractice (Hamren & Quigley, 2012). A survey of Part C state and jurisdiction coordinators ($N=27$) revealed that nine were using or planned to use telehealth as an adjunct service delivery model (Cason, Behl, & Ringwalt, 2012). The virtual home visit, telehealth, telepractice, and telerehabilitation (Cason, 2011) are all terms for having the professional in one place and the family in another. Experts have been careful to describe this as an *adjunct* service, in the implied belief that it would not replace face-to-face support entirely. But especially when families are very dispersed in rural areas, weather prohibits travel, or other access issues prevail, "tele-intervention" especially via Skype or Facetime seems promising.

Another innovation is the use of Language Environment Analysis (LENA™) devices, which record child and adult vocalizations as well as electronic sound (e.g., television, radio), producing graphs of the amount of vocalizations throughout the day (McWilliam, 2014). The child wears the recording device in a vest, and the professional exports the data to a computer with the LENA™ software (Dykstra et al., 2013). Although no studies appear to have been published for use in early intervention, the possibilities, especially for providing feedback to families about the amount of their talk, at different times of the day, might be valuable, considering the benefits to children of the number and quality of words heard (Hart & Risley, 1995).

Training and Supervision

Early intervention is a somewhat private affair, with professionals working in homes, for the most part (US Department of Education, 2014). Unlike school programs, where various adults might be in and out of classrooms, my experience is that home-based programs are not observed often, if at all. Literature on this issue is almost empty, raising questions about the extent to which in vivo training and supervision occur for home-visiting practices. In research, some protocols have been developed, which might also be used by faculty in teaching—at least at the institutions where the protocols were developed (Fleming et al., 2011; Friedman et al., 2012; Marturana & Woods, 2012). For the field to have well-trained professionals serving infants and toddlers with disabilities and their families, professional developers and supervisors will need to overcome barriers to observation- and performance-based feedback (Ledford & Gast, 2014; Powell & Diamond, 2013).

Classroom-Based Options

Research on classroom options for infants and toddlers with disabilities is sparse. The synthesis of research funded by the Institute of Education Sciences in the US Department of Education dealt almost exclusively with preschool (ages 3–5) classroom practices (Diamond, Justice, Siegler, & Snyder, 2013). Stowe and Turnbull (2001) addressed the legal considerations of inclusion for infants and toddlers, which include the right to inclusive settings, including classroom programs. The extent to which children in early intervention are in child care programs is impossible to determine, because the service delivery method for providing itinerant early intervention (i.e., professional visiting the center) is usually part of "home-based" services. So that is what is reported to the US Department of Education. The community setting is usually not the location listed as the primary setting for early intervention, when a "home visitor" goes to the center. The challenge for the field is to determine the availability of specialized but inclusive settings. Perhaps owing to the push for natural environments, the field has become bifurcated into either homes and child care programs or early intervention centers and provider offices (Kellar-Guenther et al., 2014). The middle option might need to be explored, especially with an increase in children who need intensive intervention but who obviously should not be segregated just on the basis of the severity of their needs. A classroom-based program would provide these families with specialized information, the child with specialized interventions, and the community with an option beneficial to both children with disabilities and children without disabilities.

Few people dispute that early intervention for infants and toddlers and their families is necessary. Not only does it provide children with interventions but it provides families with emotional support, material support, and informational support (McWilliam & Scott, 2001). The direction of early intervention in the next few years is likely to encompass more attention to everyday routines and a stronger partnership with families, especially in helping them take advantage of the learning opportunities they offer their children (Boavida, Aguiar, & McWilliam, 2014; Dunst et al., 2014).

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Assessment in Early Childhood Special Education

6

Scott R. McConnell and Naomi L. Rahn

Assessment

Assessment has long been acknowledged as an essential feature in the provision of early childhood special education (ECSE) services. In this historical position, assessment serves as a major element of eligibility determination (Salvia, Ysseldyke, & Bolt, 2012) and a required element of intervention planning and ongoing evaluation for children and families (McLean, Wolery, & Bailey, 2003). However, in recent years rapid and significant growth has occurred in the sophistication of assessment practices available for young children with disabilities and their families and broader application of these practices in a wide range of settings. The purpose of this chapter is to provide an overview of this historical role and to highlight features of the emerging uses of assessment as a central feature of high-quality services for infants, toddlers, and preschool children with disabilities, their families, and those who serve them.

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Here we make a case for an expanded view of assessment as an essential part of the system that contributes to improved outcomes for children. We argue that assessment practices, carefully aligned and intertwined with formal and informal services and supports, increase the efficacy and efficiency of societal efforts to promote young children's development. Given this approach to assessment, we describe basic features of assessment, including its core purpose and functions and the quality standards for its use, and review four major functions of assessment in early intervention and ECSE: eligibility and identification for specialized intervention, program planning, intervention and fidelity assessment, and progress monitoring.

Assessment's Historical Role and Transition to Contemporary Practice

At the outset of formal services for young children with disabilities, from the 1950s through the 1980s, assessment in early intervention and ECSE focused primarily on individual child description and eligibility evaluation (McLean et al., 2003). Formal and well-evaluated assessment tools are available for this purpose. These tools reflect both comprehensive and broad models of child development and performance such as the *McCarthy Scales of Children's Abilities* (McCarthy, 1970), *Stanford-Binet Intelligence*

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Scale (Terman & Merrill, 1972; Thorndike, Hagen, & Sattler, 1986), and *Wechsler Preschool and Primary Intelligence Scale* (Wechsler, 1963, 1967) or more specific criterion-referenced or curriculum-embedded measures of child development such as the *Hawaii Early Learning Profile* (Furuno et al., 1979) or the *Carolina Curriculum* (Johnson-Martin, Jens, Attermeier, & Hacker, 1986).

These assessments, and others like them, became common in part because of federal and state legislation and regulation creating and expanding legal mandates for services to young children with disabilities. Perhaps most noteworthy was early attention to assessment for child find and eligibility determination; from the outset, preschool special education services could only be provided following determination of either an established disability or "developmental delay" (i.e., when a child's assessed development varies significantly from normative expectations). To meet the needs of teams making this latter determination, researchers and commercial publishers released a new generation of measures to provide norm-referenced assessment across multiple domains (e.g., *Battelle Developmental Inventory*; Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984/1988). While federal and state law and regulations required formal description of intervention targets and assessment of child progress toward them (i.e., as goals and objectives on Individualized Family Service Plans [IFSPs] or Individual Education Plans [IEPs]), this aspect of special education and related services was generally teacher- or therapist- and child-specific, and less dependent on formal practices.

Yet over time, growing evidence of relations between preschool skills and development and later academic, social, and other performance led to continued research and development of refined intervention procedures for infants and preschoolers (Ramey & Ramey, 1998). This led to the development and increased use of assessments that helped specify intervention targets and substantially increased formal attention to assessment and monitoring of the development of individual children receiving specialized supports (e.g., American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2002).

Defining Assessment

While the border between *assessment* and *intervention* continues to blur (Bagnato, Neisworth, & Pretti-Frontczak, 2010), assessment's core features remain consistent. Similar to others (c.f., Anastasi, 1988; McLean et al., 2003; Salvia et al., 2012), we define assessment as *the systematic collection and evaluation of information to determine what, if anything, to do differently*.

Assessment occurs in a wide variety of situations and serves as an essential guide for design, selection, application, and evaluation of intervention practices. "Systematic collection … of information" makes clear the intentional, purposeful, and rigorous features of any assessment practice. While the collection can occur in many different ways (e.g., teacher ratings, observational assessments, or evaluations of responses to items on standardized tests), "systematic" means that conditions and procedures for data collection are specified, known, and generally common across time, individuals, and settings.

"Systematic … evaluation of information" speaks to specified procedures, rules, and practices for considering collected information and, against some standard or a priori criterion, producing some judgment or appraisal. This step is critical for turning data into actionable information. For many, this element of any assessment is core to its value (Messick, 1990).

"Determining what, if anything, to do differently" follows naturally from this step and brings practical utility to any assessment-based judgment. Specific questions (e.g., does this child's performance vary from criterion or expectation?) often direct assessments: the answers should lead to actions that bring social utility to the assessment.[1] In particular, determining what to do differently should lead to determining if current services, supports, or conditions are appropriate or if different actions will better serve the individual(s).

[1] This element of our definition, calling for determination of practical actions, may differentiate our perspective from others. We believe this practical determination is a central feature to assessment that contributes to improved outcomes rather than data collection and evaluation that produce nothing more than "assessment reports."

This last feature, using data to determine specific courses of action, expands existing definitions that focus solely on collecting and analyzing information; here, a central expectation is that assessment contributes to monitoring and improving outcomes. Our system of educational and developmental services, including special education and related services, is predicated on the connected ideas that individual developmental achievement is driven (at least in part) by experience and interaction, and that variations from expected rates of achievement can (and often, must) lead to changes in these experiences and interactions to more successfully support a child's development. By focusing on the status and development of a child *and* the services and supports related to observed development, the central role and contributing features of assessment in a larger system of "special education and related services" become clear.

This notion that assessment practices can contribute to improved outcomes highlights at least three features of a more contemporary set of practices. First, assessment should help identify children who will benefit from additional, or different, services and supports. This identification may be global, as in determining eligibility for special education and related services and providing procedural safeguards; conversely, the identification may be narrow, specific, and dynamic, as in the screening practices of multi-tiered systems of support (Greenwood, Carta, & McConnell, 2011). Second, contemporary practices must provide ongoing dynamic descriptions of children's progress and related practices: we must monitor how children develop and use this information frequently to adjust the intensity, focus, or other features of intervention. Third, contemporary assessment practice must closely align with intervention, which in turn must closely align with intended developmental outcomes. "Intervention" is not a general, nonspecific action but a set of specific practices that produce particular outcomes; thus, assessment practices must guide the selection and use of intervention practices to promote intended outcomes for individuals and groups of children. These three features—identification, monitoring, and alignment with intended outcomes—maximize the efficacy and efficiency of assessment practices and their contribution to improved outcomes for children.

Basics of Assessment

Purposes of Assessment

Assessment as defined here can occur for various purposes, and characteristics of assessment will vary due to these different purposes. For instance, some assessments in early intervention and ECSE are completed to meet federal, state, or local statutory or regulatory requirements; US regulations require that states develop procedures for determining possible eligibility for early intervention or ECSE, ensuring "a timely, comprehensive, multidisciplinary evaluation of each child, birth through age two, referred for evaluation, including assessment activities related to the child and the child's family" (34 CFR 303.322). In these cases, many assessment features (instruments, characteristics, administrators' qualifications, and interpretation or evaluation standards) may be specified in advance.

Other times, assessments will take place to inform teachers in the design or evaluation of instructional and other services or to apprise parents and others of children's growth or progress. In these instances, assessment practices are likely to be more specific, more varied across programs and time, and with fewer a priori evaluation or interpretation standards.

Assessments can help describe groups for program planning and evaluation, policy analysis and development, or communication with the public. Kindergarten entry assessments, like those developed as part of federal Race to the Top-Early Learning Challenge Grants to states, will provide "lagging indicator" information about the success of early childhood policy and practice innovations in states and local jurisdictions that will be useful in evaluating and refining early childhood services. Similarly, the *Early Development Instrument* (Janus et al., 2007; Janus & Offord, 2007) was developed as a "leading indicator" to describe the school readiness of

groups of children (in a neighborhood, city, state, or province).

Evaluating, selecting, and implementing any assessment must begin with a clear statement of intent: *who* is the focus—an individual child or family, that child or family in a particular situation or context, or a group of children? What are the *areas of development* that must be assessed? How will the data be *used*? What *degree of confidence and precision* is needed?

Functions of Assessment

These purposes can be sorted and classified as different assessment *functions* (Hawkins, 1979). In most cases, ECSE assessment practices are directed to individual children; at this level, we can identify five primary functions. First, assessments can *identify children who may benefit from additional or compensatory services and determine their eligibility for special education and/or other related services*. This type of assessment ("diagnosis") is often the first part of a longer sequence for one child and is often a requirement for providing early intervention or ECSE.

Next, children will encounter *assessment for program planning*. Due to the requirements of individualized educational planning in special education and the low fidelity of current diagnostic assessments in education and development, detailed information is needed to determine *what* to teach (and often *how best to teach it*) to children needing preventive or compensatory services. This function of assessment can sometimes benefit from information typically gathered in identification and eligibility determination but generally will also require information that is more detailed, specific, and narrow in scope.

Third, given contemporary problem-solving models (Tilly, 2002) and the challenges in implementing even well-specified interventions (Cook & Odom, 2013), there is increasing attention to *assessment and monitoring of interventions*. This is critical in implementing some interventions and provides vital information during review or revision of intervention services.

Last, best practices require ongoing *assessment of intervention efficacy or monitoring progress toward desired outcomes*. By definition, ECSE is provided in cases where typical experience does not produce desired developmental outcomes: a different type or amount of experience is assumed to be necessary to promote that development. To assure that plans to support development work, ongoing assessment of child growth and development over time (and related evaluation of the rate of change in observed developmental achievement) will determine what (if anything) to change.

Quality Standards for Assessment

To meet statutory and best practice standards, assessment practices must be rigorous and applied with care. However, standards for high-quality assessment vary somewhat by function or purpose. To paraphrase a truism, there are no "good" assessment instruments or practices: rather, we evaluate them for their particular function and intended use.

Reliability. Historically, assessment instruments were evaluated for reliability and validity. *Reliability* is the extent to which any assessment product or score is *trustworthy*, or "the consistency of scores obtained by the same persons when reexamined on different occasions, or with different sets of equivalent items, or under other variable examining conditions" (Anastasi, 1988, p. 109). Measurement, in any case, includes information (the *true score*) and random noise (*error*). If one person takes two measures of the same thing, one after another, some minor difference in results will appear. The size and characteristics of this difference define reliability.

While many forms of reliability exist in the measurement literature, in ECSE reliability is typically evaluated in three ways. First, *internal consistency* describes the empirical cohesiveness of a set of items or scores added into one sum. To the extent that different items correlate with one another, or different assessment instances sample the same broad idea or construct, internal consistency increases.

Second, *interrater* or *interobserver agreement* describes the extent to which two independent assessors score a particular behavior or response similarly. Many early childhood assessments rely on direct observation of discrete child behaviors and classroom events or on slightly more summative ratings completed by teachers or others of child performance, activities, or interactions. When assessments occur this way, it is critical to evaluate the degree to which results reflect characteristics of the assessed content rather than the standards and judgments, or biases, of individuals collecting the data. As people's judgments vary from one another, interrater agreement estimates decline.

Third, ECSE assessment is often evaluated for *temporal consistency* or *test-retest reliability*. Many traditional assessment instruments assume that child characteristics remain relatively stable. While this is not always true in ECSE (Kazdin, 1979; Strain et al., 1992), particularly when monitoring progress or if child behavior is highly variable across situations or conditions, there are many instances where consumers find it important that assessment results appropriately represent a child's achievement or performance at a particular point in time. This is critically important in many normative comparisons, where (for both the child being assessed and scores coming from participants in the norming samples) teachers, parents, and others can assume that observed assessment results minimize any variation due to the day or time of assessment.

Validity. Validity is the meaningfulness of any assessment or information about "*what* the test measures and *how well* it does so" (Anastasi, 1988, p. 139, emphasis in original). Cronbach (1990, p. 145) describes validity as the result of "inquiry into the soundness of the interpretations proposed" from any assessment. Validity studies provide evidence of the extent to which results of assessment can be useful, as generally intended by test developers or for the purposes in a particular case. Unlike most measures of reliability, where explicit standards for evaluating and selecting assessments exist, validity standards are somewhat more general and idiosyncratic to the purpose of assessment and sometimes the instrument or practice itself (Messick, 1995).

Traditionally, three types of validity are discussed (c.f., Anastasi, 1988). *Content validity* describes the extent to which a particular assessment samples the behaviors, situations, and/or interactions of interest for a particular assessment purpose. Content validity is often determined logically by examining both items and conditions of any assessment and comparing these to generalizations teachers or others might want to make from assessment results. *Criterion validity* evaluates "the effectiveness of a test in predicting an individual's performance in specified activities" (Anastasi, 1980, p. 145), including future tests and life events. Examples might include the extent to which a measure of language and early literacy collected in preschool predicts reading performance in early elementary school or the degree to which a measure of developmental risk status collected at age 3 predicts later performance on a kindergarten entry assessment. Third, *construct validity* is "the extent to which the test may be used to measure a theoretical construct or trait" (Anastasi, 1980, p. 153). While construct validation is often more abstract (c.f., MacCorquodale & Meehl, 1948), the core idea (e.g., "is this assessment measuring what it purports to be measuring?") pervades all validity discussions, and may be particularly important in diagnostic assessment activities, where statutory or professional standards call for assessment of broadly defined domains like "developmental delay" or "kindergarten readiness."

Another validity standard is emerging in ECSE. *Treatment validity* (similar to *consequential validity*; Messick, 1988) is the extent to which an assessment practice informs or helps design instructional or other intervention services that produce meaningful changes in an individual's (or group's) performance. Treatment validity can be assessed over a short period of time, as when an assessment practice is used to identify or refine instructional practices or intervention options in a child's current educational programming, or over longer periods of time, as when identifying changes in services or placements to

benefit child development and achievement (Connor et al., 2009).

Modern interpretations. In the latter half of the twentieth century, academic psychometricians developed and deployed new logical and analytic models to the design, evaluation, and use of tests. This "modern test theory" approach, most notably item response theory (IRT: Embretson & Reise, 2000; Wilson, 2005), is now commonplace in education generally and ECSE specifically (Greenwood, Carta et al., 2011; Greenwood & McConnell, 2011; Rodriguez, 2010).

While many details of IRT differ markedly from older approaches, core concepts remain the same. In general, assessments should be *stable or consistent* to reflect a child's performance or development, *meaningful and well specified* as to child or other characteristics, and *useful* in choosing short- or long-term changes in intervention and services.

While technical features of test and measurement construction continue to develop, offering new and perhaps better tools for building and evaluating assessment practices, many of the functional requirements and bases for evaluating them remain the same. End users can, and should, have information to help evaluate the precision, trustworthiness, meaningfulness, and utility of information.

Assessment for Identification and Eligibility

Definition

A common, widely understood, measurement task in ECSE is to identify children who may benefit from additional or compensatory services, including determination of eligibility for special education and/or other related services. In current practice, this stage combines two otherwise distinct functions, *screening* and *diagnosis*. Technically, *screening* refers to a brief, broadscale evaluation used to identify individual cases when more information is needed. In current multi-tiered systems of support, screening often refers to universal and repeated assessment of developmental achievement or growth in a larger group (e.g., classroom, school, program, or community), with the results used to identify those who would benefit from more intensive or supplemental intervention (Christ & Nelson, 2014; Greenwood, Carta et al., 2011). In ECSE, *diagnosis* refers to formal evaluation of individual children for special education eligibility or program enrollment. Diagnostic assessment is typically broad in scope and includes direct or indirect assessment of child status, characteristics, developmental trajectory and, often, environmental supports, comparing this to normative or other a priori standards or criteria and identification of individuals, based on this comparison, who are deemed to meet inclusion criteria for particular program services or procedural supports and safeguards (McLean et al., 2003).

Examples

Screening. McConnell, Wackerle-Hollman, and Bradfield (2014) describe screening practices to identify individual children for intervention in language and early literacy multi-tiered systems of support. These systems are increasingly common in early childhood programs serving children with and without disabilities and can identify individual children who are not acquiring age- or domain-appropriate skills related to the long-term achievement of reading proficiency so that these children can receive further help to improve their achievement (Carta et al., 2016).

The Center for Response to Intervention in Early Childhood (Bradfield, Vue, Rodriguez, & McConnell, 2014; Bradfield, Wackerle-Hollman, Albano, Rodriguez, & McConnell, 2014; Wackerle-Hollman, Schmitt, Bradfield, Rodriguez, & McConnell, 2015) has developed one universal screening approach in this area. In this model, Individual Growth and Development Indicators of four domains of language and early literacy development (i.e., oral language, phonological awareness, alphabet knowledge, and comprehension) have been developed, evaluated, and constructed into three measures, designed to be completed in Fall, Winter, or Spring in the year

before kindergarten. Each consists of 15 items, selected specifically to increase sensitivity to identifying lower-performing students in that season. Adult examiners assess all children in a classroom, comparing individual students' scores to empirically derived "cut scores," or scores for each measure that best identify children who are performing well below expectation and likely to benefit from supplemental instruction.

Evidence from early research and development (Bradfield, Wackerle-Hollman et al., 2014; Wackerle-Hollman et al., 2015) suggests that seasonal screening measures are trustworthy and closely associated with established, standardized measures of language and early literacy. They also identify children in ways that match with teachers' clinical judgments of their needs and intervention candidacy based on longer standardized measures. Classification accuracy can be improved by gathering additional information from teachers (Bradfield, Vue et al., 2014). Research on this model of screening for supplemental intervention proceeds (McConnell, Wackerle-Hollman, Roloff, & Rodriguez, 2014), including expansion to Spanish-speaking preschool children (Wackerle-Hollman et al., 2012).

Screening also occurs in community-wide child-find efforts to identify those who may benefit from early intervention for infants and toddlers with disabilities and ECSE for preschoolers with disabilities and delays. The *Assuring Better Child Health and Development (ABCD) Program*, funded by the Commonwealth Fund and administered by the National Academy for State Health Policy, is an integrated state-level approach to screening for a broad array of health and development concerns (Pelletier & Abrams, 2003). Now implemented in over 25 states, ABCD aligns state policy, funding, and practice development to increase the frequency of screening in primary health care and other settings and to better coordinate response to screening results (National Academy for State Health Policy, 2014). While intentionally varied to reflect unique policy and practice contexts in different states, ABCD focuses on broad, consistent use of a small set of evidence-based screening instruments, along with public/private quality improvement partnerships to review and improve screening penetration and follow-up. A variety of practices have emerged at state and local levels (Earls & Hay, 2006; Pelletier & Abrams, 2003), but challenges remain in increasing universal screening rates and in using these practices to refer children to more extensive evaluation (Bethell, Reuland, Schor, Abrahms, & Halfon, 2011; King et al., 2010).

Diagnosis. Importantly, ECSE diagnosis is the "front door" to an array of special education safeguards and assurances, coordinated services, and opportunities for effective services and developmental achievement that support future competence. Perhaps due to its central role in providing special education, this aspect of assessment has a long, rich, and well-developed matrix of research, measure development, and practical implementation (Division for Early Childhood, 2014; Shonkoff & Meisels, 1990).

In 2014, the Division for Early Childhood (DEC) of the Council for Exceptional Children published a fully revised compendium of best practices in ECSE, *DEC Recommended Practices in Early Intervention/Early Childhood Special Education.* This document presents "best-in-class" procedures that are supported by research and consistent with the values and expectations of contemporary practice, observable and actionable in practice, applicable to all children with and without disabilities, and appropriate for use in a wide array of settings and situations.

Seven of these best practices describe assessment for diagnosis. In particular, diagnostic assessment should (1) adapt planned assessment practices, to the extent possible, to follow families' preferences for this work; (2) employ a team of professionals and family members to collect and evaluate assessment data; (3) employ assessment practices that are appropriate, given the child's age, individual characteristics, family, and life circumstances; (4) conduct a broadscale assessment that describes "the child's strengths, needs, preferences, and interests; (5) conduct assessment in the child's preferred and most fully developed language or communication system; and (6) report the results in ways that both address a priori evaluation standards for eligibility determination and that are understandable and useful

for families and other professionals. Finally, consistent with other recommendations (American Educational Research Association et al., 2002), when making important decisions that may affect individuals and resources, "… practitioners [must] use a variety of methods, including observations and interviews, to gather information from multiple sources, including the child's family and other significant individuals in the child's life" (DEC, 2014, p. 7).

Key Features of Quality Implementation

Practices in this domain of assessment for identification and eligibility vary widely, as do the questions that assessment and evaluation reports can answer. Across all these practices, three key features of quality implementation can be described.

First, it is essential that all assessment instruments and practices be selected for their "fit" to the evaluation purpose and for the questions at hand. Second, assessment instruments and practices must be easy to understand and must meet appropriate standards of rigor for planned uses. Third, assessment for identification and eligibility should be efficient, both for the immediate task and for subsequent services and supports to children and families. As *DEC Best Practices* suggests, any assessment should be appropriate for the questions to be addressed and the individual case at hand.

Assessment for Program Planning

Definition

Assessment for program planning identifies gaps in a child's skills and competencies and areas of need and provides the information needed to identify instructional goals and objectives and to inform teaching methods for immediate intervention use. The assessment compares a child's skills to a set of skills considered important for participating in age-appropriate activities. For infants, toddlers, and preschoolers, these skills might come from a criterion-referenced assessment such as the *Assessment, Evaluation, and Programming System* (AEPS, Bricker, 2002) or the *Hawaii Early Learning Profile* (HELP; Furuno et al., 1979). Teams might also use state early learning standards or program-specific frameworks (e.g., The Head Start Child Development and Early Learning Framework, U.S. Department of Education, 2011) as a basis for examining children's skills compared to expectations for their age level. For early elementary students, comparison skills typically come from standards such as the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010) or state-developed standards (c.f., Texas, Minnesota) that focus on basic academic skills.

Assessment for program planning in ECSE can be characterized by five principles. First, assessment is directly linked to intervention. Information collected and analyzed during this part of the process leads directly to the use of that information for planning individual children's intervention programs (Bagnato et al., 2010; Bricker, 2002; Macy, Bricker, & Squires, 2005). The field of EI/ECSE has long linked assessment and intervention (McConnell, 2000). Assessment must focus on skills important for participating in home, classroom, and community activities that are expected given the child's age and developmental level. Similarly, the assessment outcomes should inform the intervention, with the team teaching skills the child needs.

Second, this assessment examines the child's use of functional or useful skills important for participation in authentic contexts (Neisworth & Bagnato, 2005; Snyder, Wixson, Talapatra, & Roach, 2008). Traditionally, diagnostic assessment occurs in the context of unnatural and even strange situations and often focuses on skills of questionable importance for the child (Bronfenbrenner, 1977). For example, a traditional standardized assessment might require that we assess an infant's grasping and releasing skills. In contrast, an authentic programmatic assessment might instead assess the infant's

ability to stack foam blocks during play with a parent (i.e., an authentic, typical activity for a young child).

Third, assessment for program planning is flexible and adaptable for children with varying needs (Snyder et al., 2008) to ensure equity and "fit" to the individual case (Neisworth & Bagnato, 2005). Typically when administering standardized assessments, all items are administered in the same way and do not allow for modifications. In contrast, when assessing for program planning, the user can modify procedures and materials to accommodate the child's skills and needs. For example, for a child who is deaf, items might be administered using spoken language and American Sign Language to fully assess functional communication skills.

Fourth, the assessment process is family friendly (Bagnato et al., 2010; DEC, 2014; Grisham-Brown & Pretti-Frontczak, 2011). During early childhood, parents and other family members are integral to a child's life. Young children typically spend a large part of their day with mom, dad, a grandparent, or other primary caregiver. These relationships are critical for healthy social-emotional development, and caregivers play an important role in helping the child learn new skills. In addition, family members know their child best. Teams gather information from families and listen to their concerns to gain an accurate picture of a child's strengths and needs.

Fifth, the process is dynamic or repeated, collecting information in an ongoing way to provide information about the child's skills across time to inform programming decisions (DEC, 2014; Grisham-Brown & Pretti-Frontczak, 2011). Rather than administering a criterion-referenced assessment only once when the child is first eligible for services, teams collect ongoing information by reassessing the child's skills to inform changes to intervention.

Program planning assessment should focus on skills essential for the child's success within everyday routines and activities in the home, school, and community. For infants and toddlers, this will often include gross motor, early communication, and self-care in home or care settings. For preschoolers the scope may expand to include social interaction and pre-academic skills required in inclusive preschool, home, and community settings.

Examples

Given the vast changes in children's development during early childhood and shifting emphases in programs as they begin school, assessment for planning intervention varies depending on the child's age. For infants and toddlers with special needs, the focus should be on supporting the family to maximize outcomes (Bruder, 2010; Johnson, Rahn, & Bricker, 2015). Both the Routines-Based Interview (McWilliam, 2003) and the AEPS Family Report (Bricker, 2002) provide a format to gather information about the child's daily routines and activities (e.g., meals, bathing, and dressing) and family preferences regarding intervention targets. This assists the team in identifying desired outcomes important for the child's functioning during everyday activities. Intervention strategies can then be embedded within authentic activities and routines using toys and materials available in the home.

In preschool, a child-centered approach is more directly informed by the current and future demands of academic and behavioral school success. The AEPS (Bricker, 2002) is an example of a comprehensive tool used to identify the child's skills. AEPS items are clustered in developmental areas and arranged hierarchically, from earlier to later developing skills. Each item includes a subset of objectives that develop earlier than the goal and generally precede it. This allows teams to identify where a child lies in the developmental sequence and which skills need focus. Information gathered from both teacher and parent reports are used to identify and set priorities for skills to address in intervention. These skills are taught using evidence-based teaching strategies selected based on the skills being taught and the child's strengths, needs, and preferences, with instruction and practice embedded across various activities (Wolery, 2005).

In the elementary setting, where demands of the curriculum are more dominant, assessment

for those with academic needs should be individualized based on those needs (Fuchs, Fuchs, & Compton, 2012). Within an RTI framework, assessments include curriculum-based measurement (CBM; Deno, 1985, 2003) or other similar measures (e.g., DIBELS; Good & Kaminski, 2000) that provide information about critical skills. Some children will have needs outside of academics requiring specialized assessment (e.g., a functional behavioral assessment [FBA] for significant behavior issues; c.f. O'Neill, Albin, Storey, Horner, & Sprague, 2014). Based on results, teams then design interventions to address specific skills using evidence-based interventions that could include published curricula and specific evidence-based teaching strategies (see, e.g., Wong et al., 2014).

Key Features of Quality Implementation

Assessment for program planning must reflect the five key principles for this function of assessment. First, the content of assessment must be linked closely to intervention (Neisworth & Bagnato, 2005; Snyder et al., 2008). Information gathered from the tool should allow the child's team to make decisions in two key areas: (1) which skills to target and (2) which teaching methods and strategies to use to meet those targets.

Second, assessment must examine functional skills in authentic contexts. Assessments should focus on gathering information on skills important or essential to children's participation in the home, classroom, and/or community. Assessments are often administered within typical activities, and use toys and materials appropriate for the child's developmental level and available in the child's environment (Snyder et al., 2008; Neisworth & Bagnato, 2005), and identify skills or need that are functional, generalizable, most likely to have the greatest impact on child outcomes, and unlikely to develop without intervention (Johnson et al., 2015; Pretti-Frontczak & Bricker, 2000).

Third, this mode of assessment must be flexible for diverse learners. Assessments should be flexible enough to allow the team to adapt items for a range of learners. The assessment should be appropriate for and adaptable for use with culturally and linguistically diverse children and families, allowing the child to respond in his or her native language and in ways consistent with family culture.

Fourth, program planning assessment must be family friendly. Families should have meaningful and multiple options for providing information about how the child functions at home and in the community. Also, they should play a key role in making decisions about the focus of intervention efforts.

Fifth, assessment should be dynamic and repeated as needed. Children change rapidly during early childhood and some interventions may not produce desired results. Both factors make repeated administration of an assessment important in determining how to promote skill development over time.

Assessment for Intervention Monitoring

Definition

Once an intervention has been designed, ongoing assessment of its implementation must follow. Assessment for intervention monitoring is a systematic description and standard-based evaluation of implementation, to ensure that services are meeting a priori or individual standards—or that additional support is provided if the planned intervention is not carried out as intended. While great strides have been made in the field of ECSE since its inception, a large gap exists between best and actual practices (Dunlap, Hemmeter, Kaiser, & Wolery, 2011). Thus, it is important that we monitor implementation of intervention programs to ensure quality services for young children with disabilities.

It is a special educator's legal and ethical responsibility to ensure the intervention plan is carried out as specified. Presumably, children will progress better if the programs we plan are carried out as specified (Wolery, 2004). Lack of

progress may be due to "infrequent, inaccurate, or inconsistent use of interventions" (Wolery, 2004, pp. 573–574). If a child does not progress as expected, the team must ask if services are provided as frequently as the plan specified and with sufficient quality.

In practice, this is likely easier to determine for older children because recommended instructional methods are more direct and easily observable. For example, we can readily observe a teacher implementing a well-specified reading program with a second grader receiving special education. We can observe the time and pacing of instruction and whether the teacher is implementing the program with fidelity.

Observing intervention implementation in early intervention and ECSE may be more challenging when instruction is embedded within the course of daily routines and activities. Learning opportunities are distributed throughout the day, making them more difficult to record. Plus, they are often more difficult for the untrained eye to spot. For example, a teacher may withhold a block from a preschooler and give an expectant look to provide an opportunity for the child to request the block. The observer would need to know the child's IEP goals and the procedures for using naturalistic communication strategies to notice the teacher facilitate this opportunity. These difficulties compound in home-based programs, which are often implemented by parents or other caregivers. It is challenging to know the frequency and quality of implementation between visits.

It may be challenging to document implementation in ECSE, but it is essential to do so (Fixsen, Blase, Naoom, & Wallace, 2009). As noted by Bagnato et al. (2010), even the best intervention is effective only when implemented with fidelity. Assessment for intervention monitoring should follow four general principles. First, the program itself should be clearly articulated before implementation, with special attention to core ingredients. Second, data on implementation should be collected continually to ensure the program meets a priori standards. Third, implementation should closely match the original plan along key dimensions, with formal timelines for review and program revision. More frequent changes may be based on informal or incomplete information, and thus may increase the odds that intervention is poorly matched to a child's needs and characteristics. Fourth, the team should examine data on implementation and child progress to determine if the intervention requires changes. Monitoring implementation may help identify key reasons why a child is progressing slower than the team expected, which may then help the team modify services.

Examples

In special education, interventions are tailored specifically to meet the child's needs and, with infants and toddlers, the family's needs (Bagnato, McLean, Macy, & Neisworth, 2011). The nature of the program and subsequent monitoring will vary based on the child's age and needs. In birth-to-three services, an IFSP for a 12-month-old with hearing loss and communication delays might have intervention components that require the family to place hearing aids on the child for particular intervals and that help the family embed communication opportunities into home routines to increase the child's communication skills. In this example, the team would monitor implementation variables like frequency of home visits, frequency and quality of coaching to teach specific strategies to parents, parent logs of child use of hearing aids, and parent use of communication strategies during and between visits. These data would be reviewed regularly and frequently—perhaps every other week at first, fading to monthly reviews—to identify gaps between planned and implemented intervention; any gaps would be addressed by planned revisions to intervention supports.

For preschool and elementary students, intervention plans are described in the child's IEP. For a 3-year-old with autism (ASD), this plan might include addressing communication, social-emotional, and adaptive skills with services provided by a co-teaching team in an inclusive preschool classroom. The plan would include specific evidence-based practices (EBPs) for teaching children with ASD (see Wong et al.,

2014) and a checklist for both type and frequency of embedded teaching opportunities to be provided in different contexts. The team would monitor implementation, including checklist recordings of frequency and fidelity of implementing specific components of EBPs. Teachers would review these data weekly and make necessary adjustments when implementation varies from the original plan.

Key Features of Quality Implementation

Quality implementation of assessment for intervention monitoring requires attention to four distinct features. First, special educators must define the intervention plan before implementation, with sufficient detail to communicate clearly its requirements and to set the occasion for thorough review of implementation. Tilly (2008, p. 21) describes a model in which practitioners identify "who will do what, when, and in what manner" as intervention unfolds. Second, special educators must have rigorous and reasonable plans for collecting data regarding the implementation of each core feature (Wolery, 2004). These data should be collected in an ongoing fashion so that any needed changes can be identified quickly, particularly when child progress is "slow, variable, or is not occurring" (Wolery, 2004, p. 579). Third, we must analyze the data collected to ensure the plan and its components are carried out with fidelity or as intended (Greenwood, Carta et al., 2011; Tilly, 2004). Best practices dictate that data describe the extent to which practitioners "implement the frequency, intensity, and duration of instruction needed to address the child's phase and pace of learning or the level of support needed by the family to achieve the child's outcomes or goals" (DEC, 2014, p. 10). Finally, if review of implementation data suggests significant variations from original intent, the team has a responsibility to adjust its practices to carry out the plan fully. This may include monitoring whether or not a service is provided with the specified frequency, that modifications to the environment or materials are occurring as planned, that some core element of an EBP is provided with the specified frequency, or that an EBP is being implemented as intended.

Assessment for Progress Monitoring

Definition

Once individuals have been identified for special or supplemental instruction and intervention, and these specialized services have been planned and implemented, best practices dictate that teachers and other professionals (as well as parents and other interested parties) frequently monitor the degree to which these services or supports promote changes in desired child performance and promote progress toward identified long-term goals. Progress monitoring is frequently repeated and often rather brief. The child's performance is in turn evaluated against an a priori standard of expected change or rate of growth. This information is used to determine whether to continue the current array and dosage of intervention services or if some change is warranted.

While progress monitoring has been a hallmark of special education for some time (c.f., White, 1986), technical features of this approach to assessment have received substantial attention since the 1990s. In particular, scholarship has identified two paradigmatically different approaches to progress monitoring—*Developmental Skills Mastery Monitoring* and *General Outcome Measurement* (Fuchs & Deno, 1991; McConnell, 2001).

Developmental skills mastery monitoring (or DSMM, termed "mastery monitoring" by Fuchs & Deno, 1991) is common in many ECSE programs. In DSMM, child progress is marked by successive mastery, or skilled performance, on a set of behaviors or items that are ordered developmentally. Mastery criteria for performance are specified and distinct measurement procedures are used for each individual behavior or item. In DSMM, accuracy or appropriateness of the skill or item hierarchy is critically important, measurement is focused and specific, and

(under many conditions) assessment can be very sensitive to short-term effects that are very specific to any given intervention. One specific example of this approach would be to assess, on a weekly or even daily basis, children's performance relative to IFSP or IEP objectives. Assessment of this type can help guide instruction on a particular skill to continue or to advance to more complex skills.

By contrast, general outcome measurement (or GOM) notes changes in performance by repeated assessment of the child in a general, or more global, task. Progress is noted by increases in proficiency (typically, either the extent to which the child completes the full task or some count of successful responses to that task); in other words, assessment describes a child's partial proficiency on a global outcome toward which development and intervention are directed. In GOM, the general or long-term outcome being assessed and the extent to which assessment opportunities sample the child's performance of this outcome are critically important. Measurement is consistent across occasions and provides an integrated view of the child's skill. GOM assessment is broad and outcome referenced, and as a result may be somewhat less sensitive to either intervention specific or small changes in child development but more related to longer-term expectations. GOMs provide metrics of both *status* (i.e., child performance at a given time) and *growth* (i.e., change in that performance across repeated assessments), which can be particular assets to ongoing progress monitoring (Deno, 1997).

Key Features of Quality Implementation

At least four key features of progress monitoring are required: two relate to application and use and two to instrument or measure selection. First, progress-monitoring measures must be administered frequently. A primary purpose for this assessment is to describe short-term effects on child development and to use this information to adjust intervention as needed. As a result, progress must be assessed often enough to both describe rates of change in child behavior, and to prompt changes in intervention services, and thus improve long-term outcomes, as often as is possible.

Second, progress-monitoring measures must quickly and easily produce data teachers can analyze to make decisions about ongoing intervention services. This requires both that data provided by measures be accessible and easy to produce and that teachers have and employ rigorous decision-making rules to evaluate these results.

Third, progress-monitoring measures must sample behaviors or competencies that are highly related, conceptually and empirically, to interventions being provided. This is a special case of validity, as noted previously; content and construct validity *for the intervention being implemented* must be very high. Progress-monitoring measures must reveal when intervention is contributing (or not contributing) to changes in child achievement or behavior.

Fourth, progress-monitoring measures must be appropriate for, and sensitive to change in, repeated assessments. This often requires "parallel forms"—empirically equivalent test sets that rely on different items or tasks to evaluate child performance—to reduce contributions from test practice. But it also requires that the measures used be sufficiently robust and reliable (i.e., have small standard errors of measurement) to be able to detect real changes in child performance over the shortest time possible.

Examples

Developmental Skills Mastery Monitoring. DRDP access (McLean, Edelman, & Salcedo, 2011) is a DSMM approach, carefully developed to "observe, assess, and report on the development of [infants, toddlers, and preschoolers] who receive preschool special education services" (McLean et al., 2011, p. 4). *DRDP access* is a universal design adaptation of *Desired Results*, an instrument originally designed for children without disabilities; *DRDP access* provides more

fine-grained assessment of developmental skill, specifies adaptations for children with specific disabling conditions, and has been engineered specifically to report on developmental progress in 6-month intervals as required by US federal special education regulations.

DRDP access is an observational teacher rating scale with content aligned to state early learning standards. Teachers or others who have spent considerable time with an individual child review and rate the child's performance on specific measurable behaviors grouped within slightly broader domains of developmental performance (e.g., "children show growing abilities in communication and language"). *DRDP access* results are presented both descriptively (e.g., skills the child has recently mastered in each developmental domain or "desired result") and summatively, with a scaled score that indexes overall current performance.

General Outcome Measurement. Individual Growth and Development Indicators, or IGDIs, were developed to provide single-point and repeated assessment for both screening/identification and for progress monitoring. Walker, Carta, Greenwood, and Buzhardt (2008) describe the use of the Early Communication Indicator, an infant and toddler measure, for monitoring growth in proto-communication and communication among infants at risk for developmental delays. Using this measure, home visitors repeatedly monitor individual child communication behaviors in a standard play-like activity with a familiar adult and compare observed rates of gestures, vocalizations, and single- and multiple-word utterances to both broad normative standards (based on age) and individual intervention targets (based on parent and professional goal setting). When child progress falls below expected levels of development over time, intervention plans are revised or expanded and monitoring continues. This progress monitoring and intervention adjustment process serves as basis for an online professional support program (Buzhardt et al., 2011) and has been widely used with positive results in statewide home visiting efforts (Greenwood, Buzhardt, Walker, Howard, & Anderson, 2011).

Key Features of Quality Implementation

Three primary factors drive quality implementation of progress-monitoring measures. *Selection of appropriate instruments or measures* is central to positive effects from progress monitoring. The measures or instruments must meet basic standards for psychometric rigor, and they must meet demands unique to this function. In particular, progress-monitoring measures must be (a) related to long-term intervention goals; (b) appropriate for repeated use, with frequency sufficient to provide high-quality information to allow for rapid intervention review and adjustment; (c) sensitive to small changes in child performance over time; and (d) to the extent possible, produce data that teachers and parents can interpret directly and easily. Second, data on child performance must be collected frequently. At its core, progress monitoring provides information to allow rapid and ongoing assessment of intervention efficacy and to support ongoing refinement of intervention services. Finally, high-quality progress monitoring requires *thorough and reliable analysis and use of collected data.* Teachers and parents must reflect on the "moving picture" of intervention effect as this process unfolds and be prepared to revise interventions when warranted. This requires easy-to-use information from progress-monitoring measures and clear, well-implemented rules for data analysis and interpretation.

Future Directions in Assessment Development and Application

As attributed to Niels Bohr, Yogi Berra, and others, we note that it is very difficult to make predictions, particularly about the future. Nonetheless, several modest recommendations for ongoing assessment development and application may be warranted.

First, ECSE practice and policy will benefit from ongoing development and use of a broader, deeper, and more sophisticated array of assessment tools and practices. While assessment resources have certainly expanded as our system

of identification, support, and service to young children and their families has grown, this area is still in its earliest stages of development. More tools and practices, across all functions of assessment, will enable parents and practitioners to better understand the developmental course of young children, to reflect on and plan for interventions to affect that course, and to monitor the effects of these efforts at the individual, group, and population levels over time.

Similarly, we expect to see growing sophistication in the methods and analytic tools used in this research and development work. IRT and other "modern" test development approaches are only recently widely applied in education and psychology (Embretson & Reise, 2000; Wilson, 2005), and these approaches are beginning to be applied to assessing young children (Anthony et al., 2011; Bradfield, Wackerle-Hollman et al., 2014; Phillips, Piasta, Anthony, Lonigan, & Francis, 2012). The growing sophistication in design and evaluation will further support development so that one might expect more and better measures as this work continues.

Finally, technology platforms are apt to become increasingly common; they will bring faster acceleration of sophisticated and new assessment approaches. We are already seeing these effects in language development (Xu, Richards, & Gilkerson, 2014); this century's explosion of small, affordable, and relatively powerful electronic devices can only expand this area.

Closing

Assessment practices for young children with disabilities are central to identifying children who would benefit from early intervention, the design of services and supports for them and their families and monitoring and evaluating these services over time. A strong reciprocal relation between assessments and intervention effects is clear for individuals and systems. As these practices increase, improve, and expand, this reciprocal effect will likely continue and, in the end, be a vital component for meeting obligations to children, their families, and those who serve them.

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Dr. McConnell and his colleagues have developed assessment tools and related resources known as *Individual Growth & Development Indicators* and *Get it, Got it, Go!* This intellectual property is subject of technology commercialization and possible licensing agreements through the University of Minnesota. Dr. McConnell may be entitled to royalties for products related to the research described in this paper. The university has reviewed and managed this relationship in accordance with its conflict of interest policies.

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Evidence-Based Practice in the Context of Early Childhood Special Education

7

Brian Reichow

History of Evidence-Based Practice

For much of the twentieth century, clinical judgment and/or consensus guidelines were the main ways in which decisions regarding interventions for young children with special needs and their families were made, and the process for deciding on which intervention to use for specific children, while individualized, was often made in the absence of scientific evidence. The use of evidence to inform clinical practice, particularly the use of high-quality evidence such as that often obtained through randomized controlled trials, began to receive increased attention in the second half of the twentieth century. One early figure who was central to this movement was Archie Cochrane, an epidemiologist from the UK for whom the Cochrane Collaboration, one of the largest organizations devoted to the promotion of evidence-based practice (EBP[1]) in the world, was named. Cochrane suggested that when evidence from randomized controlled trials (RCTs) is available, then the results should be used to inform decision making in healthcare. He also called for the creation of a registry of clinical trials and explicit and transparent criteria for evaluating published research; all of these ideas were to become deeply embedded in what became EBP (Cochrane, 1972). Although it would take many years to fully operationalize the process of using scientific evidence to inform intervention decisions, the seeds of what we now call EBP had been planted. Over the next 20 years, the idea of using evidence, and how the consideration and use of evidence should fit and intersect with the considerations of clinical expertise and patient values and choice to make intervention decisions, continued to receive increased attention and debate. This directly led to the formalization of EBP.

The original conceptualizations and definitions of EBP,[2] many of which still hold true today,

[1] In this chapter, the term "evidence-based practice" has deliberately been used in the singular tense, to help readers understand that evidence-based practice originated as and remains a *process* for making intervention decisions (i.e., a *verb*) rather than solely as a description of the status of an intervention practice and the amount of research that is supporting the use of the practice (i.e., an *adjective*). In this chapter this distinction will be made by using the term "EBP" to refer to EBP as a process and "evidence-based" to refer to an intervention's status as an EBP.

[2] It is important to note that EBP began in medicine as evidence-based medicine (EBM). In the 20 years since it was first introduced, many different fields have proposed similar conceptualizations and definitions of the practice of informing intervention decisions on evidence, albeit with slight variations in the terms that have been used to denote these practices. While there can be subtle differences between definitions that might be reflected in the specific terms that are used to refer to EBP, the term EBP will be used hereafter in this chapter to avoid confusion.

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were formalized by Gordon Guyatt, David Sackett, and other colleagues in the Department of Clinical Epidemiology at McMaster University in the early to mid-1990s (e.g., Evidence-based Medicine Working Group, 1992; Sackett, Richardson, Rosenberg, & Haynes, 1997; Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). EBP was originally defined as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett et al., 1996, p. 71). This initial conceptualization was soon expanded to clarify that the use of best evidence was integrated with clinical expertise and patient values and choice; thus, EBP became "the integration of the best research evidence with our clinical expertise and our patient's unique values and circumstances" (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000, p. 2). This conceptualization is still used today.

The concept of integrating scientific evidence with clinical expertise and patient's values and choice quickly spread to many disciplines especially in the social sciences, including many that work with young children with special needs such as the American Psychological Association (APA; American Psychological Association Presidential Task Force on Evidence-Based Practice, 2006; Silverman & Hinshaw, 2008), the Council for Exceptional Children (CEC, 2014; Odom et al., 2005), and the US Department of Education (What Works Clearinghouse [WWC], 2014). Furthermore, using evidence to inform decisions in educational settings became mandated by legislation in the USA in 2001 with the passage of the Elementary and Secondary Education Act (aka, No Child Left Behind, PL 107-110), which stated that educational practices must be "scientifically based" and with the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 2004 (PL 108-446), which stipulated that services for children with disabilities should be based to the extent possible on peer-reviewed research.

Although the specific definitions of EBP vary slightly between disciplines and organizations, they all emphasize the importance of using the results from research with rigorous methods to guide and help inform decision making whenever possible. In this way, EBP is intended to help practitioners[3] provide effective interventions to those they serve. However, differences do exist between the different definitions and standards of EBP. One of the most significant differences in EBP criteria between organizations regards the type of research that can be used to demonstrate a practice has enough research to be considered evidence based. To assist making decisions concerning the strength of evidence, evidence hierarchies have been developed by many organizations that advocate for EBP (e.g., Boruch & Rui, 2008; Oxford Center for Evidence Based Methods Levels of Evidence Working Group, 2011; Rubin & Bellamy, 2012d). In perusal of these evidence hierarchies, you will find that many contain both primary studies and secondary analyses of primary studies (e.g., systematic reviews and meta-analyses). For instance, the hierarchy from the Oxford Centre for Evidence-Based Medicine (2011) describes the strongest level of evidence for determining intervention benefits as "[a] systematic review of randomized trials or *n*-of-1 trials." It is also noteworthy that evidence hierarchies often contain multiple research methodologies; stated differently, the hierarchies reflect that multiple research methods are appropriate to answer different research questions (c.f., Rubin & Bellamy, 2012a). While some advocates of EBP suggest the only evidence that should be used to inform intervention decisions must come strictly from RCTs, others, including many organizations more aligned with the social sciences and early childhood education, often have broader conceptualizations for the types of research that can be used to designate an intervention as evidence based including quasi-experimental designs (e.g.,

[3] In this chapter, as in much of this Handbook, the field of early childhood special education has been conceptualized to include all practitioners who might work with children with special needs, including educators, special educators, speech-language pathologists, occupational therapists, physical therapists, psychologists, pediatricians, social workers, parents, service coordinators, etc. This transdisciplinary nature of serving young children with special needs will be important when considering EBP as many disciplines have distinct and somewhat different conceptualizations of the term.

Gersten, Fuchs, Coyne, Greenwood, & Innocenti, 2005; WWC, 2014), single-subject experimental designs (e.g., Byiers, Reichle, & Symons, 2012; Horner et al., 2005; Kratochwill & Stoiber, 2002; Odom & Strain, 2002; WWC, 2014), correlation research designs (e.g., Thompson, Diamond, McWilliam, Snyder, & Snyder, 2005), and qualitative research (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005; Noyes, Popay, Pearson, Hannes, & Booth, 2008). Related to the type of research methodology that is required for a practice to be considered evidence based is the amount of research that must be amassed for a practice to be considered evidence based. The only "gold-standard" criteria regarding the amount of evidence required for an intervention to be considered evidence based are two RCTs conducted by two independent research groups. However, organizations that recognize other types of evidence have standards that reflect this position and include evidence from a collection of single-subject experimental designs, quasi-experimental design studies, and combinations of evidence across different types of research methods (e.g., CEC, 2014; WWC, 2014).

Another significant difference in conceptualizations of EBP is the way in which the term is used. For many, including this author and others (e.g., Buysee & Wesley, 2006; Sackett et al., 2000), EBP is a cyclical process of selecting appropriate intervention and ensuring the chosen intervention is having the desired outcomes. In this conceptualization, EBP is a *verb* that describes the process. For others, EBP has become synonymous with being a descriptor of whether a particular intervention has amassed enough evidence to be considered evidence based and is used more as an *adjective* to assist in describing the attributes of the research support for a given practice. Although this might be somewhat of a semantic debate, it has significant implications that must be made more explicit to help ensure desired results are achieved for all children. Because all interventions are not effective for all children, choosing to use an EBP (as a noun or adjective) does not ensure the desired effect will be achieved. However, using the EBP process described in this chapter (EBP as a verb) does provide a framework that continually monitors child progress to ensure that the desired results are achieved.

What Is "Evidence-Based Practice?"

For this chapter, EBP is conceptualized and defined in a way that is consistent with the conceptual framework initially laid out by Sackett and colleagues (Sackett et al., 2000) and that others later expanded (e.g., Drake, Merrens, & Lynde, 2005; Rubin & Bellamy, 2012b). In this framework, EBP is a multistep process used to make decisions about which intervention(s) or service(s) to provide and the follow-up that occurs to ensure that the intervention is having the desired effect. When EBP is used within this multistep framework, it is a cyclical process that is undertaken to make initial and subsequent decisions on interventions, which incorporates not only research evidence but clinical expertise and patient values and preferences (note, when considering or describing EBP for young children with special needs, the "patients" are most often considered to be the caregivers of the child). Current conceptualizations (e.g., Buysse, Wesley, Snyder, & Winton, 2006; Rubin & Bellamy, 2012b; Straus, Glasziou, Richardson, & Haynes, 2011) of EBP operationalize it as a five-step process involving (1) question formulation describing the characteristics of the patient or population, intervention, comparator, and outcome (e.g., PICO); (2) searching for and retrieving the best available research evidence; (3) critical appraisal of the research evidence; (4) selection of the intervention or intervention method based on available evidence, clinical expertise, and patient values and choice; and (5) continual progress monitoring. While it is beyond the scope of this chapter to fully describe how to fully execute each step, an explanation of the key processes and methods involved for each step is provided in Table 7.1 and expanded upon below; readers interested in a fuller description or operationalization of each step are encouraged to consult a textbook on EBP (e.g., Buysee & Wesley, 2006; Drake et al., 2005; Nathan & Gorman, 2015; Norcross, Hogan, & Koocher, 2008; Rubin & Bellamy, 2012a; Straus et al., 2011) or to consult

Table 7.1 Steps in the EBP process

Step	Description
1. Formulate a guiding question	The first step in the EBP process is to formulate a scoping question that will guide the inquiry into which practice to use. Often this is done using the PICO format described in the text that outlines characteristics of the child, intervention, and desired outcome. Note, this step is essential and very important as the parameters, terminology, and descriptors that are provided in the PICO will guide the remainder of the steps in the EBP cycle
2. Evidence retrieval	The second step involves searching for, identifying, and obtaining the "best" evidence on the question at hand. Evidence retrieval often involves searching electronic databases using keyword searches, other online searching methods, or even hand searching through journals. It is important to emphasize that the "best" evidence should not be limited to one specific type of research methodology but, rather, should be rigorous evidence from methods that are appropriate for answering specific research questions
3. Evidence appraisal	Once a collection of empirical evidence on the intervention being considered has been collected, it is then necessary to determine the quality and strength of support of the evidence for the particular outcome in question, which is the third step in the EBP process. There are many methods for appraising study quality and effects, but, at a minimum, one must examine the methodological rigor, the strength of effects, and the consistency with which effects are found across studies
4. Intervention selection	After the empirical evidence has been appraised and conclusions have been drawn for the intervention(s) being considered, it is time to determine which intervention is most likely to produce the desired outcomes for the child for whom the intervention is being considered. When selecting an intervention, it is important to engage all those involved in the EBP process including those with clinical expertise and families
5. Performance monitoring and data-based decisions	The fifth step in the EBP process is to monitor the effects of the selected intervention. This step is the final step but should not be considered a terminal step; rather, this should be seen as a continual step that is ongoing to ensure that the desired effects are being achieved. When considering how to monitor, there are two main areas that should be assessed: (1) implantation of the intervention by providers and (2) the behaviors of the child for whom the intervention program has been designed. In addition to collecting data, performance monitoring involves making decisions on the effects of the intervention (i.e., is it working) and modifying the intervention methods (if implementation fidelity is low) or intervention type if the desired effects are not being seen

(Boyd et al., this volume) chapter later in this volume for a discussion of how EBP can be implemented in early childhood special education settings (see Chap. 17).

Step 1: Question Formulation

The first step in the EBP process is to formulate a question that will help focus and guide the remaining steps of the process (see O'Connor, Green, & Higgins, 2008; Oliver, Kickson, & Newman, 2012; and Rubin & Bellamy, 2012c for guidance on question formulation). Some people refer to this question as a scoping question as it helps provide the scope of what will be examined during the process. There are many ways in which the question can be formed, with the most popular being a PICO, where the (P) stands for patient(s), which in the case of early childhood special education is the child; the (I) for intervention; the (C) for comparator (i.e., to what is the intervention being compared to); and the (O) for outcome. In some cases, the comparator might not be known or might not exist, and therefore this element of the PICO may be omitted. Note, some suggest adding an "S" to PICO to form PICOS, where (S) stands for study type.

For example, if you are trying to determine an appropriate intervention to use to help increase daily skills for a toddler with Down syndrome, the PICO might be:

P—toddler with Down syndrome
I—parent skills training
C—treatment as usual
O—daily living skills (e.g., Vineland)

From this PICO, a scoping question can be formed, which might read, "For toddlers with Down syndrome, does parent skills training increase daily living skills more than treatment as usual?"

Although sometimes the formal formulation of a scoping question is overlooked, it is an important part of the EBP process as it builds the foundation for the remaining steps. Formulating a question helps focus the process and helps to ensure that all of the important aspects that need to be considered, especially the child characteristics (population), intervention characteristics, and desired outcomes, have been clearly articulated and operationalized. When formulating a question, it is important to be as specific as possible to ensure that relevant evidence is obtained and so that one has the best likelihood of being able to answer specific questions at hand.

Step 2: Evidence Retrieval

The second step in the EBP process is to search for and retrieve research evidence on the intervention that is being considered for use (see Lefebvre, Manheimer, & Glanville, 2008; Rubin & Bellamy, 2012c; and White, 2009 for guidance on evidence retrieval and searching for evidence). A well-developed and specific PICO will help guide the search and retrieval of research evidence, as it outlines parameters that should be considered when searching for evidence. In searching for the best evidence, it is important to utilize multiple sources to try to obtain an unbiased account of the effectiveness of the intervention being considered. One of the most common methods for retrieving evidence is through the use of electronic databases (e.g., PsycINFO, ERIC, and Medline). When using electronic databases, the PICO can be used to help identify search terms that can formulate a search strategy. One simply enters the search terms into the electronic database and then queries the results to find relevant hits. It is important to know the characteristics of the electronic databases that you might be using, as the types of studies and types of publications that are contained in each database differ slightly; a librarian, or online tutorial, can be a valuable resource for additional information.

However, for those outside of academia, obtaining evidence is often problematic as many journals have restricted access and individual articles can be expensive to retrieve. A newer option for scholarly work is Google Scholar, but caution must be taken when using this as the only source of evidence as its trustworthiness has been called into question (e.g., Scullard, Peacock, & Davies, 2010). Although retrieving information online for those not housed in a university is improving somewhat with the increasing popularity of open-access publishing, a majority of evidence still remains difficult to retrieve. This is compounded by the increasing growth of research involving young children with special needs (c.f., Reichow & Volkmar, 2011). Although university libraries often can be a resource for obtaining research evidence, this is sometimes not feasible. One recommendation for maximizing one's efforts in this area is to utilize systematic reviews and meta-analyses, where possible. The advantage of locating systematic reviews and meta-analyses is that they provide an overview and analysis of a collection of research instead of a singular study that one might otherwise locate. Additionally, much of the synthesis and appraisal of primary studies that is involved in the EBP cycle is likely to have been completed and therefore might lend to a somewhat streamlined process.

Step 3: Evidence Appraisal

The third step of the EBP process is the critical appraisal of the evidence that was obtained related to the scoping question in step 1. It is important to note that there are many tools and methods that have been developed to evaluate research evidence, which often differ according to both the type of research that has been retrieved and the

discipline in which the research was conducted or is being used to review. With respect specifically to evidence appraisal as related to EBP, many EBP criteria have explicit descriptions on what to appraise and how to synthesize the evidence to determine if an intervention is evidence based. This section will provide an overview of some common themes in evidence appraisal (e.g., Katrak, Bialocerkowski, Massy-Westropp, Kumar, & Grimmer, 2004) and guide interested readers to resources that can be used in evaluating interventions for young children with special needs.

Evidence appraisal has two main components. First, one must assess the quality of individual studies that have examined the effects of the intervention being considered. In completing this step, it will be essential to have a good understanding of the research design that has been used to evaluate the study, as most evidence appraisal tools are specific to a particular research methodology. Although the tools might differ in the items that they assess, most appraisal tools are examining the validity and confidence that can be had in the results of the study. As such, many appraisal tools focus on a study's internal validity and are most concerned with the methodological quality of the research that was conducted. The CEC EBP standards (2014) and those of the APA (2006) rely heavily on aspects of internal validity in their appraisal of evidence. Another area that can be assessed is the generalizability of an intervention's effects, sometimes referred to as external validity. Although most EBP appraisal tools contain at least one item related to external validity, this type of validity often receives less attention. However, it is important to consider the generalizability of an intervention when selecting one using the EBP process since it is likely that the intervention will be applied to a child that was not the recipient of the intervention in experimental research and will likely be applied in a setting that is different than the conditions in the experimental research. Stated differently, it is important to ascertain if an intervention can operate as intended and produce the desired results when implemented in the complexities of real-world settings without the tight control of experimental conditions.

The second component of the evidence appraisal is to examine the amount of evidence supporting an intervention. After individual studies have been evaluated, it is necessary to synthesize the evidence that has been located so that a determination regarding the strength of evidence for the intervention being considered can be made. When determining whether a practice has been established as evidence based, one looks to the accumulation of positive and replicated findings supporting the practice. Again, there are many methods for synthesizing and classifying the strength of support that once more often vary by research type and discipline (e.g., Brantlinger et al., 2005; Gersten et al., 2005; Goodheart, Kazdin, & Sternberg, 2006; Horner et al., 2005; Thompson et al., 2005; WWC, 2014).

In the previous step, the use of systematic reviews and meta-analyses was recommended. It is important to note this should not preclude the appraisal of both the systematic review/meta-analysis and careful consideration of how the primary studies that were included in the review were evaluated and the strength of the recommendations that can be made based on the strength of the original research. While less has been described on how to critically appraise systematic reviews and meta-analyses (c.f., Higgins et al., 2013; Rubin & Bellamy, 2012e; Shea et al., 2009), rigorous standards for conducting (e.g., Cooper, Hedges, & Valentine, 2009; Higgins & Green, 2008) and reporting systematic reviews (PRISMA Statement; Moher, Liberati, Tetzlaff, & Altman, 2009; Liberati et al., 2009) are available and should be used as a resource when evaluating the quality of systematic reviews and meta-analyses. These standards explicitly state that the quality of the primary studies included in a review should be evaluated, so it is likely that the review will provide some context of the quality of the research it contains. It is also important to note that although systematic reviews or meta-analyses might be done with great caution using rigorous methods, if the primary studies that they are reviewing have significant flaws, the conclusions that can be reached from the synthesis will be limited by the poor quality of the primary studies. People often refer to this phenomenon as

"garbage in, garbage out." It is also important to note that while some evidence hierarchies place replicated findings from multiple systematic reviews or meta-analyses at the top of the evidence hierarchy, most criteria for determining EBP do not have criteria specifically related to systematic reviews or meta-analytic findings; this remains an area for future exploration.

Step 4: Selecting an Intervention

The fourth step in the EBP process is selection of the intervention that will be used to make the desired changes (see Gill & Pratt, 2005 and Rubin & Bellamy, 2012b for guidance on intervention selection). This step is where the intersection of evidence, expertise, and values enters, as this decision should be made through a process that includes taking the best research evidence into account with clinical expertise and consumer values and preferences. When selecting an intervention, it will be important to review and consider the empirical evidence that has been amassed, but it will also be necessary to consider other factors that might affect the likelihood of an intervention's success in practice for the individual with whom one is working. Satterfield and colleagues (as referenced in Rubin & Bellamy, 2012b) refer to these external forces on EPB in their transdisciplinary model of evidence-based practice as environment and organizational context and include issues such as resources (cost), policies, and workforce development, among other forces. When selecting the intervention, it will be important to take all of these factors into consideration but will be essential to keep the desired outcome in mind to ensure the desired results can be achieved.

Step 5: Performance Monitoring and Data-Based Decision Making

The final step in the EBP process is the continual monitoring of the performance of both interventionist and child to help ensure that the desired intervention effects are being realized. It should be noted that it is important to monitor both the implementation of the intervention to ensure that it is being delivered with fidelity and to monitor the behavior of the child to determine if the intervention is being successful. The importance of this step in the EBP cycle should not be underestimated, as it is the only step in the process that ensures the desired effects are occurring. Both types of performance monitoring are a multistep, ongoing process that can be done at a number of different levels depending on the situation in which the EBP process is being implemented.

When evaluating intervention decisions within the EBP framework, it is important to monitor the fidelity of the intervention providers to ensure that the intervention is being delivered as intended. While research has not demonstrated the precise level of fidelity needed for an intervention to be effective, it is known that interventions delivered with higher levels of fidelity have more favorable outcomes than interventions delivered with less fidelity (c.f., Dunst, Trivette, & Raab, 2013). The first process in measuring fidelity will be to determine the steps of the intervention that is being implemented. Monitoring fidelity can be done in a variety of ways including having interventionist provide a self-appraisal of the number of intervention steps completed and having a third party observe the interventionist and provide an assessment of the interventionist's delivery of the intervention protocol. A minimal process of helping ensure fidelity has been suggested as the use of intervention manuals and protocols (c.f., Perepletchikova & Kazdin, 2005); while I agree that manuals and protocols provide guidance that may increase fidelity, measurement of actual performance and interventionist behaviors will provide a more accurate assessment of fidelity and can be later examined with data on child behaviors to ensure the intervention is being successful.

Once the fidelity of the intervention services has been confirmed, it is important to assess the child's behavior(s), which is the second level of performance monitoring that must occur. The behaviors that should be monitored are the child outcomes or desired results that have driven the EBP process from the outset (i.e., the "O" or out-

come from the initial PICO). When monitoring performance, it will be important to set up a data collection system that allows you to continually monitor performance on a regular basis; thus standardized assessments are likely not appropriate and might not provide the detailed information that is required to determine the effectiveness of the intervention. Instead, direct behavioral observation (e.g., Ayers & Ledford, 2014) of the child or systematic parent report (e.g., Weisz et al., 2011) is likely to yield more detail on changes over time in the child's performance. It is also important to note that it is not enough to simply collect data; these data must be analyzed on a continual basis. An excellent resource for more information on collecting, graphing, and interpreting and using data is the series of articles published in *Young Exceptional Children* by Gischlar, Hojnoski, and Missall (i.e., Gischlar, Hojnoski, & Missall, 2009; Hojnoski, Gischlar, & Missall, 2009a, 2009b; see also Collins, 2012; Rubin & Bellamy, 2012f; and Wolery, 2014). When continually monitoring the child's progress, or lack thereof, it is critical to make decisions about whether to continue the intervention services or to decide if changes need to be made in the services being provided. This decision can be guided by the data and should be made using the clinical expertise of the interventionist while incorporating the family's values and preferences.

EBP in Early Childhood Special Education

DEC Recommended Practices

In the early 1990s, the Division for Early Childhood (DEC) recognized a divide between research and practice and thus a need to assist teachers and practitioners working with young children with special needs and their families. Given this need, several people began the process of identifying "best practices" in early intervention and early childhood special education and forming a collection of the best practices into a practice-friendly format to help close the research to practice gap. The term "recommended practice" was chosen instead of best practices since the initial Task Force realized that all practices will not be appropriate for all children and that the best practice is likely to change as our knowledge of working with young children with special needs evolves. The Recommended Practices were first published in a DEC document (DEC Task Force on Recommended Practices, 1993) and then as a book (Odom & McLean, 1996). These two products marked one of the first attempts at creating practice recommendations for the multitude of professionals and disciplines involved in working with young children with disabilities and their families and contained 415 practices. The Recommended Practices were revised 7 years later in 2000 (Sandall, McLean, & Smith, 2000) and slightly again in 2005 (Sandall, Hemmeter, Smith, & McLean, 2005). This version of the Recommended Practices had 250 of practices that were identified through focus groups (e.g., experience-based practices) and empirical evidence (e.g., research-based practices), the latter of which being a major difference between the initial Recommended Practices, which were created primarily through consensus, and the revised Recommended Practices which sought to integrate the best empirical evidence with practice knowledge (McLean, 2015). In addition to print, practitioners indicated a desire to have multiple formats and training materials for the Recommended Practices. Thus, additional products such as a Recommended Practices Workbook (Hemmeter, Smith, Sandall, & Askew, 2005), Recommended Practices Assessment Guide (Hemmeter, Joseph, Smith, & Sandall, 2001), material on personnel preparation (e.g., Stayton, Miller, & Dinnebeil, 2002), web-based products (Smith, McLean, Sandall, Snyder, & Ramsey, 2005), and a demonstration video (e.g., DEC, 2001) were created to help increase the use and adoption of the practices (c.f., McLean, 2015). Since their inception, the DEC Recommended Practices have been a frequently used tool for providing education and training for practitioners who work with young children with disabilities and their families the

skills and knowledge needed to create positive intervention programs. Although they are not a set of practices that have been deemed evidence-based per se, they do provide guidance on best practice in many areas and have been a very helpful resource for practitioners for many years.

2014 DEC recommended practices. A major revision of the Recommended Practices began in late 2010, and the most recent Recommended Practices were published by DEC in 2014. The new Recommended Practices contain 66 practices across the following eight key areas: (1) leadership, (2) assessment, (3) environment, (4) families, (5) instruction, (6) interactions, (7) teaming/collaboration, and (8) transition. As with previous versions, the 2014 Recommended Practices are based on the best research evidence available and knowledge from exemplary practice and were written to reflect other practice guidance in early childhood education that focuses on developmentally appropriate practices (e.g., Copple & Bredekamp, 2009). A major difference from previous versions of the Recommended Practices and the 2014 edition was the reduction in the number of practices the recommendations contained, which was done in response to feedback from the field that the hundreds of practices in previous versions were too many. Revision activities for the current Recommended Practices included development of a framework to guide the revision process, multiple review cycles, convening multiple stakeholder input sessions, conducting field surveys, and evidence validation activities including a gap analysis (see Snyder & Ayankoya, 2015, for a fuller description of revision activities). DEC also established a Recommended Practices Commission that will be responsible for updating the Recommended Practices in coordination with the Early Childhood Technical Assistance Center.

Another significant difference between the 2014 Recommended Practices and the older versions is that the 2014 Recommended Practices are meant to be a dynamic living knowledge base that are meant to be continually updated as new knowledge is gained in our field (Snyder & Ayankoya, 2015). As McLean highlights in her review on the history of the DEC Recommended Practices (McLean, 2015), a challenge from the initial set of practices would be creating a continual process of review and revision to maintain the quality and currency of the practices. Unlike previous versions of the Recommended Practices, which were published primarily in print, the 2014 version has been published online and is planned to be one element of an online system that will be continually updated to ensure those who use the Recommended Practices have information that is up to date. As such, the current Recommended Practices are not meant to be a static guidance of the state of the field in 2014, but rather a beginning point for a way to maintain a description of the evidence base of how best to serve with young children with special needs and their families. As such, they will need continued updates, which will provide an opportunity for them to be tweaked and improved as we learn more about not only how young children learn but also how practices are best implemented in real-world settings. Moreover, as advances in our knowledge about what works best for whom under which conditions are made, designing a system of recommended practices that provide guidance to practitioners and family members on when, where, and with what methods to begin intervention would be a major advance in the fields of those who work with young children with disabilities and their families. Continual updating of the Recommended Practices will help ensure services that are being provided to young children with disabilities are being informed by current evidence.

Differences between evidence-based practice and DEC recommended practices. Buysse et al. (2006) highlighted two key differences between EBP and the Recommended Practices. First, Buysee and colleagues reiterate that EBP is an ongoing process incorporating the five steps of the EBP cycle described previously in this chapter, while, historically, the Recommended Practices have been practice guidelines that were a tangible product. Second, Buysse and colleagues explain how EBP often is completed at a local level by making individualized recommendations for individual children, whereas the

Recommended Practices are meant to provide global guidance about what works, on average, for most children, and highlight that some recommended practices might not be appropriate in some circumstances. Additionally, although the Recommended Practices are based on research knowledge, not all of the practices would meet the standards or criteria to be designated as evidence based that were previously discussed. Hence, the editors of this volume did not want the term "recommended practice" to be used interchangeably with "evidence-based practice"; throughout this chapter and this handbook, we have tried to be consistent with our terminology surrounding the distinction between the DEC Recommended Practices and EBP as it has been conceptualized in this chapter.

Future Directions in EBP for Young Children with Special Needs

EBP is a relatively new term and many advances in how EBP is conceptualized and practiced continue to be made. Although EBP has become strongly rooted in many fields, the concept is not without controversy (e.g., Dijkers, Murphy, & Krellman, 2012; Lilienfeld, Ritschel, Lynn, Cautin, & Latzman, 2013; Norcross, Beutler, & Levant, 2005). As such, there remains room for improvements in both the identification of EBP, the dissemination of EBP, and the use of EBP in everyday settings. Moreover, even though EBP is a relatively new phenomenon, it does not appear to be diminishing, if anything using EBP continues to increase in popularity. Therefore, developing methods for increasing the utilization of EBP and developing additional methods for highlighting the advantages that can be achieved when using the EBP process to engage in decision making around interventions for children with special needs and their families should be embraced and strengthened. The remainder of this chapter is devoted to providing suggestions on how to strengthen and increase the use of EBP for young children with special needs and their families.

Increased Recognition and Use of EBP as a Process

As mentioned earlier, EBP was conceptualized and remains for many disciplines a process or a cycle, rather than the simple designation of an intervention that has been shown to be effective through multiple rigorous empirical studies. While the latter is important, and provides valuable information to those involved in the care of young children with special needs, it does not ensure that young children with special needs receive interventions that are effective and responsive to their individual needs. To ensure interventions are having their desired effects, EBP as a process with the continual progress monitoring and intervention refinement is needed. Unfortunately, many individuals who serve young children with special needs and their families are unaware that EBP can and was intended to be a process. In order to ensure that EBP becomes part of someone's practice instead of a designation, the ways in which EBP is discussed and taught must be modified in many preservice preparation and ongoing professional development programs. Poignant examples and suggestions of how EBP can be used in early childhood settings are provided in the chapter by (Boyd et al., this volume) (Chap. 17). Additionally, when designing professional development activities, it would be wise to consider how implementation science (e.g., Dunst et al., 2013; Halle, Metz, & Martinez-Beck, 2013; Metz & Bartley, 2012) can be best utilized to help ensure achieving optimal outcomes.

Moving from Global Recommendations to Individualized Recommendations

In his proposal of "second-generation research," Guralnick (1997) called for "research [that] should address issues that can guide specific program directions at a level that is of value in the daily activities of clinicians, educators, interventionists

in general, and families" (p. 12). Twenty years later, while intervention research in early childhood special education might be moving toward this goal, much of the research has not achieved this level of resourcefulness. Furthermore, although many have been calling for evidence that specifies what works for whom under what conditions for many years, guidance at this level is still lacking in many areas. As you will see in this volume, the quality and specificity of recommendations that can be made in the care of young children with special needs and their families are variable across ages, disciplines, outcomes, and intervention techniques. Although there have been tremendous gains made through research on the care of young children with special needs and how best to educate and serve these children and their families (c.f., Diamond, Justice, Siegler, & Snyder, 2013), the majority of recommendations that can be drawn from the literature remain broad. Therefore, work remains to be done. Given the individualized nature of the EBP process described in this chapter, adding an individualized a priori recommendation on intervention success would likely increase the effectiveness of EBP and intervention for young children with disabilities and their families in general. The integration of advances in neuroscience, as highlighted by Wolf and colleagues (see Chap. 29) and others (e.g., Shonkoff & Levitt, 2010), provides an exciting example of ways in which EBP might be individualized in the future.

Improved Consumer Participation and Consumption

Consumer values and choice has always been an integral part of the conceptualization of EBP, but, in practice, the integration of values and preferences with best empirical evidence and clinical expertise has lagged behind. Thus, there is a need to develop better ways to engage consumers (e.g., practitioners, caregivers, families) in the EBP process. Although family involvement is mandated in the procedures for creation of individualized family service plans (IFSPs) and individualized education programs (IEPs), this alone is not enough. We must develop methods for helping families become a more active part of choosing and monitoring the effects of interventions and services their child is receiving. We should also strive to involve families in the development of new treatments to ensure the methods have high social and ecological validity; the increasing use of patient outcomes research methods (e.g., PCORI; Torgerson & Sibbald, 1998) may provide an opportunity to achieve this goal.

In addition to increased participation of practitioners and families in the identification of EBP, those who identify EBP should strive to increase the applicability and availability of the practices in everyday settings. For many years, the research community often engaged consumers through dissemination of research findings in journal articles or textbooks, personnel preparation programs, and professional development offerings; given the research to practice gap, we must consider this method to have not been completely successful and must develop new methods. We now live in an age in time in which information is readily available 24/7, and people are increasingly turning to and relying on the Internet, mainly the World Wide Web, for information on a variety of topics including healthcare (Fox & Duggan, 2013; Wainstein, Sterling-Levis, Baker, Taitz, & Brydon, 2006). While the vast amount of information that is available online provides an excellent opportunity for consumers to increase their knowledge and participation in the EBP process, concerns about the quality of information and the ability of caregivers and practitioners to locate relevant, high-quality information is a concern (c.f., Reichow et al., 2012; Reichow, Shefcyk, & Bruder, 2013). Given the increasing use of the Internet by practitioners and families as information sources, it is time that advocates of EBP begin to devise ways to best harness this medium for good use.

Conclusion

Much advancement in our understanding of EBP has been made in the two decades since its formal conceptualization. This progress has resulted in a growth in the use of EBP and the use of EBP is

becoming increasingly mandated in many areas. When considering how to best serve children with special needs and their families, consideration of EBP should be a major focus; the field of early childhood has a rich theoretical and empirical foundation that can often lead practitioners to solutions that work across a number of contexts and participant characteristics. However, the field has not achieved a level of evidence in which we know with absolute certainty "which intervention will work for whom under what conditions." This question has and can continue to serve as a guide as we move forward. Until we can answer this question with absolute certainty, using the EBP process described in this chapter will increase the likelihood that practitioners and families will achieve the desired outcomes for their clients or children.

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Part II

EBP Evidence-Based Practice in ECSE Early Childhood Special Education

8 Developing Literacy and Language Competence: Preschool Children Who Are at Risk or Have Disabilities

Karen E. Diamond and Douglas R. Powell

Early childhood education and intervention are expected to significantly improve the developmental trajectories of infants, toddlers, and preschool children with disabilities and children who are at risk because their families are poor or they speak a language other than English (Diamond, Justice, Siegler, & Snyder, 2013). Yet early childhood programs have not met their potential for accelerating children's development (Bowman, Donovan, & Burns, 2000). Concerns about preschool children's development of language and literacy skills are apparent in the mandated improvements in specific language and literacy skills contained in congressional reauthorizations of the federal Head Start program (Public Law 105-285, 110-134). Children who are at risk and children with disabilities are more likely to enter kindergarten with lower levels of achievement than are their more advantaged peers (Denton Flanagan & McPhee, 2009). Children who enter kindergarten with less-developed skills are at greater risk for poor academic and social outcomes in later grades (Bierman et al., 2008).[1] While these results reflect findings from a well-established body of research on the early literacy development of children who are at risk, early literacy intervention research with young children with disabilities is just beginning (Carta & Driscoll, 2013).

Considerable attention has focused on differences in children's early literacy skills at kindergarten entry (Chernoff, Flanagan, McPhee, & Park, 2007). Early literacy skills, developed during the preschool years, provide the foundation for learning to read; learning to read is associated with later school success (Juel, 2006). Evidence from studies with children who are typically developing and children with language impairments suggests that children make the fastest growth in the acquisition of reading skills between preschool and first grade (Skibbe et al., 2008). Given this relatively steep trajectory in acquiring early reading skills, children who are behind their peers when they enter kindergarten, while making gains, are unlikely to catch up. For most at-risk children, then, it is unlikely that the achievement gap will ever be

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[1] We note, however, that some preschool children who are at risk because they live in low-income families enter preschool with age-appropriate performance in language and literacy skills and continue to achieve grade-level performance in kindergarten (Cabell, Justice, Konold, & McGinty, 2011).

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closed (Vernon-Feagans, Kainz, Hedrick, Ginsberg, & Amendum, 2013).

Young children's home language and literacy experiences vary substantially, and differences in the home language and literacy environment may widen over time (Burgess, Hecht, & Lonigan, 2002). Parents' education and income are negatively related to the quality of the home language and literacy environment as reflected in literacy-related materials and adult-child interactions such as book reading (Roberts, Jurgens, & Burchinal, 2005), although there is substantial variability across families (Baroody & Diamond, 2012). Disparities in language competence of 18-month-old children are associated with family SES, with a gap of 6 months between children from families with lower and higher SES when children were 24 months old (Fernald, Marchman, & Weisleder, 2013). These results are a downward extension of earlier work by Hart and Risley (1995) who found substantial gaps in preschool children's oral language competence associated with family SES and the home language environment.

There is strong evidence that the associations between the home literacy environment and young children's language and literacy skills, reported for children who are typically developing or at risk, are replicated in families that include young children with some disabilities. Carlson, Bitterman, and Jenkins (2012) used data from the Pre-Elementary Education Longitudinal Study (PEELS) to examine associations between the home literacy environment and measures of oral language for young children with various disabilities. For children with "low severity disabilities" (p. 74), but not children with moderate to severe disabilities, home literacy practices predicted children's oral language in ways similar to that found for typically developing children, although the associations were somewhat weaker. Breit-Smith, Cabell, and Justice (2010) used parent-reported information collected as part of the National Household Education Survey to examine home literacy practices in families that included a child with a language impairment and those with children without disabilities. After controlling for child age and family SES, they found no significant differences in home literacy practices. Similarly, in a study in the Netherlands, van der Schuit, Peeters, Segers, van Balkom, and Verhoeven (2009) found no differences in parent-reported home literacy activities in families with a child with an intellectual disability compared to families with a typically developing child, after controlling for children's mental age. The home literacy environment made important contributions to the language and early literacy development of children with intellectual disabilities in ways that were similar to families of children who were typically developing. These results are different from earlier studies in which preschool children with an identified disability were reported to experience fewer high-quality interactions with parents during shared book reading than their peers (cf., Marvin & Mirenda, 1993). There is also evidence that the home language environment (both oral and sign) is related to the development of children who are deaf and hard of hearing in ways similar to that found in families of typically developing hearing children (Lederberg, Schick, & Spencer, 2013).

In all of these studies, contributions of the home literacy and language environment to young children's language and literacy competence come from both the availability of literacy materials (e.g., books, writing materials) and the language and literacy activities, such as shared book reading, in which adults engage with young children. The processes that link home language and literacy practices and children's development in children who are typically developing appear to be applicable to children with low severity disabilities, including deaf children born to deaf parents and children who are hard of hearing and have speech perception (Lederberg et al., 2013).

Decoding and Oral Language Skills

The results of meta-analyses (National Early Literacy Panel [NELP], 2008) and research (Kendeou, van den Broek, White, & Lynch, 2009) provide evidence that two sets of processes are critical for learning to read: those related to an understanding of letters and sounds (referred

to as decoding skills) and those related to oral language competence. This empirical work is consistent with the theoretical perspective described in *The Simple View of Reading* (Hoover & Gough, 1990). Although reading is a complex activity, *The Simple View* holds that "reading consists of only two components, decoding and linguistic comprehension" (p. 128), each of which is necessary, but not sufficient alone, for reading success. Both research findings and this theoretical perspective suggest that preschool children need a foundation of skills "related to decoding (e.g., phonological awareness, letter knowledge, concepts about print) and to language-comprehension success (e.g., vocabulary, drawing inferences, listening comprehension)" (Diamond et al., 2013, p. 12) to achieve skilled reading. These skills are related to reading competence for children who are typically developing (Storch & Whitehurst, 2002) and for children who are at risk (Diamond et al., 2013), children with language impairments (Wilcox, Gray, Guimond, & Lafferty, 2011), and children who are hard of hearing and have speech perception (Lederberg et al., 2013). Research with elementary students with moderate and severe intellectual disabilities has also emphasized the importance of decoding and comprehension skills for understanding text (Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012).

This chapter focuses on research evidence for instructional interventions (including curricula) that support young children's development of decoding and oral language skills that are critical to later reading success. We focus primarily on interventions in prekindergarten classrooms that are intended to improve learning outcomes of young children who are at risk. There are few published studies on the efficacy of literacy interventions for specific groups of preschool children with disabilities (Carta & Driscoll, 2013; Diamond et al., 2013), and we found no research focused on literacy interventions with preschool children with moderate and severe disabilities. Thus, we have included some recent work with older students which is relevant for younger learners. We assume that readers are interested in the evidence for specific practices designed to support children's early literacy development. To that end, we describe results of intervention studies that have employed experimental (including single subject) or quasi-experimental designs (Shadish, Cook, & Campbell, 2002) to determine the impact of an instructional practice or curriculum on children's development of decoding and oral language skills.

Intervention studies differ in their level of attention to elements or features of an intervention (Powell & Diamond, 2012). In some studies, a discrete instructional practice is evaluated (e.g., a semantic association strategy for teaching letter-sound correspondence to children with hearing impairment; Miller, Lederberg, & Easterbrooks, 2013), while in others a broad range of practices are compared against business as usual (e.g., print-focused conversations during read alouds; Justice, Kaderavek, Fan, Sofka, & Hunt, 2009). The latter investigation provides valuable information about the effectiveness of an intervention "package" but does not identify which of the components is critical, nor the fidelity with which the components need to be implemented, to achieve effects on children's development and learning. We begin by examining the results of interventions, including curricula, designed to improve decoding and oral language skills for young children who are at risk or have a disability and conclude with a section on evidence-based approaches to help teachers promote children's early literacy and language competence.

As we noted earlier, theory (i.e., *The Simple View of Reading*) and research (e.g., NELP) point to decoding and oral language skills as foundations for children's development of skilled reading. Our decision to organize much of this chapter around these skills reflects our understanding that some instructional practices, such as shared book reading, may be implemented in ways that support both oral language and decoding development (Powell & Diamond, 2012). Because there is substantial evidence that the foundations for learning to read are similar for children who are typically developing, children who are at risk, and children with disabilities who have speech perception, we include studies conducted with children without disabilities.

In the NELP (2008) meta-analysis, a number of decoding skills acquired during preschool, including alphabet knowledge, phonological awareness, and writing, had medium to large predictive relations with children's literacy skills in early elementary grades. Preschool children's oral language skills were related, although less strongly than decoding skills, to later literacy achievement. Earlier evidence suggests that the contributions of decoding and oral language skills to children's reading performance vary across preschool and early elementary grades (Storch & Whitehurst, 2002). As Kaiser and Roberts (2011) have observed regarding the development of young children with language impairments, children's language skills "may be the ubiquitous underpinning of reading" (p. 301) even when early reading outcomes are more directly related to children's decoding skills. Lederberg et al. (2013) note that, for children who are hearing impaired and have speech perception, general underlying language competence and the ability to use spoken phonological knowledge for decoding print are critical skills for learning to read.

Teaching Decoding Skills

Code-related (decoding) skills help children to "crack the alphabetic code," learning that letters in written words reflect the sounds in spoken words. Code-related skills reflect auditory and written aspects of language and include alphabet knowledge and phonological awareness along with an understanding of print conventions and book concepts (Powell & Diamond, 2012). These skills, assessed in preschool, are strong predictors of later success in reading and writing for children who are developing typically, for children at risk, and for children with disabilities (Kaiser & Roberts, 2011; Lederberg et al., 2013; NELP, 2008; Wilcox et al., 2011).

A classroom environment rich in literacy-related materials provides opportunities for teachers to enhance children's literacy knowledge through children's naturalistic interactions with print and writing materials (Justice & Pullen, 2003). This type of implicit approach to children's early literacy development is insufficient, however, for promoting early literacy and language skills of children who are at risk or have a disability (Diamond et al., 2013; Easterbrooks, Lederberg, & Connor, 2010). More effective approaches to teaching decoding skills include those in which the teacher helps children understand the skill or concept being taught (e.g., blending words to make new words), demonstrates the skill, and provides multiple, repeated opportunities for children to practice (Phillips, Clancy-Menchetti, & Lonigan, 2008). Fortunately, there have been a number of recent, rigorous evaluations of early childhood interventions that offer guidance about effective approaches to teaching decoding skills (Diamond et al., 2013).

Children's knowledge of letter names and the sounds that letters make is one of the best predictors of early reading (NELP, 2008). Recently, Piasta, Petscher, and Justice (2012) investigated the diagnostic efficiency of letter-naming benchmarks assessed in preschool as indicators of higher risk for later reading difficulties in kindergarten or first grade. In this study of the development of young children who were at risk and attended public preschool programs, the investigators found that children who knew the names of 18 uppercase and 15 lowercase letters at kindergarten entry were likely to continue to succeed in learning other literacy tasks; children who did not achieve these benchmarks were "most likely to continue to struggle with literacy learning" (p. 953).

In English, some letter names include the phoneme that the letter represents (e.g., /m/). When a letter name contains the letter's sound, knowing the letter name facilitates learning the letter sound for children with speech sound disorders and language impairments and children who are typically developing (Ellefson, Treiman, & Kessler, 2009). Recent experimental studies (Piasta, Purpura, & Wagner, 2010; Piasta & Wagner, 2010b) and meta-analyses (Piasta & Wagner, 2010a) have examined the differential value of teaching a letter's name and its sound together, compared to teaching either letter names or sounds alone.

Piasta et al. (2010) investigated the effects of two approaches to letter knowledge instruction: teaching letter names and their sounds (e.g., "the letter C makes the /k/ sound") or teaching letter sound only (e.g., "that letter makes the /k/ sound"). They compared the performance of children in the letter-name-plus-sound and letter-sound-only instructional groups on alphabet knowledge and phonological processing skills to the performance of children in a control group who received instruction on numbers. Children who received letter-name-plus-letter-sound instruction learned the names of more letters than did children in either of the other groups; they learned more letter sounds than did children in the control group. Children in the letter-sound-only group did not differ from children in the control group in their acquisition of knowledge about the alphabet during the intervention period. The results of this investigation and other experimental studies are consistent with "a causal interpretation of the letter name-to-sound facilitation effect" (Piasta & Wagner, 2010b, p. 337).

In addition to alphabet knowledge, phonological skills reflecting preschool children's ability to manipulate elements of spoken language are linked to later literacy achievement (NELP, 2008). The development of phonological skills progresses along a continuum from sensitivity to larger units of sound (e.g., words in sentences) to smaller (syllables) and smaller (initial sounds, phonemes) units (Phillips et al., 2008). Memory is also a substantial component of phonological processing for preschool children (Lonigan et al., 2009), although it has not been a direct focus of early literacy interventions.

Results from intervention studies with preschool children suggest that explicit instruction in phonological awareness leads to significant gains in children's learning (Byrne & Fielding-Barnsley, 1991; Byrne, Fielding-Barnsley, & Ashley, 2000; Powell, Diamond, Burchinal, & Koehler, 2010). In a recent study, Miller et al. (2013) examined the effectiveness of explicit instruction, embedded within a literacy curriculum, for teaching preschool children with hearing impairments three key phonological awareness skills: syllable segmentation, rhyme recognition, and initial phoneme isolation. They used a multiple baseline across skill single-case design to determine whether there was a "functional relation … between instruction" (p. 209) and children's learning. Instruction began with a 3- to 5-week period of explicit instruction of each skill followed by opportunities for practice. Instruction was implemented in small groups of three children outside the classroom. Results suggest that, overall, instruction was effective in teaching these skills, with a functional relation between teachers' instruction and children's learning. There was suggestive evidence that children's auditory perception of spoken language was related to the ease with which they learned these phonological awareness skills.

In an experimental study implemented with low-income preschool children at risk for later reading failure, Lonigan, Purpura, Wilson, Walker, and Clancy-Menchetti (2013) compared the effects of separate decoding (phonological awareness, letter knowledge) and meaning-focused (dialogic reading or shared reading) interventions, or intervention combinations, on children's acquisition of early literacy skills. A phonological awareness intervention used word games to teach children phonological awareness skills, progressing from larger (e.g., whole word) to smaller units of speech. In the letter knowledge intervention, children were taught to identify and label examples of upper- and lowercase letters. The meaning-focused intervention used two approaches to adult-child book reading to promote children's oral language skills: dialogic reading in which children were active participants in telling the story (cf., Lonigan & Whitehurst, 1998) and shared reading in which the adult read the book to the group. Each of these interventions was implemented by research staff as a pullout with a small group of three to five children and lasted 10–20 min a day, 5 days a week. The reading interventions began in the fall, at the beginning of the school year, and the decoding interventions began at the end of January; all interventions continued until the school year ended. Children in each of the intervention groups made significantly greater gains on the skills taught in the intervention (e.g., the

letter knowledge intervention affected children's letter and sound knowledge) than did children who received the classroom curriculum only. There were no intervention effects on literacy skills that were not taught (e.g., children in the letter knowledge group did not make accelerated gains on measures of phonological awareness).

Browder et al. (2012) evaluated the effectiveness of a multicomponent literacy program (*Early Literacy Skills Builder*) that included attention to decoding skills on the literacy development of students with severe developmental disabilities in grades 3–5. The curriculum included attention to decoding skills including letter-sound correspondence, segmentation, and onset rime. Students in the intervention made significantly greater gains on measures of phonological skills, with small to moderate effect sizes, than did students who received the standard curriculum. These results are important in suggesting that decoding skills can be taught effectively and should be included in literacy instruction for students with moderate and severe disabilities.

Results from the NELP (2008) meta-analysis suggest that children's knowledge of print (e.g., understanding that meaning is conveyed by print rather than pictures) is a significant component of early literacy development. In a recent intervention study, Piasta, Justice, McGinty, and Kaderavek (2012) taught preschool teachers to make verbal (do you know this letter?) and nonverbal (tracking print with one's finger) references to print during shared reading. The effectiveness of this print referencing intervention for promoting children's early literacy skills was compared for children enrolled in a high-dose (four reading sessions of a single book each week) or low-dose (two reading sessions of a single book each week) intervention compared to children who received a regular classroom reading of the same book. After controlling for children's initial performance in the fall of preschool, teachers' use of print referencing during shared whole-group book reading led to significantly greater gains on measures of reading, spelling, and comprehension for children in the high-dose group compared with children in the regular reading control group at 1- and 2-years post-intervention. Children in the low-dose intervention tended to have higher scores than children in the control group, but most of these trends were not significant.

Young children's writing, including children's ability to write their names and to write dictated letters, is an important component of early literacy skills linked to conventional literacy outcomes in decoding, reading comprehension, and spelling (NELP, 2008). Moderate concurrent associations have been found between children's name writing, letter knowledge, and phonological awareness in studies that include children who are developing typically (Both-de Vries & Bus, 2010), children who are at risk (Diamond, Gerde, & Powell, 2008), children with oral language impairments (Puranik & Lonigan, 2012), and preschool children with a range of disabilities (Diamond & Baroody, 2013). Diamond and Baroody (2013) found that preschool children who used only letters when writing their name, compared to children who included non-letters in their writing, made significantly greater growth in skills related to letter and letter-sound knowledge from preschool to kindergarten. Learning to use only letters to write one's name during preschool was associated with unique variance in early reading skills in kindergarten for children who were at risk and children with identified disabilities. To the extent that learning to write one's own name using letters promotes a broader understanding of the alphabet and calls attention to letter-sound associations necessary for word decoding, it may be a useful tool for promoting children's early literacy skills (Diamond & Baroody, 2013; NELP, 2008).

Several studies of code-focused interventions implemented by parents point to the promise of training parents of children with special needs to promote print concepts. A study by van Bysterveldt, Gillon, and Moran (2006) conducted with parents of children with Down syndrome found that a 6-week print referencing intervention that used storybook reading had positive effects on children's phonological awareness and letter knowledge. Parents were taught how to focus their children's attention on targeted letters and sounds within words as well as initial phonemes.

Also, a feasibility study of a 10-week parent-implemented print referencing intervention that involved repeated shared book readings had positive impact on the rhyming but not alliteration skills of children with language impairments (Justice, Kaderavek, Bowles, & Grimm, 2005).

Oral Language

The NELP meta-analysis (2008) found that oral language skills, assessed in preschool or kindergarten, were moderately associated with children's literacy achievement in early elementary grades. By the time children are in second or third grade, oral language skills and vocabulary become important components of reading comprehension (Storch & Whitehurst, 2002). A child's vocabulary at the end of first grade predicts reading comprehension in high school, with differences among young children in vocabulary knowledge persisting throughout their schooling (Cunningham & Stanovich, 1997). Significant differences in children's vocabulary and language processing efficiency, linked to the home language environment and family socioeconomic status, have been reported in children as young as 18 months of age (Fernald et al., 2013).

Shared book readings are common approaches for enhancing young children's literacy achievement (Lonigan et al., 2013; Powell & Diamond, 2012) and have been effective in promoting access to grade-level text for elementary students with moderate and severe disabilities (Browder, Lee, & Mims, 2011). Recent meta-analyses have found significant, moderate effects of shared reading interventions in preschool or kindergarten on a variety of oral language outcomes (Mol, Bus, & de Jong, 2009; NELP, 2008). Shared reading interventions designed to promote children's oral language development have used both explicit instruction and conversations related to the book (extratextual talk) for promoting broader language skills.

Repeated reading of a single book, along with explicit instruction of targeted words, has been used to increase young children's vocabulary knowledge within the context of book reading. Biemiller and Boote (2006) found that children learned between 8 and 12 new words per week when teachers repeated their reading of a single book and provided brief explanations of 7–10 different new words at each reading. Similarly, Sénéchal (1997) found that children who heard repeated readings of the same book over a few days had stronger vocabulary skills than did children who heard the book read only once. In a study with kindergarten children who were at risk for problems learning to read, Coyne, McCoach, and Kapp (2007) found that embedding definitions of target words in a storybook reading was an efficient way to help students create a representation of a word's meaning. More intensive instruction, including explicit instruction of word meaning, multiple exposures to target words across contexts, and opportunities to practice using the word, was needed before children understood the word in new contexts or produced a complete definition of the word.

The dialogic reading method of reading to preschool children, noted earlier in this chapter, uses both simpler and more challenging questions to promote oral language skills (Whitehurst et al., 1988). In this approach, children are encouraged to take an active role as the storyteller, with adults asking questions, adding information, and prompting the child in order to increase their sophistication of language and depth of analysis of the events in the story. Because children are active participants in this approach to reading, it is implemented in small groups of five or fewer children so that all can participate. Randomized trials of dialogic reading with children from low-income families have found significant effects on children's expressive vocabulary (Whitehurst et al., 1994) that lasted up to 6 months after the end of the intervention. Wasik and Bond (2001) found that book reading that combined dialogic reading with an emphasis on teaching vocabulary from the book resulted in immediate effects on children's receptive vocabulary.

Recent studies have examined the effects of conversations and questions before, during, and after shared reading for children's vocabulary and oral language development. In an experimental study, Blewitt, Rump, Shealy, and Cook (2009)

examined the use of low and high demand questions in promoting children's vocabulary knowledge. Low demand questions, used when novel words were introduced, involved asking children to recall story elements or describe pictures; high demand questions that focused on inferences and predictions were asked later in the book reading. They found that asking questions about words significantly improved children's comprehension; asking higher demand questions facilitated a deeper understanding of word meanings. Blewitt and her colleagues suggest that high demand questions help children access more detailed aspects of a word's meaning only after they have a basic understanding of that word's meaning.

Gonzalez et al. (2011) examined the effectiveness of a shared book reading intervention to teach science and social studies vocabulary to preschool children from high-poverty schools. Children participated in small group reading sessions in which their teachers embedded discussion of and practice with a small set of challenging words. Children who received the intervention outperformed their peers who received the regular curriculum in their expressive and receptive knowledge of the targeted words and in their performance on a standardized measure of receptive vocabulary. In a second study, they examined associations between intervention teachers' conversations (extratextual talk) before, during, and after shared reading and children's receptive and expressive vocabulary knowledge (Gonzalez et al., 2014). Teachers' talk after book reading was associated with children's expressive, but not receptive, vocabulary development. The amount of time that teachers devoted to higher-level discussions, such as connecting concepts discussed in the book with children's life experiences, significantly predicted both receptive and expressive vocabulary outcomes.

Zucker, Cabell, Justice, Pentimonti, and Kaderavek (2013) examined associations between the frequency and features of shared book reading and children's language and literacy development, using data from teachers randomly assigned to the comparison group in a print referencing intervention (see Justice et al., 2009; Piasta et al., 2012). Children attended need-based preschool programs, including Head Start. They found that the frequency of shared reading predicted preschool children's expressive vocabulary development. Children did better in classrooms where book reading occurred more often. Teachers' talk before, during, and after shared book reading was related to children's gains in expressive vocabulary and letter knowledge in preschool and to receptive vocabulary in kindergarten. There was a trend toward significance in first-grade reading comprehension. In this study, both literal and inferential talk (similar to Blewitt et al.'s low and high demand questions and to Gonzalez et al.'s labeling and association questions) were associated with children's gains in language skills. Taken together, the results of this series of studies point to the importance of engaging children in conversations, providing explicit instruction, and using rich language in order to promote children's oral language competence. The impact of shared book reading on children's early literacy competence may be mediated by the amount and quality of teachers' extratextual conversations with children.

Available evidence suggests that parents of language impaired preschool age children can be trained to improve their children's language skills. Roberts and Kaiser (2011) conducted a meta-analysis of 18 studies of the effects of parent-implemented language interventions on the language skills of children between 18 and 60 months of age with any type of language impairment (e.g., less than 50 expressive words at age 2 years). Results indicated that parent-implemented intervention had significant, positive effects on children's receptive and expressive language skills and vocabulary, expressive morphosyntax (e.g., mean length of utterance), and rate of communication (e.g., total number of utterances) compared to control group children. Most of the interventions focused on socially communicative interactions between parents and children, particularly during play, routines, and everyday activities. Many of the interventions sought to enhance turn taking that increased child-initiated communication and the amount of parent–child interaction and also to provide increased linguistic

input to the child (e.g., parent expanding on what the child says). The Roberts and Kaiser meta-analysis was unable to explore the relative impact of specific intervention features because the studies generally provided minimal information about how parents were trained.

Efforts to train parents to implement a modified version of dialogic reading with their children with language impairments point to mixed success. One investigation found that parents increased their use of open-ended questions and related strategies emphasized in dialogic reading, with modest effects on children's language skills (Dale, Crain-Thoreson, Notari-Syverson, & Cole, 1996), whereas a subsequent random assignment study found no significant effect of parent-implemented dialogic reading on children's language skills compared to control group children (Crain-Thoreson & Dale, 1999).

There are a number of unsettled questions about oral language instruction (Powell & Diamond, 2012). There is not an empirically derived list of words that young children should know, and there is no agreement on how many new words should be taught at one time. There is considerable variation across interventions. Beck and McKeown (2007) provided intensive instruction on six words per week in a study with kindergarten and first-grade students, whereas Biemiller and Boote (2006) provided instruction on four to six different word meanings at each session with kindergarten, first-grade, and second-grade students. Biemiller and Boote argue for teaching more words. Because some children are likely to know the meaning of each of the new words, teaching more words helps to ensure that each child is introduced to some words that are new to him or her. We do not know about the optimal exposure needed for a child to learn a new word, although this is likely to be related to the child's existing vocabulary knowledge, nor do we know the most efficient ways to use extratextual talk (in frequency; placement before, during, or after reading; or complexity) to support children's oral language development. Observational studies in early childhood classrooms serving young children who are at risk suggest that teachers' language tends to be constrained, with relatively few in-depth teacher-child discussions or conversations (Burchinal, Vandergrift, Pianta, & Mashburn, 2010). In addition, many children are eligible to attend preschool because they are from low-income families or have a disability and they are often enrolled in classrooms with peers whose language, literacy, and social skills are reduced compared to more advantaged children. Children who themselves exhibit less well-developed language skills may benefit little from enrollment in classrooms in which their peers also display less-developed skills (Diamond et al., 2013).

In the past, many literacy interventions focused on teaching functional sight words (e.g., restroom signs) to students with moderate to severe disabilities, but, even when students were able to apply their knowledge of the word, this approach was unlikely to help the student learn to read (Browder et al., 2012). Goldstein (2011) argues that we need to rethink the literacy skills we teach young children with disabilities, extending our focus to literature and to electronic media that satisfy personal interests and contribute to enjoyment. While we found no research on literacy interventions with preschool children with moderate to severe disabilities, recommendations from studies with preschool children with speech and language impairments point to the importance of explicit teaching and providing multiple opportunities to learn the skill (Carta & Driscoll, 2013). Research with older students has found that specific adaptive strategies (e.g., adapting text, offering response options, using a hierarchy of least prompts) have been effective in increasing access to age-appropriate literacy materials (Hudson, Browder, & Wakeman, 2013). Researcher-designed e-books that integrate principles of Universal Design for Learning with technology have been effective in promoting the development of comprehension skills for elementary students with moderate and severe disabilities (Coyne, Pisha, Dalton, Zeph, & Smith, 2012). These approaches provide a starting point in the development of effective instruction of literacy skills for young children with moderate and severe disabilities.

Professional Development in Early Literacy and Language

The evidence-based practices identified in this chapter for promoting growth of children's literacy and language skills are not consistently implemented across early childhood classrooms serving at-risk children. For example, explicit instruction of decoding skills occurs infrequently in classrooms that include children who are at risk (Justice, Mashburn, Hamre, & Pianta, 2008) or children with disabilities (Easterbrooks et al., 2010). In addition to providing teachers with new curriculum resources, educational leaders have long responded to discrepancies between desired versus actual instructional practices and child outcomes by offering workshops and similar training events for teachers. A recent narrative review of 69 intervention studies on professional development for preschool teachers and staff (1990–2010) found that a majority of interventions (88 %) were delivered entirely or in part through lecture-based classes or workshops (Snell, Forston, Stanton-Chapman, & Walker, 2013).

Findings of correlational research lend some modest albeit equivocal support for in-service workshops focused on a range of content domains. In a study of staff in childcare centers, Burchinal, Cryer, Clifford, and Howes (2002) found that attendance at workshops conducted at the center, in the community, or at professional meetings was associated with modestly higher classroom quality and caregiver sensitivity regardless of formal education level. Findings from a descriptive study suggest that a 2-day workshop on implementation of a structured literacy and language curriculum appeared to help preschool teachers of at-risk children achieve a high level of procedural fidelity (e.g., lesson materials are in place) but not necessarily a high level of instructional quality (Justice et al., 2008).

For several decades, the extant literature on preK-12 education has described limitations of one-time institutes or workshops as the sole in-service training strategy for improving instruction and student outcomes (e.g., Goldenberg & Gallimore, 1991). Individualized work with teachers in their classrooms—referred to as coaching or mentoring—is increasingly viewed as a superior strategy for promoting meaningful change in teachers' practices and children's outcomes. There is some evidence to suggest that a combination of workshop and mentoring yields stronger outcomes than workshops alone. Lonigan, Farver, Phillips, and Clancy-Menchetti (2011) randomly assigned 48 preschool centers serving at-risk preschoolers to (a) a business-as-usual control condition, (b) a literacy-focused curriculum with workshop-only professional development, or (c) a literacy-focused curriculum with workshop-plus-in-class mentoring condition. The literacy curriculum focused on children's knowledge of vocabulary words, phonological awareness, and print knowledge and was the same in the two professional development conditions. The workshop condition involved a 2-day workshop near the beginning of the fall semester and four additional half-day workshops evenly spaced through the remainder of the school year. The workshops provided an explanation and demonstration of curriculum activities, with both didactic and hands-on components. Teachers and aides in the workshop-plus-mentoring condition attended the same series of workshops and received weekly classroom visits conducted by teacher mentors who gave feedback on observed curriculum implementation, modeled curriculum activities, and engaged in problem solving with teachers on impediments to curriculum implementation. Results indicated that the oral language, phonological awareness, and print knowledge skills of children whose teachers participated in the workshop-plus-mentoring condition were more consistently positive compared to children whose teachers participated in the workshop-only condition or the control condition. A comparison of effect sizes across conditions suggests that the curriculum was the most significant factor in increasing intervention children's literacy skills.

The Lonigan et al. (2011) study is among a handful of experimental investigations of effects of different levels or forms of professional development on children's literacy and language outcomes. A common pattern in the design of research on professional development is to

examine a professional development intervention in relation to a business-as-usual control condition, often with attention to effects on classroom or teacher practices but not on children's outcomes. Earlier in this chapter, we noted that classroom-based intervention studies vary in their level of evaluative attention to a specific instructional practice versus a package of practices. This pattern also is found in research on effects of professional development (Powell, Diamond, & Cockburn, 2013). Thus, the empirical literature offers more information on the impact of bundled components of professional development than on the relative effect of a particular component.

The training-plus-coaching approach to professional development is integral to several early literacy and language interventions that have found positive effects on children's oral language and/or code-focused skills with randomized controlled trials. An academic-year intervention known as ExCELL (Exceptional Coaching for Early Language and Literacy) and led by Wasik and Hindman (2011), which included weekly coaching and monthly group trainings plus classroom materials, produced positive effects on children's vocabulary and phonemic knowledge (see also Wasik, Bond, & Hindman, 2006). A randomized controlled trial of a semester-long intervention by Powell and colleagues found positive effects on children's letter knowledge and sound skills. The intervention included 2 days of initial group training and twice-monthly coaching sessions focused on teachers' instructional practices (Powell et al., 2010).

It is interesting to note that positive intervention effects on one or more targeted child skills have been found in experimental studies that distribute the group training time in different ways. For example, in contrast to the Lonigan et al. (2011) arrangement of a 2-day workshop at the beginning of the year and four half-day workshops spaced across the school year, Wilcox and colleagues offered an initial 4-h workshop in May of the school year prior to teachers' participation and nine 2-h follow-up training sessions during the participation year (August–May). The work with teachers focused on implementation of a language and literacy curriculum for preschoolers with developmental speech and/or language impairments (Wilcox et al., 2011). The Head Start REDI (Research-based, Developmentally Informed) professional development plan involved 3 days of professional training prior to implementing the intervention and a 1-day "booster" session conducted in January (Bierman et al., 2008). Each of these interventions included weekly mentoring visits to participating classrooms.

In recent years, program designers have used technologies to expand the geographic reach of coaching-based interventions and/or attempt to reduce the costs of staff travel to classrooms for coaching sessions. Piasta, Justice, McGinty et al. (2012) examined an adaptation of teacher training for the Learning Language and Loving It program (Weitzman & Greenberg, 2002) with a 3-day summer institute and written feedback to teachers based on twice-monthly classroom videotapes. This professional development design contrasts with an in-service training plan of eight group evening sessions and six individual (coaching) sessions provided in an earlier exploratory study of the program that found positive intervention effects on children's talk (Girolametto, Weitzman, & Greenberg, 2003). In the Piasta et al. study, children in intervention classrooms showed greater linguistic productivity and complexity in their talk. The Powell et al. (2010) intervention described previously compared randomly assigned teachers who received in-person coaching and teachers who participated in coaching remotely by submitting a videotape of specified instructional practice and receiving feedback in a web-mediated system. Positive outcomes on children's code-focused skills were found in both coaching conditions. Pianta, Mashburn, Downer, Hamre, and Justice (2008) found that technologically mediated consultation (coaching) with teachers combined with access to web-based video clips that included attention to literacy and language content was more strongly associated with the quality of teacher practices than access to the web-based resources alone.

Some investigators have significantly enhanced the workshop-plus-coaching combination with

additional supports for teachers to implement new language and literacy curricula and teaching practices. The Center for Improving the Readiness of Children for Learning and Education (CIRCLE) model is among the more comprehensive approaches to professional development focused on literacy and language outcomes (Landry, Anthony, Swank, & Monseque-Bailey, 2009). It includes 2-h small group sessions that meet twice per month for most of the school year and features an online course, twice-monthly in-class mentoring that includes feedback on videotaped practices, and a tool for informally monitoring children's progress. Buysse, Castro, and Peisner-Feinberg (2010) examined a multicomponent professional development program to improve teachers' instructional practices with Latino dual language learners. The program included a 3-day institute at the beginning of the year, consultation with a bilingual expert focused on developing an action plan for implementing instructional practices and bimonthly visits to monitor teacher progress, and a community of practice meeting held every other week with six to eight teachers focused on developing, implementing, and revising lesson plans.

Coursework also has been developed and evaluated as a form of in-service training. Quasi-experimental studies of a 15-week course combined with in-classroom coaching (Neuman & Cunningham, 2009) and a 6-day course (Dickinson & Caswell, 2007), both focused on promoting at-risk children's literacy and language competence, found modest positive effects on teachers' practices. In a subsequent study, Neuman and Wright (2010) found that coaching was more effective than coursework in improving literacy and language instruction. None of these studies reported effects on children's outcomes.

There is limited research on whether teachers continue to implement practices promoted by a professional development program after the program ends. Recently Bierman et al. (2013) collected follow-up data on 37 teachers from the Head Start REDI intervention, which focused on children's social-emotional skills as well as literacy and language outcomes. At the end of the REDI program, REDI coaches made contact with teachers (telephone, email, classroom visits) approximately once per month to answer any questions the teachers had, but teachers no longer participated in formal meetings with the coach or received financial compensation for program preparation efforts. One year after the conclusion of the Head Start REDI program, classroom observation data indicated there was a high quality of implementation of practices related to the REDI program's social-emotional domain but, compared to data collected at the conclusion of the intervention, a decline in the quality of practices focused on language and literacy outcomes. A prior study found that teaching practices related to social-emotional outcomes were sustained with higher quality and more teacher enthusiasm than teaching practices in the literacy and language domain (Sanford DeRousie & Bierman, 2012). In addition, kindergarteners who had been enrolled in the REDI intervention the previous year continued to show greater gains related to social-emotional competence than did their peers in comparison preschool classrooms who did not receive the REDI intervention; there were few differences between groups for vocabulary, print awareness, and phonological sensitivity outcomes (Bierman et al., 2014).

Recently several investigators have compared outcomes of 1 versus 2 years of professional development related to children's language and literacy development. Hindman and Wasik (2012) explored whether a second year of in-classroom coaching as part of their ExCELL intervention resulted in improvements in classroom quality and greater child gains than 1 year of the professional development program. Their within-teacher analyses found that a second year of coaching did not significantly improve classroom quality, although teachers maintained strong gains made during the first year of the intervention. Child outcomes in 1 versus 2 years of ExCELL were examined with completely different groups of children because teachers had a given set of children in their classroom for 1 year only. Results indicated that intervention effects were greater in the second year than in the first year on children's gains in vocabulary skills, but not in alphabet knowledge or sound awareness skills. Alphabet and phonological awareness skills increased

equally in both years. Landry, Swank, Anthony, and Assel (2011) conducted between-teacher analyses of classroom and child outcomes of 1 versus 2 years of participation in the CIRCLE professional development model described earlier. No differences were found in instructional practices, but the vocabulary and complex language skills of children whose teachers participated in 2 years of the professional development program were stronger than the skills of children whose teachers had 1 year of the intervention. Subgroup analyses suggested that a teacher's second year of intervention participation was particularly helpful for the vocabulary development of English language learners who had low vocabulary skills at the beginning of the year.

The literature on in-service training emphasizes the importance of supportive systems for ensuring high-quality implementation of professional development activities. For example, in a critique of an Early Reading First program implemented in urban Head Start centers, Roskos (2013) notes that the professional development plan underestimated the amount of time needed to rework the Head Start program's existing classroom curriculum to accommodate early literacy instruction and lacked strategies for dealing with Head Start regulations that reduced opportunities for coaching sessions. The initiative also did not fully anticipate the amount of time needed to train coaches on core content in early literacy, assessment, and instruction and provided insufficient guidance to coaches in how to differentiate support to meet the needs of individual teachers. There was a limited supply of early childhood educators with strong literacy expertise, and a "soft money" coaching position was not appealing to many experienced early educators. In addition, Roskos reports the professional development model overlooked the role of middle-level supervisors in the Head Start program as potentially key supporters of change in classroom practices. Roskos indicates the initiative was beneficial overall but participants' opportunities for learning were compromised because the design of the professional development effort "lacked an appreciation of the complexities of implementation" (Roskos, 2013, p. 21).

Summary

An increasingly robust scientific literature documents the importance of both code-related and oral language skills for young children's development of skilled reading. Children's code-related skills reflect their knowledge of letters and sounds and are strongly associated with learning to read in studies with preschool and kindergarten children who are typically developing, at risk, or have disabilities. Children's oral language and vocabulary skills are related to reading comprehension by second and third grade. Descriptive studies have linked preschool teachers' language and literacy instruction to children's decoding and oral language skills. Random assignment studies of professional development interventions provide evidence that interventions designed to improve teachers' early literacy instruction lead to changes in teachers' instructional behaviors, particularly those behaviors related to decoding instruction. There is some evidence that professional development interventions individualized for each teacher, as occurs with coaching and mentoring, have stronger effects than do more broadly based interventions such as workshops. Available evidence indicates that parents of children with language impairments can improve their children's language outcomes when successfully trained to implement interventions focused on print referencing and on socially communicative interactions with their children, but there is mixed evidence on the child outcomes of parent-implemented versions of dialogic reading. A continuing challenge is to demonstrate that when the intervention is effective in changing teachers' instruction or parents' interactions, it also results in greater gains for children.

While there has been substantial work related to understanding and improving language and literacy outcomes for young children who are at risk and have identified disabilities, much of what we know comes from descriptive, correlational studies. Intervening in classrooms and with families and then evaluating the effects of those interventions by examining the gains made by children remain the most effective approach for understanding what works. Few longitudinal studies

have been conducted to determine long-term effects of early literacy interventions with children with special needs (Carta & Driscoll, 2013). Research follow-up with teachers and family members who participate in interventions provides evidence about their continued use of intervention strategies and can facilitate our understanding of factors related to the adoption and continued use of these approaches. Follow-up with children, which has occurred only infrequently to date, provides evidence for longer-term intervention effects as well as information about factors that may moderate those outcomes. Finally, research that promotes our understanding of how to adapt effective teaching practices to meet the needs of individual children in different circumstances, including children with moderate and severe disabilities, is needed if we are to maximize early literacy and language outcomes for all.

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Understanding Science, Technology, Engineering, Arts, and Mathematics (STEAM)

9

Within Early Childhood Special Education

Gretchen Butera, Eva M. Horn, Susan B. Palmer, Amber Friesen, and Joan Lieber

A renewed interest in science and mathematics instruction across all levels of schooling has filtered down to preschool classrooms (Moomaw & Davis, 2013), and mathematics ability at school entry is one of a small array of predictors for later achievement (Duncan et al., 2007). The following story about a science lesson being conducted in preschool illustrates this growing trend in early childhood and early childhood special education (ECSE).

The children in Cathy Browning's inclusive preschool classroom have been learning about living things. This morning when the children gather for opening circle, Anna, the assistant teacher, sits down next to Benny, a child with a visual impairment, while Cathy leads the group discussion. Cathy shows the children a package of bean seeds and asks the children if they know what it is. Anna pulls another package of seeds from her pocket and gives it to Benny so he can hold it close enough to see it. Several children are excited because they know about seeds. Sam, a redhead sitting close to Cathy, immediately begins to tell about planting seeds with his grandpa in the garden, and several other children report other planting adventures. Grant is sitting next to Sam in an adapted floor sitter with a tray. Sam asks Grant if he has planted seeds, and seeing this, Anna reaches over to give Sam a seed packet that he places on Grant's tray table. Cathy takes advantage of the children's enthusiasm to show them a picture of a bean plant, while Anna points out the bean plant on the front of the seed package Benny is now gripping tightly in his fist.

The children around Benny want to see his seed package, and Anna suggests Benny show the other children the bean plant on the packet of seeds. Smiling shyly, Benny extends the packet to Juan, the child nearest to him, while Anna pronounces the word and points to the picture. "Bean, see the picture of the plant?" At this moment, Sherry, an early childhood special educator who works in the classroom with Cathy and Anna three mornings a week, slips into the circle taking her place next to Kelsey and Sandy, both of whom have speech and language delays. Taking yet another package of bean seeds from her pocket, Sherry hands it to Kelsey and leans over

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to Sandy as she whispers "sssseeds" into her ear and then says, "SSSSeeds starts just like SSSandy." Sandy smiles and reaches for the packet from Kelsey who gives it to her. Sherry pats Kelsey on the shoulder and whispers to Kelsey, "Thanks for sharing the ssseeds with SSSSandy."

Cathy wonders out loud what the plants will look like next week, and the children offer predictions. Cathy tells the children they will have a chance to paint a picture of their growing plants during small group time and they can share their picture with the class and with their families. Cathy asks the children, "What color paint should I put out in the art center?" Cathy listens to the children's suggestions and nods, "Also today I put some green, white and pink pipe cleaners in the art center. See if you can use them to make a model of the plants we looked at today. Anna is going to put the picture of the bean plant there so you can use it as a model."

There are a number of reasons why integrating science and mathematics into preschool classrooms has received this increased emphasis. First, the current attention on science and mathematics is supported by research about what young children can do and learn in preschool (French, 2004; Inan, Trundle, & Kantor, 2010; Peterson & French, 2008; Starkey, Klein, & Wakeley, 2004). As Cathy, Anna, and Sherry illustrate, young children are quite capable of engaging in many learning tasks they enjoy and that serve to prepare them for formal schooling. There is considerable evidence that early learning has a substantial effect on later achievement. In an IES-sponsored early intervention and early childhood education research synthesis, Diamond, Justice, Siegler, and Snyder (2013) described the strong relationship between children's early math knowledge and later achievement in mathematics. Research is also presented that illustrates how teachers' intentional use of a structured approach to teaching mathematics in preschool leads to improvement in young children's math achievement. Finally, the synthesis authors suggest that while young children may need a lengthy period of instruction to learn some key mathematics concepts, an inquiry-focused approach to teaching science and mathematics may also promote learning. Several curricula and approaches for science (French & Conezio, 2011–2014) and math (Clements & Sarama, 2009; Klein, Starkey, & Ramirez, 2002) have shown promise for use in early childhood classrooms.

Second, the importance of science and mathematics in preschool can also be seen in policy statements, state and federal regulations, and professional organizations' recommendations. State early learning standards increasingly include science and mathematics indicators. A recent joint statement of the National Association for the Education of Young Children (NAEYC) and the National Council of Teachers of Mathematics (NCTM) emphasizes the importance of preparing children early with the mathematical and scientific tools needed to "construct a solid foundation for success in school" (NAEYC & NCTM, 2010, p. 1). Most recently, the National Science Teachers Association (NSTA, 2014) adopted a position statement on early childhood science education, also endorsed by NAEYC. The statement asserts that *all* children have the capacity to observe and discover the world around them and that early science experiences lay the foundation for future scientific learning.

Finally, the current emphasis on children's academic achievement as the most important indicator of educational quality has contributed to a national discussion about the role of early learning and development programs in preparing children for academic instruction. Heckman and Masterov (2007), economists who study the productivity argument for investing in young children, suggest enriched early childhood interventions may have their greatest impact by serving to foster motivation and positive attitudes about learning for young children. In contrast to more traditional views of readiness in which the focus is on ensuring children have the cognitive skills needed for academic achievement, we see readiness as a dynamic, cumulative developmental process that begins long before kindergarten and involves motivation to learn as well as learning itself. The increased emphasis on science and mathematics in preschool curriculum then seems easy to countenance since learning about the

world around them is inherently motivating to young children. Furthermore, both mathematics and science instruction can easily provide the opportunity for children to acquire the cognitive and noncognitive processes related to solving problems (Butera et al., 2014; Butera, Palmer, Lieber, & Schneider, 2011).

Within the current context of early education, it is increasingly clear that children with disabilities are quite likely to be included as active participants in the same learning activities that typically developing preschoolers experience (see Winton, this volume). On the face of it, science and mathematics instruction may seem particularly suitable for supporting the learning and development of children with disabilities for many of the same reasons those activities are suitable for all children. As the teachers in our vignette illustrate, activities can be designed for children to experience "hands-on" learning, and there are also many opportunities to support the development of children's vocabulary and language skills (Peterson & French, 2008). Finally, of particular importance for young children with disabilities, science and mathematics activities often provide children with disabilities instruction that supports their specific learning needs. In particular, instructional activities can be designed to promote children's peer interactions and provide "teachable moments" for learning social skills and supporting children's social competence, which are frequently areas of need for young children with disabilities (Brenneman, Stevenson-Boyd, & Frede, 2009; Clements & Sarama, 2009; Notari-Syverson & Sadler, 2008; Peterson & French, 2008).

To illustrate the role of science and mathematics instruction in the broad context of children's learning and in order to emphasize the integrated nature of teaching and learning, we use the acronym STEM (Science, Technology, Engineering, and Mathematics) and the more current acronym STEAM (Science, Technology, Engineering, Art, and Mathematics). STEM has often been used in debates about education policy and K-12 curriculum, particularly in reference to perceived shortages of American workers skilled in STEM-related areas presumably due to inadequate education (Gonzalez & Kuenzi, 2012). Although the domains of science and math are the focus of this chapter, technology and engineering are equally important to acknowledge in early childhood education (ECE). An integrated cross-disciplinary approach to STEM instruction in which teachers use intentional, inquiry-based explorations to ask questions, plan investigations, and reflect on findings seems ideal for all young children as it emphasizes real-world, hands-on experiences that enhance learning and increase children's motivation to continue to learn (NSTA, 2014). Figure 9.1 outlines the process of infusing STEAM within instruction.

In addition to their enthusiasm for hands-on, real-world experiences, most young children enjoy exploring and creating visual art, music, dance, and dramatic play. Because of these child predilections, we refer to an extended STEM, STE*A*M, including the arts which serve to enhance children's engagement across all content domains including science, technology, engineering, and mathematics (Koralek, 2005). There is evidence that the participation in the arts at an early age facilitates children's learning perhaps because of the relationship between the arts and creativity. In a recent study, LaMore and colleagues (2013) found that graduates in STEM-related fields who were business entrepreneurs or held patents were eight times as likely to have been involved in the arts when they were young than STEM-related graduates with less evidence of participating in those creative aspects of STEM. The arts provide many opportunities to support children's creative and strategic thinking

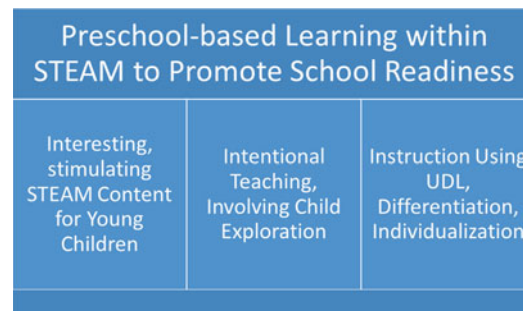

Fig. 9.1 Infusing STEAM into early childhood instructional practices

(i.e., engineering and technology). Producing visual art gives children the opportunity to explore and make use of patterns, employ measurement, quantify various properties of material used in projects, and calculate (i.e., mathematics). It also requires children to use tools and employ various aspects of their immediate surroundings to solve problems (i.e., engineering and science). See Table 9.1 for some examples of STEAM activity topics).

In this chapter,)we discuss the essential role of STEAM in the education of all young children in inclusive preschool settings where children with and without disabilities learn together. Effective STEAM instruction for all children occurs when teachers value children's active engagement in learning and are able to plan and implement activities focusing on STEAM content and processes as well as children's motivation to learn. We begin by reviewing effective instructional approaches for STEAM in preschool. We discuss the importance of intentional teaching in early education settings, particularly with regard to the needs of young children with disabilities. A focus on intentional teaching leads us to a more comprehensive approach or framework for engaging early educators in systematically planning for support for young children with disabilities. We use our work in Children's School Success (CSS) (Odom et al., 2003) and Children's School Success Plus (CSS+; Horn, Palmer, Lieber, & Butera, 2010) to highlight key instructional strategies for science and math learning in early childhood while also directing the reader to other research that underlies these points. CSS+ is based on a series of grant-funded projects in which we worked with

Table 9.1 What is STEAM? Standards-based learning activities in preschool

Domain	Elements	Preschool activities
*S*cience	Physical science (nonliving systems) • Physics—study of matter and motion • Chemistry—changes in matter • Meteorology—atmosphere Life science • Biology—life and living organisms • Zoology—animals • Botany—plants • Ecology—saving the planet	Physical science—sunlight and shadows, air movement, how different liquids move at different speeds, floating and sinking objects, weather, combining ingredients in cooking Life science—plant seeds, listening walk, butterflies and insects, leaves in fall, worms, small animals, recycling, our bodies
*T*echnology	Functional tool use	Touch screen/computers, taking photos, digital media, assistive technologies, scissors, or other fine motor tools
*E*ngineering	Simple machines or structures • Build simple machines or structures • Test to see how they work • Evaluate how they can work better	Simple machines, marble mazes, Legos, blocks, pulleys, ramps, build tunnel to crawl through
*A*rts	Music Movement Dance Visual arts	Use creativity to integrate the Arts into Science, Technology, Engineering, and Mathematics
*M*athematics	Number and operations Algebra Geometry Measurement Data analysis	Counting objects; matching shapes; making patterns with objects, shapes, or colors; measurement in block or sand play; charting data on favorite colors or foods; sorting objects into categories

preschool teachers as research partners to develop and test the efficacy of an integrated comprehensive preschool curriculum framework designed to meet the needs of preschool children at risk for school failure. We developed the CSS+ curriculum framework that we describe in this chapter to guide teachers' thinking about STEAM activities that support children's readiness for school learning especially with regard to needs of children who have or are at risk for disabilities. The classroom in which Cathy, Anna, and Sherry work is revisited throughout the chapter to provide specific examples about how the curriculum framework can be used to develop STEAM activities to support learning for all children. The descriptions of the three preschool teachers and their classroom are based on teachers we came to know through CSS+.

Teaching and Learning in Early Education)

In the following vignette, Cathy, Anna, and Sherry illustrate the changing landscape of the field of early education and ECSE. Cathy leads the instruction as she and her two co-teachers prepare the children to move into small group time. Note in particular how Cathy attempts to support children's use of mathematical and scientific tools (technology) to problem solve by asking questions, using observation to answer them, and collecting data in a systematic fashion using a chart and pictures (engineering, mathematics, and the arts). The activity described in the vignette is one we used in CSS+ and is adapted from the work of French and Conezio (2011–2014). The vignette is intended to describe how new perspectives on teaching and learning influence how curriculum is designed and delivered. Also evident in the vignette is how the three teachers work together to embed teacher-child and child-child interactions designed to support children's individual learning needs.

While the children are gathered in large group, Cathy points to the calendar where a bean plant has been drawn under yesterday's date. Reminding the children of their discussion about bean plants yesterday, she asks "How do you know if something is living?" "It grows," the children shout. "It eats and drinks" is another answer. "Yes, indeed!" says Cathy, acknowledging what the children offer. "How do you think the bean plant grows? What does it eat? What does it drink?" Cathy tells the children that they are going to try to figure out how a bean plant grows over the next several days. "The bean plant starts as a seed," Cathy says. "We can find lots of seeds in many of the plants we eat. Have you ever seen an apple seed when you're eating an apple?" The children report that they have. "How about an orange? Does it have seeds too? Today we are going to look at lots of seeds that we see in the fruits and vegetables we eat." Cathy shows the children pictures of an apple, an orange, and a bean. Anna has given Kelsey, Sandy, and Benny an apple, an orange, and a bean, and Anna prompts the children to hold them up so that all the children can see them. As the children reach for the items, Sherry suggests that each child pass the items around and the children do so. Exchanging quick glances, the three teachers allow the conversation to continue. Anna and Sherry use the opportunity to elicit the sign for apple from several children as the apple is passed to them, and Anna says the words apple, orange, and bean to Juan in both Spanish and English, encouraging him to repeat each word. In the meantime Sherry has placed an apple, orange, and bean on the tray table of Mabel, a little girl in a wheelchair. She whispers to Sharniece, who is sitting next to Mabel, "Ask Mabel which one she'd like to eat." Sharniece asks Mabel and reports excitedly, "Mabel likes to eat beans!" Cathy shows the pictures of apple and orange trees and a bean plant to the other children in the group asking them questions and listening to what the children tell her. They like to eat apples, oranges, and beans and report eating them at home. After

a few minutes, Cathy calls the group back together, and she goes on to give directions. "We'll take turns looking at the apples, oranges and beans during small group time," she explains, "and we'll keep track of what we find when we explore by counting and graphing the seeds we find." Cathy plans to guide children in creating a bar graph in which they can use different colors and pictures to demonstrate what they have observed.

Cathy Browning and Anna Renfrow, her assistant teacher, have taught together for nearly 5 years. Like many early educators across the country, the two women have a lively group of 20 three- and four-year-olds, including seven children identified with various disabilities and two English language learners. Sherry Archibald is an early childhood special educator joining the class three mornings a week to provide classroom support for children who have specific learning needs. Sherry also sets aside time each week to plan with Cathy and Anna, giving them specific suggestions about how to provide for the learning needs of the children with an Individual Education Plan (IEP). Sherry has been working with Cathy and Anna for the past 3 years. The three women have learned to work well together, but they readily admit that learning to be an instructional team was not always easy. They learned early that they needed to do some planning together in order to be "on the same page."

As they began to plan together, Cathy and Sherry found they often had differences about the instructional approaches they favored, reflecting historical differences between the fields of ECE and ECSE. Sherry reported often wishing that Cathy would "get to the point" in her science and math discussions with children, and she worried that the needs of children with disabilities seemed to be overlooked when children engaged in what she ruefully described as "discovery learning." Cathy, on the other hand, found Sherry far too directive in her interactions with the children and thought the degree to which Sherry "told them what to do interfered with their learning)."

Effective Instructional Approaches in Math and Science

Broadly speaking, the dichotomy between ECE and ECSE illustrated by Cathy and Sherry influenced how they approached science and math instruction in the classroom. In ECE the emphasis is on children's interactions as they create their own contexts for learning and development, while in ECSE the onus is on the teacher to design the instruction to enable children to learn efficiently (see Odom, this volume). When asked about how they learned to work well together, Cathy and Sherry laughed and explained that they "lived through their differences" and credit Anna with "translating us to each other as she "explained the importance of discovery learning to Sherry" and "emphasized to Cathy the specific needs of children with disabilities for explicit instruction sometimes." All three early educators believe that they have come to some common ground over time by talking through their differences and explaining that "we do what works."

The emphasis Cathy, Anna, and Sherry place on doing what works is reflected by writers of ECE and ECSE literature describing effective instructional approaches in ECE, particularly in terms of academic content (see Odom, this volume). As DeVries (2001) notes, the priority in most schools is academic learning, and teachers are expected to *directly transmit* that content to children. However, if teachers infuse academic content in activities in which children are likely to show interest, they can capture children's attention, encourage children to explore and experiment with materials, and foster social interactions both *with the teacher* and *between children* while continuing to maintain focus on academic goals (Jones, Lake, & Dagli, 2005). According to Ginsburg, Pappas, and Seo (2001), this perspective can be employed for mathematics learning. When children are engaged in free play activities, "they explore patterns and shapes, compare magnitudes and enumerate. Less frequently, they classify, explore dynamic change, and use spatial relations…mathematical activities emerge in the content of young children's

ordinary interactions with the everyday environment" (p. 206). But Ginsburg and colleagues note that adult guidance "can help children learn even more than they manage to learn on their own…and can help them prepare for later learning in school…guided learning can be of special value for children who are at heightened risk for school failure" (pp. 208–209). Related to science, an investigation by Cook, Goodman, and Schultz (2011) illustrated that preschoolers were able to distinguish relevant variables in two exploratory play situations, suggesting that young children can determine informative and uninformative evidence in order to effectively isolate relevant variables. In this way, preschool children displayed a rudimentary awareness of the scientific method.

Cathy, Anna, and Sherry examine progress monitoring data they collect on a regular basis to determine if their instruction is working. They make it a point to discuss how to modify and adapt their instruction based on what the data suggests. All three of the women acknowledge the importance of the research literature to inform their daily practice. However, doing so is problematic for a number of reasons. Most of the research on STEM or STEAM instruction has been conducted with school-age children (without disabilities), it very seldom includes a cross-disciplinary emphasis, and there is virtually no research on teaching technology or engineering per se to young children. However, some research on science and mathematics instruction suggests that when children are expected to learn through play and the adult's responsibility is to set up "an attractive environment and to respond to children's interests," there are smaller gains in learning than when more teacher guidance and direction is in evidence (Diamond et al., 2013, p. 8). Specifically, Chien and colleagues (2010) compared outcomes in mathematics for children enrolled in three separate classrooms each using different instructional models. One classroom used a model that encouraged child-directed exploration; teachers in the second classroom used a model that relied on teacher instruction, feedback, and discussions, while the third classroom used an instructional model that emphasized teacher scaffolding to encourage children to engage in learning at a higher level than children would on their own. Chien and colleagues found that the *free play-only* children made smaller gains during their prekindergarten year than the children in the other groups as assessed by the Woodcock Johnson Test of Applied Problems. Cathy, Anna, and Sherry agree that a balance between adult direction and guidance and support of child-initiated interactions within an evidence-based set of curriculum materials such as ScienceStart! (French & Conezio, 2011–2014) or Building Blocks for mathematics (Clements & Sarama, 2003) seems important and likely to result in more positive learning outcomes than would be the case with the use of either approach alone.

For Cathy, Anna, and Sherry, as well as many other early childhood teachers, there is a lack of clarity about how to achieve balance between adult direction and guidance and child-initiated interactions. The ECE research literature provides some guidance in this regard. Mantzicopoulos and her associates' (2009) Science Literacy Project uses an inquiry approach to teach scientific literacy to kindergartners. In one study, the researchers (Samarapungavan, Mantzicopoulos, & Patrick, 2008) described an inquiry unit investigating the life cycle of the monarch butterfly in which children in the intervention demonstrated evidence of learning about the scientific inquiry process. In addition, however, the authors provide detail about the instructional approach of the teacher. In the beginning of the intervention, teachers introduced activities to children and then engaged children in discussions about science, the tools they would use in inquiry, and about insects, specifically butterflies. Then teachers introduced children to the setting in which they would observe the monarch butterflies and record their growth and development over time. The teachers' role during the unit was to "ask questions, provide hints and reminders to the children, and model skills. The teachers also helped children communicate by encouraging small group and whole-class discussion and developing a system for students to share what they learned in each inquiry cycle" (p. 883). The underlying theoretical framework is described as relying

on "classic developmental theories" as well as "guided inquiry" (p. 869).

In research related to the *ScienceStart!* curriculum (French & Conezio, 2011–2014), the authors reflect about the balance between child-initiated and adult-guided instructional experiences. French (2004) writes "…children are active learners who construct knowledge through participation in hands-on experience. However, we believe adult support can help children receive maximum benefit from their activities" (p. 140). French views science as the central part of a coherent, integrated early childhood curriculum. The *ScienceStart!* curriculum provides a well-articulated description of this instructional approach, using a scientific problem-solving cycle in which children reflect and ask questions, plan and predict, act and observe, and, finally, report and reflect. In an early efficacy study of *ScienceStart!* in early childhood classrooms, 61 children using the curriculum were compared to children in a control group ($n = 101$) who did not (French, 2004). Children receiving the ScienceStart! curriculum demonstrated significant gains in their receptive vocabulary, as measured on the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997). Teachers reported that when they use *ScienceStart!*'s child-initiated and teacher-directed activities, children are actively engaged, talk frequently, and readily acquire knowledge about scientific content and processes.

Intentional Teaching to Support Effective Instruction in STEAM

Intentional teaching has been used in recent years to describe an instructional approach that balances child-initiated interactions with adult-directed guidance and support. Epstein (2014) explains that intentional teachers skillfully weave together child-guided and adult-directed experiences in early childhood settings to combine the best of teacher-lead instruction and child-guided interactions, which emphasize child choice. For Epstein, child-guided experience is based on "children's interests and actions with strategic teacher support" (p. 3). Adults provide direction in that teachers have goals for an activity, but these are modified and shaped by children's active engagement in the process of learning. This is illustrated throughout the interactions Cathy, Anna, and Sherry have with the children but may be most clearly recognized when they, after exchanging glances, take advantage of the interest the children show in the apples, oranges, and beans. They provide the children more opportunity to handle the fruit than they had originally planned and provide the opportunity for children to share their related previous experiences with the fruits and vegetable as they also seize the opportunity to give children with specific learning needs (i.e., Juan, Sandy, Kelsey, Grant) extra practice learning the labels for the fruits and vegetable. In keeping with Epstein's descriptions of intentional teaching, adult guidance is provided to the child-initiated activities. Later in the day, Cathy and Anna will look over the pictures and pipe stem facsimiles of bean plants the children have made at the art center and talk to the children about them using this discussion to reinforce the children's learning. Intentional teaching provides a model for early childhood educators that combines the child-guided approaches historically favored in ECE with the more direct role of the teacher often described in ECSE.

It is important to note that the emphasis on intentionality advocates for a balanced approach to teaching and learning in which different developmental domains (e.g., physical, social-emotional, cognitive), subject areas (e.g., language literacy including English acquisition, mathematics, social studies, science, art, music, physical education, and health), and teaching strategies (e.g., child-initiated and adult-directed experiences) are deliberately employed to teach children with diverse learning needs and capacities within a classroom (Epstein, 2014; NAEYC, 2009). From this perspective, the traditionally dichotomous views on teaching and learning ascribed to by ECE and ECSE are secondary to intentional instruction for each child (Moomaw

& Davis, 2013). NAYEC's position paper on developmentally appropriate practices (2009) explains the primary role of the teacher:

> …whether a learning experience is adult- or child-guided, in developmentally appropriate practice it is the teacher who takes responsibility for stimulating, directing, and supporting children's development and learning by providing the experiences that each child needs (p. 17).

The role of the intentional teacher is key to fostering early learning and development related to STEAM. Clements and Sarama (2009, 2012) note that such teaching can occur by arranging activities in which children explore the world around them and figure things out, such as observing differences or figuring out a practical math problem. As the three teachers in our vignette demonstrate, early educators have the opportunity to capitalize on this interest and guide children's use of analogical reasoning, encouraging them to generalize skills learned from one activity to another, and to plan ahead (Ginsburg, Ertle, & Presser, 2013). Cathy, Anna, and Sherry assume intentional teaching roles by modeling, supporting, and directing children to observe, compare and contrast, measure, predict, check, record, and report (Gelman, Brenneman, Macdonald, & Roman, 2010). Creating these guided and directed opportunities for learning can help children develop positive attitudes toward learning, encourage dispositions such as inventiveness and persistence, and contribute to future success in school (Brenneman et al., 2009; Clements & Sarama, 2009).

In a small group of seven later in the morning, Anna and Sherry help the children cut up apples, oranges, and beans to find the seeds. Sherry shows the child how to look for seeds, using Grant's tray table to cut open an orange. The seeds are examined, described, and placed in piles of seed types, which are counted both by individual children and chorally with all the children participating as the seeds accumulate. The children are reminded that the seeds come from plants called fruits and vegetables. After Sherry prompts several children to show seeds they find to another child, several children spontaneously show the seeds they find to Grant and Mabel. One of the plastic knives has been adapted with tape so that Larry can get a better grip on it, and Anna helps him use it providing hand over hand support and then letting him try on his own. Using the butcher paper, Sherry, with direction from the children, makes a column for apples, oranges, and bean seeds asking several children to draw the fruits and vegetable under the appropriate column. Sherry then uses a variety of colored markers to make a slash mark for each seed found in the appropriate column with occasional help from one of the children who has discovered a seed. Toward the end of the session, the two women and the children count the slash marks and total up the number of each seed type they have found. Pointing to the numbers and the slash marks, Anna asks, "Which one has the most? Which one has the least?" Sherry has assembled the various seed types in piles. She has several children point to or touch the seed piles to answer the questions. She asks, "Anna, do we have more apple seeds or orange seeds?" Anna says, "I'm not sure. Maybe Seth can tell us." Seth looks at the slash marks and the piles and says, "We have more apple seeds than we do orange seeds." Anna says, "You're right!! I love how you used the data to answer the question." While Anna praises Seth, Sherry uses sign language to emphasize what Seth has reported. There are more apple seeds than orange seeds.

Children's School Success Plus

The activities described in Cathy, Anna, and Sherry's classroom are from our recent work in CSS+ project (Horn et al., 2010) in which we redesigned the original comprehensive, manualized CSS curriculum (CSS; Odom et al., 2003) and created a curriculum framework for use in preschool settings that include children with disabilities. The CSS+ curriculum framework provides strategies for developing daily activities that integrate the content domains of language and literacy, science, math, and social competence by drawing activities from other research-based curricula (e.g., Adams, Foorman, Lundberg, & Beeler, 1998; Clements & Sarama, 2003; Copley,

2010; French, Conezio, & Boynton, 2003; Webster-Stratton, 2000). Specific to math content, CSS activities were adopted from the work on young children and mathematics of Clements and Sarama (2003) and Copley (2010). Further, content was incorporated that was reflective of the NCTM (2007) standards for mathematics in preschool (i.e., numbers and operations, algebra, geometry, measurement, data analysis and probability). In science, we utilized specific themes within the Science Start! (French & Conezio, 2011–2014) curriculum including measurement and mapping, color and light, properties of matter, and neighborhood habitats with author permission.

Within the CSS+ curriculum framework, a variety of teaching strategies are intentionally used to engage children in challenging curriculum content. For example, an essential component to fostering children's learning and inquiry skills uses the problem-solving process developed by French and her colleagues (2003). Within an activity, teachers lead children in discussions focusing on the following steps in the problem-solving process: (1) reflect and ask, (2) plan and predict, (3) act and observe, and (4) report and reflect. As Cathy, Anna, and Sherry demonstrated in the seed activity, the teachers initially asked the children to recall any experiences they have with seeds and also reminded them what they learned previously, eliciting questions and ideas from the children as much as possible (reflect and ask). Next, Cathy showed them the apples, oranges, and beans and the tools she has laid out for them to explore the seeds found in fruits and vegetables asking them what they think they will find (plan and predict). Later in the day, the children were helped to cut the fruit and find the seeds, recording what they find (act and observe). Finally, the children were helped to keep track of the various seeds they accumulated, using a graph that incorporated different colors and pictures. They were also encouraged to talk about what they found (report and reflect). As the children progressed through various activities about living things in general and about plant growth in specific, Cathy will ask the children to revisit to what they have learned, thinking about it and sharing their thoughts with one another and beginning the problem-solving process yet again to expand their learning. Note that the children are provided with opportunities to learn both science and mathematics content and processes and that they also use tools (technology) and solve problems (engineering). In addition, they use art to enhance their learning by creating a chart using different colors and pictures, painting bean plants, and making a facsimile of one using pipe cleaners.

Framework for Promoting All Children's Access and Learning

Our expanded knowledge of the value of providing STEAM instruction in the preschool years as well as the reality of growing diversity within preschool classrooms can create a challenge for the early educator. Learning activities must be designed that are both academically challenging and accessible to *all* children. This requires some careful planning as is illustrated by Anna, Cathy, and Sherry.

While Anna and Sherry facilitate the children's work finding and graphing seeds, Cathy is reading a book entitled "I Am a Seed" to another group of seven children, while another group of children play in the block area or housekeeping supervised by a classroom volunteer. As the book reading and seed activities finish, the children rotate groups. Anna asks Seth to bring Cathy a seed from an orange to show her, and Cathy tells Sara to "Tell Sherry what the book told us about seeds needing to drink" to help these two children manage the transition. Anna asks Larry, one of the other children in the data collection activity, to hold Sam's hand as he moves to the block area. Cathy talks with Emanuel about the block tower he has built as she helps him clean up. Overall the children transition in fairly orderly fashion, and the three women exchange smiles. It has taken this long in the year to get the children used to this routine, especially as several of the children have particular struggles with transitions.

As Cathy, Anna, and Sherry demonstrate, there is considerable complexity involved in teaching in

preschool, particularly given the diversity of children in the classroom. Teachers must plan carefully, and, in working together, they must find ways to communicate regularly about their plans. A curriculum framework to guide their instructional decision-making and maximize the likelihood that all children will learn from the planned activities is needed. Just as a contactor building a house follows a blueprint to ensure that it meets expectations for quality and design, early educators can use a framework in order to meet children's unique learning needs and be responsive to family and community expectations. Researchers have described numerous multi-tiered or multi-leveled models of instructional support, which include high-quality education to support the development of all children and additional intervention for children with greater learning needs (Coleman, Buysse, & Neitzel, 2006; Greenwood et al., 2008). Some well-documented examples include the Building Blocks Model (Sandall et al., 2008); Pyramid Model (Fox, Dunlap, Hemmeter, Joseph, & Strain, 2003), Recognition & Response: Model of RTI for Pre-K (Buysse et al., 2013), and CRTIEC RtI in Early Literacy and Language (Greenwood et al., 2012). Each of these examples incorporates the key components of high-quality curricular content and instructional strategies for all children as well as guidance on identifying the need for and designing additional instructional interventions that match children's needs. The models differ somewhat in focus (e.g., social competence, active participation in general curriculum, communication, and literacy) and/or organization of these key components.

In the Children's School Success (CSS+) project, we designed, tested, and refined such a multi-tiered instructional model, integrating content domains to provide challenging curriculum content. The assumption is that preschool curriculum must lay the foundation for the kindergarten curriculum. The decisions about the content of learning should viewed in light of the skills that children will need in their next setting in order to promote school success. The levels of instructional support in the framework begin with universal design for learning principles for all, move to differentiation to maximize individual children's active participation and learning within the learning activities, and finish with individualization for addressing *unique child goals* and learning targets (Horn, Palmer, Butera, & Lieber, 2016).

Universal Design for Learning

Universal design for learning has roots in the concept of universal design in which the basic premise is that all products, buildings, and spaces must be useable by all people to the greatest extent possible without the need for adaptation (Mace, Hardie, & Place, 1996). Universal design for learning (UDL) extends the concept of universal design to the learning environment and in this instance to the curriculum. Thus, early educators focus on designing learning environments from the start for the widest diversity of learners rather than making individual accommodations and modifications that focus on making the learning environment work for an individual child (Conn-Powers, Cross, Traub, & Hutter-Pishgahi, 2006). A curriculum that incorporates UDL from the beginning rather than as an after-the-fact adaptation provides all children with a variety of formats for using resources and materials, engaging with learning content, demonstrating what they know, and expressing their ideas, feelings, and preferences (National Center on Accessing the General Curriculum, 2003).

UDL encompasses three primary principles: (a) multiple means of representation to give learners a variety of ways to access information and content, (b) multiple means of engagement to gain and maintain learner's interest, and (c) multiple means of expression to provide learners with a variety of ways for demonstrating what they know (CAST, 2009). On a basic level, these UDL principles provide a framework for early educators to design engaging learning opportunities that incorporate a variety of ways to access the curriculum content, offer multiple methods to recruit children's active attention and sustained engagement, and include a range of formats for children to respond and demonstrate what they know and have learned.

Means of representation. Multiple means of representation has been referred to as the "what" of the learning process (Rose & Meyer, 2006). Young children differ in the ways in which they take in and understand information that is presented to them. Some may grasp information more readily by seeing it, hearing it, touching it, or a combination of all three. For example, we know that young children are initially more able to learn concepts that are presented using concrete objects and through multiple examples (Clements & Sarama, 2009).

Means of representation can be further divided into how children receive information and how the information is communicated to the children. In *multiple means for receiving information* focus, the early educator recognizes that young children have a range of learning styles. Thus, they support all styles of learning (i.e., auditory, visual, and tactile) by providing information using multiple and as appropriate simultaneous presentation through auditory (e.g., verbally stating the information), visual (e.g., providing a picture of the information), and tactile (e.g., using concrete objects to illustrate the information) means. For example, in the opening vignette, we see Cathy presenting the fruits verbally, as drawings and photos, and the actual fruits. In addressing *multiple forms of communication* focus, the early educator considers both the format of the communication and the complexity level. Strategies for varying the format include the use of pictures and signs or gestures paired with verbal communication. Cathy, Anna, and Sherry frequently vary the format when communicating with the children. In the beginning, they needed to plan how they would accomplish this, but now that they have worked together for several years, they are able to watch one another and often supply children with alternative forms of communication on the spot and as needed. Strategies for addressing multiple levels of complexity include stating the word and then stopping to define it, repeating and restating key concepts, and breaking the communication into discrete components or steps (e.g., "First, select your paper color. Second, select…"). While the focuses are not discrete and many strategies could easily fall into one or both, the important message is that early educators should reflect carefully on each focus to ensure that they are fully addressing the multiple means of representation principle.

Multiple means of engagement. Multiple means of engagement is sometimes referred to as the "why" of the learning process (Rose & Meyer, 2006). That is, early educators must think about "why" young children would want to participate in the planned activities, engage with the materials, and interact with people in their classroom environment. As a group, young children are interested in spontaneity and novelty but also need to have predictable routines. Young learners, however, also differ greatly in what captures their attention and motivates them to be engaged in a learning activity. Thus, it is important that teachers plan how to effectively tap into the children's interests, offer appropriate challenges, and help them to become excited about learning. The UDL principle of multiple means of engagement can be divided into a focus on recruiting children's interest and sustaining their attention and persistence to a task.

An effective strategy for *recruiting children's attention* is to build on our knowledge of the types of activities and materials that children in this age group tend to find appealing. In doing so, however, it is important to remember to address a number of factors that influence child interests including gender, temperament, life experiences, family culture, as well as the current popular themes, characters, and toys (e.g., princesses, dinosaurs, superheroes). Another well-documented, successful strategy for recruiting children's engagement is providing them with choices as they participate in learning activities (Dunlap et al., 1994; Koegel, Singh, & Koegel, 2010). For example, even something as simple as allowing the children to choose whether they will make the slash on butcher paper to count the seeds or if the teacher should do it for them can entice the children to engage in the activity. The early educator can also use the strategies of providing a balance between the novel and the familiar and making meaningful connections to children's prior experiences and current environments. Cathy demonstrates this strategy when she

asks the children to tell about their experiences with seeds and Sam talks about gardening with his grandpa.

Sustaining children's attention requires that the early educator closely monitors children's level of engagement and routinely implements strategies known to be effective in preventing wandering attention and supporting children's persistence. The research and theory that provide the undergirding for developmentally appropriate practice principles provide excellent guidance in how to effectively support children's attention and persistence (NAEYC, 2009). Specifically, an important factor to consider is ensuring that the difficultly/complexity level of the task is such that children are not bored, are challenged, but are not frustrated. Furthermore, children should have a high proportion of experiences in which they are successful and are thus encouraged to continue. The early educator can also support children's persistence with experiences that are just beyond their mastery by providing appropriate levels of feedback, encouragement, and scaffolding.

Another aspect of the activity planning process that plays an important role in supporting children's sustained engagement is the organization of the activities. Early educators should use a variety of instructional grouping strategies including large group, small group, and independent time with the selection reflecting an appropriate match with the learning content. Small group instruction, for example, has been shown to be highly effective for introducing new skills and concepts (Castle, Deniz, & Tortora, 2005). Cathy, Anna, and Sherry have found that using a large group to present the activities and then small group with adult guidance and direction to ensure that all of the children have the opportunity to engage in it is most effective in their classroom. The children are also provided with the opportunity for child-initiated learning in the art center and during free play with a classroom volunteer. Paying close attention to the length of activities and alternating between active participation and more quiet observation are also important to consider when thinking about recruiting and maintaining young children's active engagement (Vituello, Booren, Downer, & Williford, 2012).

Multiple means of expression. Multiple means of expression is sometimes referred to as the "how" of the learning process (Rose & Meyer, 2006). Young learners differ in the ways in which they can demonstrate how and what they have learned. Some young children provide long verbal responses, while others provide brief responses or partial responses. Yet other children are more comfortable drawing or writing out their responses. And yet another group of children may prefer using gestures, finger plays, or even singing. In fact most children use all of these approaches to express their growing knowledge about their world. Thus, the early educator must provide children with alternatives for demonstrating what they know.

Strategies that can be used by the early educator to address multiple means of expression can be divided into the three components. First the early educator can consider how she/he might provide multiple acceptable options for making a physical response including verbal responses, gestures, pointing, drawing, and writing. Second, the early educator can consider how she/he will communicate to children the acceptance of multiple levels of responding based on the length and complexity of the response. This is evident when the children in Cathy's classroom are examining the fruit and vegetable and Cathy is showing the children the pictures of apple and orange trees and a bean plant. Some children provide a very basic one-word response, while another responds in a multiple word sentence and yet other children may add new information, which connects to their own experiences. Third, during the planning process, the early educator may scaffold this child's response through a number of different levels of independence such as self-initiated complex individual response, choral responding, responding following a peer's response, and responding following an adult model.

Differentiation to Maximize Child Participation and Learning

Differentiation is the use of instructional strategies that acknowledge and respond to the belief that children are different in their approaches to learning (Hall, 2002). Central to differentiated instruction is the process of modifying and adjusting instruction to meet the needs of all children based on an understanding of their current and changing abilities, learning styles, and interests (Tomlinson, 2003). It is important to note that good teachers employ differentiation for a variety of reasons, many of which have to do with meeting the learning needs of children who demonstrate high ability to engage in curriculum content beyond commonly held expectations. It is as important to provide activities with sufficient challenge to keep high-ability children engaged and interested as it is to adapt and modify activities for children who may need more practice to acquire basic skills. During the seed activities in Cathy's classroom, this type of differentiation is evident when Seth is asked to tell which pile of seeds has more and he leads the group in counting the piles to find out. It is also apparent during book reading when Cathy uses the discussion after the book is read to expand vocabulary and oral language for each of the children asking questions and responding to the children's answers based on what Cathy knows about the children's oral language skills. The three teachers agree that it is important to begin with high expectations for all children. They use their progress monitoring data to try and design support for each child to succeed at a higher level than they did previously (Tomlinson & McTighe, 2006).

For children needing more practice to acquire basic skills, the key in differentiation is to help each child actively participate at the highest level possible. A differentiation strategy is used when the child is interested in the ongoing activity but is not able to fully participate or may not stay with the activity long enough to complete it without additional support. In addition, differentiation is used when the child performs the skills but in a way that needs improvement or refinement, providing more frequent opportunities to practice the skill with guided support. Finally, differentiation is used when a child has acquired the basic skills to participate in the curriculum activities but has made slow or little progress. The child can do some, but not all of the needed skills. Modifications would then be made to the instructional content and presentation of the content such that the child can accelerate his/her progress. Under such circumstances, it is important to match the instructional task to the child's "zone of proximal" development (Vygotsky, 1978). The early educator is responsible for structuring interactions through modifications and adaptations of the new or more complex tasks and the ones the child is already capable of performing independently.

Differentiation strategies can be clustered into three primary foci in which the teacher varies complexity or difficulty making adjustments in the content, process, and/or learning environment (Tomlinson, 2003). Sandall and colleagues (2008) describe eight types of curricular modifications (i.e., peer support, adult support, invisible support, simplification, child preference, environmental support, material adaptations, special equipment), which readily cluster into Tomlinson's three primary differentiation foci.

Differentiation of content or the information the child needs to learn (Tomlinson, 2003) can be addressed using the strategies of *use of children's preferences* and *simplification* (Sandall et al., 2008). If the child is not taking advantage of the available opportunities, the adults can identify child preferences and integrate them into the activity to make it more motivating. Cathy knows that some of the children love working with pipe cleaners, and she uses this knowledge to make working in the art center more inviting to them. Simplifying a complicated activity by breaking it into smaller parts (i.e., task analysis) or reducing the steps involved is the second strategy in this group. Sherry uses this strategy when she gives some of the children orange pieces that are already cut open.

Differentiation of process or the types and format of the activities in which the child is engaged (Tomlinson, 2003) can be addressed using the

strategies of *peer support, adult support,* and *invisible support* (Sandall et al., 2008). *Peer support* refers to adults providing peers with support and instruction so that they can help their peers who may not be as competent in the skills or content focus of the activity. For example, Sherry encourages the more competent peers to count chorally when they are counting seeds so that the children who are still learning to rote count can have their help. *Adult support* occurs when adults model an appropriate behavior, join the child in play, praise the child, and/or provide encouragement to the child. This occurs when Sherry helps Larry cut fruit hand over hand. Finally invisible support occurs when adults rearrange aspects of naturally occurring activities to support the child's success in participating. In the small group seed activity above this might look like this—Sherry starts the group off on the task of cutting and exploring the fruit and vegetables for seeds by saying, "Grant, help me show the group how to look for seeds…" Then the teacher takes Grant by the hand, and together they cut into a bean and count the seeds he finds. With this support, Grant is able to fully participate in the activity and received a full physical prompt from the teacher to successfully complete the task. If used in combination with the peer support later, Grant may additionally benefit from a second opportunity to practice the task.

Differentiation of the learning environment or the types and levels of learning support provided to the child (Tomlinson, 2003) can be addressed using the strategies of *environmental support, material adaptation,* and *special equipment* (Sandall et al., 2008). *Environmental support* refers to adults altering the physical, social, and temporal environment in order to promote the child's participation, engagement, and learning (e.g., providing picture labels on materials in the science center rather than word only, letting one child repeat the small group activity twice to increase practice opportunities). *Material adaptation* occurs when teachers modify materials so that the child can participate as independently as possible (e.g., providing premeasured "bags" of the materials needed to do a seed planting activity). *Special equipment* (e.g., using adapted scissor for a cutting task, using an I Pad communication app for the child to communicate a response) means using equipment that has been specially designed to support the child. All three of these are closely related and in fact at times overlap. Which category the planned modification falls into is not important, but what is essential is that each has been considered in planning the activity and addressing the child's individual learning need to participate and learn.

Individualization for Individual Child Learning Targets

Used well, universal design for learning and differentiation strategies can help support children's active participation in the activities and curriculum content of the early learning environment. However, these may not be sufficient to ensure that some children have learning opportunities to meet the goals and outcomes stated on her/his IEP. In order to ensure that the child with disabilities or delays has learning opportunities to meet individually defined needs, instructional individualization should include providing opportunities for planned, brief instructional episodes across activities to provide direct instruction for children's individualized learning needs and outcomes and has been referred to as an embedded learning opportunity (ELOs; Horn, Lieber, Sandall, Schwartz, & Li, 2002). ELOs are based on the premise that in order for many children to achieve their learning objectives, providing access to the general early childhood curriculum is insufficient. In order for children with disabilities to learn new or more complex skills within the context of the general curriculum and early learning environments, the early education team needs to provide instruction through modeling, verbal prompting, and physical guidance. To accomplish this, the team should identify the opportunities that are the most salient through the daily learning activities and routines to the child's individualized

learning objectives and embed short, systematic instructional interactions that support the child's achievement of the objectives within existing routines and activities. For example, for Mabel who has significant physical limitations and has as a priority goal to learn to communicate choice using an eye gaze, the team identifies multiple instructional opportunities across a range of planned and routine activities in the classroom rather than setting up special one-to-one training. In the seed activity, Mabel could choose between her peers to indicate which child she would like to be paired with as they count the number of seeds they find together. She could then choose what color marker they will use to post their count on the butcher paper. These same types of choice-making opportunities could be identified throughout the day's routines and activities to ensure that she receives an abundance of opportunities to receive instruction on her objective and acquire the skill. Similar strategies are advocated by authors describing activity-based intervention (Pretti-Frontczak & Bricker, 2004) and routine-based intervention (McWilliam, 2010).

At the end of a long day, Cathy is cleaning up the classroom as Anna returns from escorting the children to their buses. The two women exchange tired smiles when they see each other, and Anna begins to tackle cleaning up the art corner. "Anna, Sherry left us a sticky-note to remind us that Sandy's IEP meeting is tomorrow after school." Cathy says. "Did we collect some samples of her work to bring to the meeting? I know I have some notes about her progress but I may have forgotten to put some of her work aside," Cathy sounds worried and Anna laughs. "Not to worry," she says, showing Cathy a folder labeled with the date and Sandy's name. "I have it right here. And this IEP meeting will be a satisfying one, I think. Our little quiet mouse Sandy was chattering away while we waited for the bus—all about seeds and oranges and apples and beans. The kids really liked digging into them, didn't they? And Sandy was counting for me, Cathy! She got all the way to 20 without a mistake, counting the steps she was taking. It will be fun to talk about all the progress she's made."

Concluding Thoughts

Given the likely benefits of including STEAM in early childhood curriculum for all children and the enthusiasm of children who participate in STEAM activities that Anna and Cathy discuss, it seems remarkable that there is little evidence that mathematics or science instruction is routinely and systematically implemented in many preschool classrooms (Clements & Sarama, 2009; Ginsburg et al., 2006; Greenfield et al., 2009; Trundle & Saches, 2012). Several authors point out that teachers' own lack of confidence in their content knowledge about mathematics and science may in part be responsible for why early childhood educators tend to avoid teaching it. Equally troubling is that many early childhood and ECSE teacher preparation programs fail to emphasize pedagogy in mathematics and science (Chen & McCray, 2012; Ginsburg et al., 2006; Trundle & Saches, 2012; Varol, Farran, Bilbrey, Vorhaus, & Hofer, 2012). Clements and Sarama (2012) review the research on mathematics learning of primary age children with disabilities and point out that the diagnoses of mathematics learning disabilities (MLD) are often unstable over time, perhaps in part because of the lack of quality mathematics instruction in early childhood. The authors assert that the slower growth rate associated with mathematical skills in the earliest years can be remedied with extra instruction designed to address underlying difficulties with specific cognitive processes such as retrieval of facts or limits in working memory. This is particularly important to begin in Pre-k and kindergarten so that children develop positive attitudes about mathematics (i.e., "I can get it if I try") and avoid negative beliefs (i.e., some individuals "get it" while others do not).

Cathy, Anna, and Sherry illustrate the possibilities that can be achieved using STEAM activities and a curriculum framework that ensures teachers plan instruction to meet the needs of all children. It is important to acknowledge that these three early educators teach in circumstances that allow them the opportunity to plan and teach as a team. Furthermore, because they have worked together for several years, they have

learned how to work together well. If ECE and ECSE teachers are to effectively plan and implement high-quality STEAM activities that meet the learning needs of all children, they need the resources (i.e., time and materials) to do so.

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The Application of Response to Intervention to Young Children with Identified Disabilities

10

Judith J. Carta, Tracy E. McElhattan, and Gabriela Guerrero

While Response to Intervention (RTI) has been a well-known approach for preventing learning difficulties in school-aged children for many years (e.g., Burns, Appleton, & Stehouwer, 2005; Vaughn, Linan-Thompson, & Hickman, 2003), it has only recently begun gaining a foothold in programs for young children (e.g., Buysse & Peisner-Feinberg, 2010; Greenwood et al., 2011). The use of RTI is a logical step for prekindergarten programs given the long recognition of the importance of early childhood programs as a means of preventing later academic and behavioral difficulties (Anderson et al., 2003). For RTI approaches to be successfully integrated in pre-k programs, however, RTI as currently conceptualized for students in K-12 settings must be adapted to align with early childhood beliefs and practices (Barnett, VanDerHeyden, & Witt, 2007; Coleman, Roth, & West, 2009). Importantly, several existing early childhood practices are already a good fit with RTI (e.g., assessment of core curriculum program quality, the use of intentional teaching with embedded and explicit instruction, universal screening and progress monitoring measures to facilitate data-driven decision making, and the involvement of families as partners for the success of the child). Researchers and practitioners have been working to adapt RTI approaches to the programs, practices, and conceptual models of instruction within pre-k settings. This chapter aims to provide an overview of the current state of practice for RTI in early childhood and then specifically provide some information on how young children with special needs might be served in programs implementing RTI models.

An Introduction to Response to Intervention

The capacity to improve the social and educational outcomes of all preschool children and prevent unnecessary developmental delays is a long-standing societal goal but one that continues to elude us. While early childhood research, practice, and policy are vigorous fields that are actively pursued, they often fail to intersect in ways that enhance the quality of day-to-day instruction for young children. While inclusion in high-quality early education programs has been a fundamental value and the ultimate goal for *all* young children, the simple physical inclusion of young children with special needs with typically developing children does not define the manner in which instructional interactions occur to enhance children's short- and long-term outcomes. Thus, identification of the active ingredients of effective instructional design and

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environment to support inclusion continues to be a goal for researchers and practitioners. One approach for describing how that instruction and caregiving should occur to meet the needs of all children is Response to Intervention (RTI). Response to Intervention (RTI) is a framework aimed at prevention of learning and behavioral problems by identifying those children/students who might benefit from additional instructional support and then providing that support in a timely fashion (Fuchs & Fuchs, 2007; Gersten et al., 2008).

The features of RTI create the opportunity for early childhood (EC) professionals to meet the diverse needs of young children. Specifically, an early childhood RTI framework creates opportunities to tailor instruction to the level of need of individual children and implement hierarchies of instructional support differentiated to that need through a data-based decision-making process (Greenwood et al., 2011; National Professional Development Center on Inclusion, 2012).

The origin of RTI in American education resulted from concern that support systems for struggling students in K-12 had established a "wait-to-fail" model (Fuchs & Fuchs, 2006). In such models, students who were behind their same-aged peers often received no additional or differentiated instruction in the general education curriculum until they were deemed eligible for special education services. Specifically under Individuals with Disabilities Education Improvement Act (2004), practices associated with RTI became an alternative way to identify K-12 students with learning disabilities (Bradley, Danielson, & Hallahan, 2002). Thus, in K-12 education, RTI gained popularity as a means of ensuring students received timely access to evidence-based teaching and instructional practices in the general education curriculum prior to being referred for special education.

In early childhood programs, there has been a historic focus on prevention of learning problems. The USA has long embraced programs to support young children at risk due to poverty (e.g., Head Start and Early HeadStart) (Barnett, 1995; Brooks-Gunn, 2003) and those with developmental delays (e.g., IDEA Part C and Part B programs) (Trohanis, 2008). Typically, however, prevention in early education programs has meant providing early services only to highly vulnerable sectors of the population—but not to all children. RTI is an approach that takes prevention in early education to another level. Recognizing that each child learns at his/her own pace and each has a unique history of learning experiences, RTI provides a framework for differentiating instructional interventions for individual children based on observed needs or potential benefits. The RTI approach seeks to move practice away from the traditional model of waiting for students to demonstrate significant delay before they are referred for special education for more intensified instruction or intervention. Instead, within an RTI approach, children who show the first signs of delay are provided with extra support or more opportunities to learn to get them on the right track before they enter school. While this approach has not been expanding rapidly through early education programs, recent annual surveys of state administrators of pre-k programs indicate that RTI approaches are increasingly evident to support young children's academic and behavioral development (Linas, Greenwood, & Carta, 2012).

But an emerging question for those seeking to implement RTI for all children is where do children with special needs fit within these approaches? How does RTI apply to young children with identified disabilities or delays—how do they receive services in systems implementing RTI to prevent academic delays and behavioral challenges? The focus of this chapter is to address these issues by describing some research carried out by the Center for Response to Intervention in Early Childhood (CRTIEC) and by sharing lessons we have learned in working with multiple programs across the nation implementing tiered models of instructional support for young children with and without disabilities.

While a variety of RTI [now sometimes called Multi-Tiered Systems of Support (MTSS) approaches have been developed for young children [e.g., CRTIEC, (Carta et al., in press)]; Recognition and Response (Buysse et al., 2013); the Pyramid Model (Fox, Carta, Strain, Dunlap,

& Hemmeter, 2010), they share a set of key features that provide the structure for the type of content and processes by which tiered approaches have been implemented in early education. A consensus paper recently developed by Division of Early Childhood (DEC), National Association for the Education of Young Children (NAEYC), and the National Head Start Association (2013) outlined the four common features of early childhood RTI frameworks: (1) multi-tiered systems of teaching and caregiving practices, (2) high-quality curriculum for all children, (3) ongoing assessment and continuous progress monitoring for all children, and (4) a collaborative problem-solving process.

Features of an EC RTI Framework

The first feature of an EC RTI framework is a *multi-tiered approach* wherein support is provided to children with greater needs, involving either more intense or more individualized learning opportunities or caregiving interactions. Fundamental to the multi-tiered approach is that high-quality instruction or supports are matched to children's level of need so they can be successful and experience growth toward identified outcomes. Higher tiers of support are provided to those children whose behavior indicates that they are struggling to learn in response to a high-quality Tier 1 curriculum. The higher tiers of support may consist of increasing the time or intensity (children's opportunities to learn) to specific aspects of the curriculum (see Fig. 10.1).

There are no established "rules" for how this supplemental assistance to children should be provided nor are there requirements for a certain number of tiers. Small group instruction is a frequently used model for providing supplemental support at Tier 2. For example, an additional 15 min per day in a group of three or four children may be devoted to providing each child with substantially more learning opportunities on a specific skill than each would typically receive within the larger classroom (Bailet, Kepper, Piasta, & Murphy, 2009; Spencer et al., 2012). In a home context, a Tier 2 level of support in language might be provided by parents who embed learning opportunities for specific new vocabulary words during various daily routines. An important aspect of a child's placement in a tiered model is that it is dynamic or can change up or down depending on the child's growth or lack of response to the intervention provided. An important feature in that regard is ongoing formative assessment that provides a clear picture of whether the child is responding to the level of support being provided and whether the child is "closing the gap" in performance relative to his or her peers. Therefore, if a child's trajectory demonstrates substantial growth, his or her level or tier of support may be reduced. Similarly, if progress monitoring data on a child demonstrated that he or she had not responded to the enhanced support, a higher tier or added intensity of intervention would be considered.

The second feature of an EC RTI/MTSS framework and one that serves as the underlying foundation is the presence of a *curriculum* that is provided for all children. The core curricula or universal level of support should be research based with evidence of effectiveness for promoting growth toward identified relevant outcomes. The core curriculum should be based on a scope and sequence of skills that provide the framework for instruction that is explicit and systematic as well as developmentally and culturally appropriate.

The third common feature of RTI models is a system of *universal screening and progress monitoring.* Universal screening is used to identify children who may need more instructional or caregiving support. Universal screening within RTI is distinct from "developmental screening" often used in early childhood programs in two respects: (1) it examines how well children are performing relative to a benchmark in a specific outcome areas (typically early literacy, language, and behavioral/social-emotional development) instead of across multiple domains as is the case with developmental screening, and (2) it is carried out on all children on an ongoing basis—usually at least three times per year to determine whether children are growing in response to the intervention provided. It is the systematic and ongoing

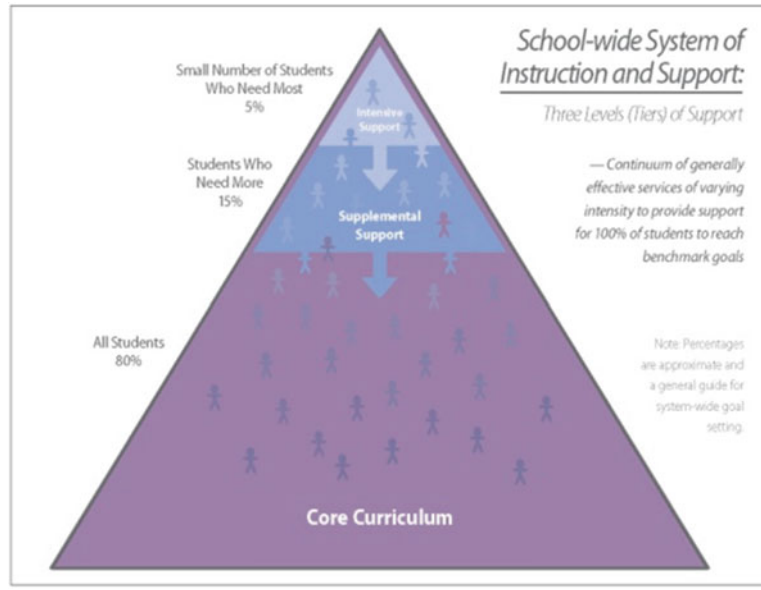

Fig. 10.1 Center for response to intervention in early childhood tiered model with permeable tiers

nature of the universal screening that ensures that children will be identified at the earliest sign that they need additional support to benefit from the curriculum. Similarly, RTI frameworks include strategies for frequent progress monitoring to help inform decisions about whether children receiving Tier 2 or Tier 3 support are learning in response to the supplemental instruction they are receiving. Trends in progress monitoring data are examined to see if children's rates of learning are increasing or, alternatively, whether they are making little or no change in their trajectories of learning. Decision rules are typically provided to help identify when children are responding well enough to change their level of support or intensity of instruction. Rules for determining how much change is necessary before moving children to a higher or lower tier are a critical aspect for guiding this dynamic process.

Finally, RTI models depend on a *collaborative problem-solving process* that helps guide decisions about what an individual child needs to support learning and behavior. Key individuals knowledgeable about the child (e.g., the teacher, parents, administrator, school psychologist, social worker) use data to see how a child is progressing and use the decision-making rules to identify what tier of support the child needs and what type of instructional strategies would help the child be most successful. These individuals gather on a regular basis to track the child's progress and determine when changes in instruction are needed.

How Does RTI in Early Childhood Overlap and Diverge from Preschool Inclusion?

The delineation of defining features of RTI for young children may cause one to ask "How is this approach different from high-quality inclusive practices?" and "Aren't many of the key features found in RTI the same as those that should be implemented in inclusive early education settings?." In fact, it is instructive to do a side-by-side examination of the critical elements of both RTI and MTSS in early and preschool inclusive practices to see how they line up. What features do they have in common and where are there distinct differences? Of course, high-quality inclusive practices in preschool have been defined in various ways (see Odom et al., 1999; Sandall & Schwartz, 2013; Winton, 2013). The core features of most conceptualizations of preschool inclusion include the following:

- The use of high-quality practices that address the needs of *all* children in the general education setting
- The use of a problem-solving approach to identify the specific instructional targets that would most benefit individual children
- The identification of instructional or caregiving strategies that would best address the instructional targets of the individual child
- The use of progress monitoring to address how well children respond to instructional interventions (Brown, Knopf, Conroy, Googe, & Greer, 2013)

High-Quality Instruction and Curriculum in the General Education Setting

The foundation of preschool inclusion is the availability of high-quality early childhood activities, curricula, and services (Sandall & Schwartz, 2008, 2013; Snyder, McLaughlin, & Denney, 2011). While inclusion is typically defined as places where children with developmental delays "are playing, learning, working, and living with family and friends in their communities" (Brown & Conroy, 1997, p. 7), meaningful inclusion also depends on effective instructional practices that support active engagement and learning. Places where high-quality inclusion occurs are well-organized environments that promote both child-initiated and teacher-led activities. Moreover, they are settings where curriculum provides the foundation for the knowledge and skills that children need to be successful in their present and future school and community environments. High-quality curricula should include a comprehensive set of learning outcomes that serve as a guide for teaching. In RTI approaches, a high-quality curriculum in Tier 1 serves as a foundation for all other tiers of instruction and should lay the groundwork for sufficient learning opportunities embedded within daily routines and activities (Grisham-Brown, Hemmeter, & Pretti-Frontczak, 2005). The underlying assumption is that a strong Tier 1 foundation will promote optimal learning outcomes and decrease the need for more intensive intervention. Although RTI models for young children have great potential and hold many positives, an ever-present concern in RTI models for young children is the scarcity of evidence-based Tier 1 curricula and the frequent reports of instruction that fail to meet standard definitions of high quality (e.g., Greenwood et al., 2012).

Collaborative Problem-Solving Process

A problem-solving model is a systematic approach that reviews a child's strengths and weaknesses, identifies appropriate instructional interventions to meet the child's specific needs, collects data on a frequent basis to monitor the child's progress, and evaluates the effectiveness of the interventions that have been implemented (Canter, 2004). For many years, problem-solving processes have been a core feature of individualization and the development of Individualized Education Programs (IEPs) for children with special needs. Those knowledgeable about the child (e.g., early childhood educators, parents or other family members, program administrators, school psychologists, social workers) gather pertinent data about the child's instruction and then summarize, analyze, and interpret it to see how a child is progressing (Gischlar, Hojnoski, & Missall, 2009; Hojnoski, Gischlar, & Missall, 2009a, 2009b). They then use decision-making rules to identify the types of instructional supports a child needs and what type of strategies would help the child be most successful (Wolery, 2004). These individuals further collaborate to track the child's progress and determine when changes are needed.

Similarly, in RTI models, collaborative problem-solving approaches are used for guiding data-based decision making and determining specific interventions appropriate for individual children. In RTI models, however, the problem-solving approach employs specific steps that include problem identification, analysis of the problem to hypothesize why it is occurring, development of an intervention to address the problem, and evaluation of the

child's response to the intervention through formative assessment. Additionally, a structured, systematic problem-solving process within an RTI model assists in the identification of groups of students with similar learning needs and concerns.

Identification of Instructional Strategies Targeted to Individual Children

The individualization of services is a fundamental principle of recommended preschool inclusionary practices (Brown et al., 2013; Division for Early Childhood, 2014). What typically occurs when high-quality inclusive practices are implemented is that the IEP process generates a plan to address a child's individual needs that includes learning objectives and support services and a recommendation concerning the least restrictive placement.

In an RTI approach, universal screening within the general education setting is used to identify the children needing more than Tier 1 instruction. These screenings typically identify children for a specific tier of instruction by comparing the child's performance relative to a national or local norm in one or more domains. Then ongoing formative assessment provides an indication of the child's response to the intervention and whether he or she is receiving an appropriate level of support to close the achievement gap or whether a higher tier of instructional support is needed. In this way, the child's response to instruction is often (but not always) a determinant of whether a referral is made for the evaluation for special education eligibility (Marston, 2002; Reschly & Tilly, 1999).

The Use of Progress Monitoring to Determine the Effectiveness of Intervention

The measurement of children's progress on learning objectives has long been used as an index of effectiveness of early education programs in meeting the instructional needs of young children (Grisham-Brown & Pretti-Frontczak, 2011; Wolery, 2004). In both high-quality preschool inclusionary programs employing typical IEP procedures and in early education programs implementing RTI/MTSS, children's progress on specific objectives is measured across time to determine whether intervention appears to be making a difference in helping a child gain skills or change learning trajectories. A lack or inadequacy of change or growth may indicate that instructional procedures should be modified. When this type of process is employed within an RTI model, progress monitoring typically occurs on a more regular and frequent basis than in early childhood programs not employing RTI approaches. Within tiered models like RTI, this increased frequency of monitoring allows the teacher or practitioner to make changes on an ongoing basis in the content or tier of instructional support to maximize the efficiency and effectiveness of the intervention.

How Do Children with Special Needs Fit into RTI Models of Service?

Given that local education agencies and programs are adopting RTI and other tiered approaches to meet the needs of all children, how do children with identified disabilities or who have been deemed eligible for special education fit into these tiered approaches? First, it is important to note that federal policies do not specifically address the use of RTI for children prior to kindergarten. However, even for school-aged children, IDEA does not prohibit children with disabilities from receiving instruction using RTI strategies unless the use of such strategies is inconsistent with their IEPs. Additionally, schools may use data gathered through RTI strategies in its evaluations of children with specific learning disabilities.

Therefore, local programs have incorporated special education for pre-K-12 children into their RTI frameworks in various ways. Some models of RTI define Tier 3 as special education. Thus, when children do not respond positively to a sec-

ond tier of instructional support and need more individualized intervention consistent with their IEPs, they might obtain this level of instruction intensity through special education in Tier 3. Alternatively, some models of RTI make available three tiers of instructional intensity through general education and deliver a Tier 4 through special education (Shapiro, 2015).

What is important here is an understanding that an IEP should not necessarily relegate a child to a specific tier of instruction. For example, a child may have an IEP because he or she exhibits significant challenging behaviors and requires special education to address these needs. That same child, however, may be functioning at normative levels in early literacy and math skills, and so receiving Tier 1 in this area might be appropriate. Moreover, regular formative assessment may also demonstrate that his the child's literacy skills are growing at an adequate rate in response to the Tier 1 curriculum and instruction. So it is clear that any tier of instructional support might be an appropriate level of support in an RTI model for a child with an identified special need depending on his or her level of performance on any given domain of learning and rate of growth in response to high fidelity of instruction.

What Have We Learned About RTI in Early Education?

Prevention-oriented approaches like RTI offer a means of increasing the intensity of instruction for struggling learners in general education settings over and above what they would receive in the Tier 1 being implemented for all children. A fundamental assumption behind this model is that Tier 1 should be based on a high-quality, research-based curriculum focused on school readiness, promoting both academic and social-emotional competence, and implemented with a high degree of fidelity (Buysse & Peisner-Feinberg, 2013). If Tier 1 fails to meet this standard of quality, higher proportions of children will probably fail to show adequate growth and will require more intensive levels of instructional support. However, limited information has been available to indicate whether high-quality Tier 1 is typically being implemented in early education programs. This was a question that needed answering prior to scaling up RTI in programs for young children. Therefore, the Center for Response to Intervention, CRTIEC, conducted a multi-site investigation to answer the following question: "What exactly is 'business as usual' in terms of the quality of preschool Tier 1 early literacy and language instruction?"

With that goal, CRTIEC researchers carried out an extensive observation study of the quality with which typical community-based programs were supporting children's literacy development. We sought to determine whether "business as usual" was adequate for providing the high-quality foundation needed in early literacy and language RTI models (Greenwood et al., 2012). In this study, we enrolled 65 classrooms from 23 programs/districts in 4 communities in 4 states and observed and assessed 659 children in their year prior to kindergarten (Greenwood et al., 2012). In each of the 4 communities, types of early education programs that were available in those cities were included, but no attempt was made to create a systematic representative sample of program types. The types of early education programs that were recruited and enrolled included state-funded prekindergarten programs, Head Start, Title 1 programs, and tuition-based programs. Participating classrooms could serve children with special needs, as long as they did not constitute the majority of students in the classroom. In order to examine instructional quality in these programs, we carried out direct, observational measurement of teacher-child interactions in these programs and also administered formative and summative measures of children's language and literacy outcomes at the beginning, middle, and end of the year prior to kindergarten.

Several important findings emerged from this study. Overall, and across program types, quality was low and variable specifically as related to the rigor of the language and literacy curriculum, amount of time teachers were observed in literacy instruction, and the amount of time children were engaged in literacy. While most children exhibited

gains in early literacy from fall to spring, the lowest functioning children (who were screened for Tier 2 or 3) did not demonstrate rates of growth that narrowed the early literacy gap as referenced to typically developing peers. Furthermore, little evidence was available that children needing Tier 2 or 3 were receiving increased instructional intensity or instructional differentiation. Approximately 30–35 % of children were identified in the fall as needing additional support beyond the Tier 1 curriculum rather than the 20 % that is generally identified in K-12 settings. In Title 1 and Head Start programs, settings where children must be income eligible, the proportions of children identified as needing Tier 2 or 3 support were much higher than proportions identified in tuition-based programs. Furthermore, for English Language Learners children and those with special needs, the proportion of children needing Tier 2 or 3 support was over 40 %, significantly greater than the expected 20 % (see Carta et al., 2015).

Within this large descriptive study, we were able to examine the early literacy and language functioning of the subsample of children who had been defined by their programs as having special needs ($n=68$; 11 % of the sample). Of these 68 children, 35 were receiving services under IDEA for a speech and/or language delay, 6 were receiving services under IDEA for an educational diagnosis of Developmental Delay only, and the remaining 27 children were receiving services under IDEA for autism, emotional/behavioral, "others," or a combination of categories (i.e., speech/language needs with developmental delay).

We were interested in examining how this subgroup of children with IEPs compared on our measures of early literacy/language in the fall prior to their kindergarten year, how their levels of growth in these areas compared during the school year, and whether they were closing the achievement gap in early literacy and language as they were entering kindergarten. Overall, when we compared children with and without special needs across these measures in the fall of their prekindergarten year, we found mixed results. We found that children with special needs performed comparably to typically developing children on measures of vocabulary and print knowledge, but children without special needs scored significantly higher on measures of phonological awareness (PA). Though initial skill level differences on these measures varied across the two groups of children, rates of growth for children with and without disabilities were similar across the year across all the measures. However, despite the fact that children with special needs gained skills across the year, their end-of-year scores illustrated that they remained significantly behind their peers as they entered kindergarten (McElhattan, Guerrero, Linas, & Schneider, 2012).

These findings have important practice and policy implications for children with and without special needs. First, the overall low levels of literacy skills in children with and without identified disabilities indicate the importance of screening and monitoring *all* children's growth in this domain of school readiness, which is particularly important for children with special needs. While it is important to allow children to develop skills through universal instruction and practices, implementing more intensive evidence-based early literacy interventions may be necessary for children both with and without special needs if their growth is not adequate in response to instruction.

Second, the fact that some language and literacy growth was occurring in children with disabilities when attending a high-quality preschool setting is encouraging. This finding also supports prior research that children with disabilities gain critical skills when they are exposed to appropriate intentional early literacy instruction in high-quality environments (Laing & Espeland, 2005; Roth, Troia, Worthington, & Dow, 2002). These data from a set of classrooms across the USA provide some preliminary data that young children, regardless of disability status, are demonstrating gains in important skills such as vocabulary and the ability to identify sounds associated with specific letters. Preschool programs should provide these students the same access to opportunities to learn these skills so critical for later academic success.

Third, even though children are making gains, we should continue to focus on ways to improve the literacy experiences of children both with and

without special needs in prekindergarten classrooms. The classrooms observed in this study were a select group in that all indicated that they were implementing Tier 1 curricula in language and early literacy with scope and sequence. Nonetheless, children with special needs included within these classrooms and provided instruction in these areas still significantly lagged behind their peers at the end of the year. It is important to provide interventions for all children who show less than adequate growth in response to general classroom instruction regardless of whether or not they have been identified as having a developmental delay or disability. These interventions should address specific skills and provide opportunities for children to meaningfully engage with literacy-rich materials and developmentally appropriate experiences.

Providing Higher Tiers of Instructional Support

Developing and validating Tier 2 and Tier 3 interventions in the area of early literacy and language was another major aspect of the work of CRTIEC. Research colleagues at the Ohio State University developed and validated Tier 2 interventions in vocabulary/comprehension (Spencer, Goldstein, Sherman et al., 2012) and in early literacy intervention (Kruse, Spencer, Olszewski, & Goldstein, 2015; Noe, Spencer, Kruse, & Goldstein, 2014). Colleagues at the Dynamic Measurement Group engaged in similar activities and developed Tier 3 interventions in these same domains (Kaminski, Powell-Smith, Hommel, McMahon, & Bravo-Aguayo, 2014). What follows is a short description of their work in these areas and some case examples of how children with special needs responded to these interventions.

Tier 2 early literacy intervention. As indicated in the descriptive study of Tier 1, high proportions of children begin their prekindergarten year with significant delays in early literacy skills (e.g., Greenwood et al., 2012). Therefore, CRTIEC investigators sought to develop a Tier 2 intervention that could be implemented in general early education settings. The *PAth to Literacy* was developed to focus on building core skills in phonological awareness (PA) and alphabet knowledge for children who had basic early literacy but needed additional support. While other studies have been carried out to examine the effectiveness of this Tier 2 intervention (e.g., Kruse et al., 2015; Noe et al., 2014), a recently completed cluster randomized trial (Goldstein et al., in preparation) provided the context for a case study of children with disabilities.

While the larger study took place across 18 classrooms in 3 different locations with the USA, participants for this case study of children with special needs came from 6 prekindergarten classrooms in Kansas. A gated screening procedure was used to identify children for participation in the Tier 2 intervention who were not developing PA skills through Tier 1 whole-class instruction. The goal of the screening procedure was to identify a small cluster of children in each of the six classrooms who exhibited basic expressive and receptive English language skill and deficits in PA. Three waves of screening were conducted with about 4 weeks between each wave using *DIBELS Next First Sound Fluency* (FSF) (Good & Kaminski, 2011) and *First Sound ID IGDI 2.0* (Wackerle-Hollman, Schmitt, Bradfield, Rodriguez, & McConnell, 2015) to identify children who were not developing PA skills. Using this procedure, clusters of 2–3 students were identified in each of the 6 classrooms. A total of 18 children (2 receiving special education services for delays in speech and language) were identified who would be appropriate candidates for Tier 2. Child 1 was a boy who was a native English language speaker. His teacher reported that he worked well in small groups and typically did not need extra instruction to learn along with peers in her inclusive classroom. Child 2 was a girl with a speech/language disorder who was a dual language learner. Her teacher reported that she often needed extra instruction to learn a new skill, but she worked well in small groups.

Both of these children received the Tier 2 *PAths to Literacy* intervention (Kruse et al., 2015) during daily small group lessons led by their classroom or para-educator. These scripted lessons included instruction on various PA skills

(blending, segmenting, word part identification, and first sound identification) using supplemental visual materials and interactive games. Teachers modeled the PA skills, had children practice, and prompted children to respond as a group and independently to various PA tasks. Scripted, response-contingent feedback was provided to children based on the group's response to various tasks.

Figures 10.2 and 10.3 provide a clear illustration of how two different children with similar identified needs responded to this Tier 2 PA intervention compared to the 16 other participating children without IEPs receiving this intervention. Overall, Child 1 responded favorably to the PA intervention, making noticeable pretest posttest gains on 2 formative measures of PA (DIBELS *Word Part Fluency* (+21) and DIBELS First Sound Fluency (+13)). At posttest, his scores were higher than those of children without disabilities (comparison group). On a standardized measure of PA, the *Test of Preschool Early Literacy* (Lonigan, Wagner, Torgesen, & Rashotte, 2007), Child 1 did not make any gains from pretest to posttest on the PA subtest; however, he did make gains in the Print Knowledge (TOPEL PK) subtest (+6; see Fig. 10.3), and his posttest scores on this measure were slightly higher than those of the comparison group. In contrast, Child 2 made only negligible gains on the *First Sound Fluency, Word Part Fluency*, and the TOPEL PA. However, she did make a 16-point gain on the *TOPEL PK*.

In reviewing the results of the two children with delays, a question arises about why the *PAth to Literacy* Tier 2 intervention resulted in such divergent outcomes. On closer inspection, one can speculate that Child 1 benefitted from the intervention because, as reported by his teacher, he did not seem to have any behavioral or learning challenges, and the additional support provided by the intervention was sufficient to help him reduce his literacy gap. In contrast, Child 2 might have not have had sufficient skills to benefit from the Tier 2 intervention and may have benefitted more from more individualized support such as a Tier 3 intervention. Her English proficiency was quite low, and she was noted to have difficulty staying focused during assessments. Perhaps the reason she scored high on the TOPEL PK measure was because expressive language was not necessary. The child needed only to name or point to sounds indicated by the teacher pointing to letters. Clearly, the level and type of support needed by

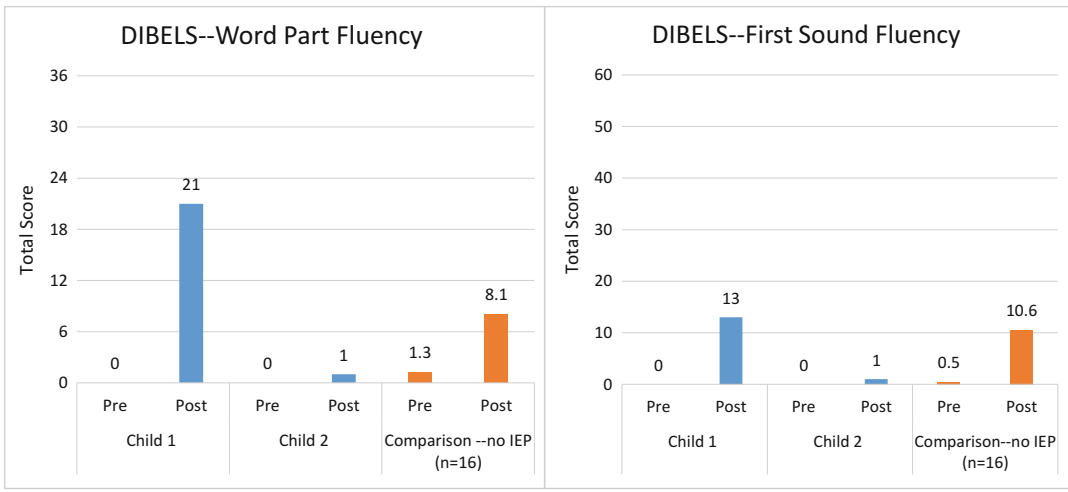

Fig. 10.2 Pre- and post-WSF and FSF scores for two children with IEPs compared to children without IEPs. Tier 2 pretest and posttest scores on First Sound Fluency and Word Part Fluency for two children who participated in the Tier 2 intervention and had IEPs. The Comparison group is the average of scores for children who participated in the Tier 2 intervention but did not have IEPs

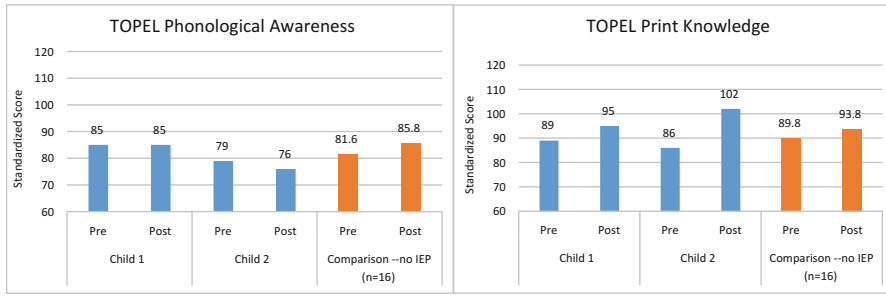

Fig. 10.3 Pre- and Post-Test TOPEL Scores for Two Children with IEPs in Tier 2 Compared to Pre- and Post-Test Scores for Children without IEPs

children with IEPs varied dramatically; and their performance was not only a function of their early literacy skills but also their ability to manage their behavior, stay on task, and respond appropriately to the various measures. Their response to instruction was clearly a reflection of more than their IEP status.

Tier 3 early literacy intervention. For an RTI model to be effective in a prekindergarten setting, it must meet the needs of all children, even those who require the most intense level of support. Therefore, CRTIEC researchers developed a Tier 3 intervention guided by three assumptions:

1. A Tier 3 intervention should be robust enough to accelerate the development of early literacy skills so that children in prekindergarten who have the greatest needs could enter kindergarten on track for beginning to learn to read, and with early literacy skills on par with their peers. This meant that the intervention should focus on the most critical skills and teach them in an optimum sequence.
2. Children identified for Tier 3 may be delayed in the acquisition of early literacy for a variety of reasons (including lack of exposure to/experience with print, speaking a first language other than English, lack of language/print-related instruction, speech/language delays, and other learning difficulties/disabilities). Therefore, Tier 3 interventions should be designed to be flexible to accommodate diverse learning needs.
3. Children with the lowest level of early literacy skills are most likely to benefit from intensified instruction that is more explicit, comprehensive, and systematic than what they might receive in lower tiers of instruction (Foorman & Torgesen, 2001; National Reading Panel, 2000). Therefore, Tier 3 interventions must incorporate elements of effective instructional design.

Given these assumptions about children needing the highest level of support, a Tier 3 early literacy intervention (Reading Ready Early Literacy, RRELI) was crafted by the CRTIEC early childhood design team at Dynamic Measurement Group (Kaminski et al., 2014). The goal of the intervention was to focus on a limited set of high-priority skills in order to increase the intensity of the intervention. These high-priority skills, selected for their utility in kindergarten (Gillon, 2000), included recognition and identification of letters of the alphabet by name, recognition and production of first sounds in words for a limited number of phonemes, and matching of phonemes to letters for a limited number of phonemes. The intervention was designed around brief (5–10 min) teacher-led activities to be conducted one-on-one or in small groups in the prekindergarten classroom.

Within an iterative research and development design, this Tier 3 intervention was tested across two CRTIEC sites and within Head Start and state prekindergarten-funded early childhood

programs. This allowed us to see whether children with disabilities in this context would be identified for a Tier 3 intervention in early literacy and, if selected, how they would respond. Similar to the process used to select children for the Tier 2 study described above, a multiple gating process was used to identify children who would be appropriate candidates for Tier 3 intervention. Measures for universal screening included the Individual Growth and Development Indicators First Sound and Alliteration measures (Wackerle-Hollman et al., 2015) and DIBELS Next First Sound Fluency (FSF, Cummings, Kaminski, Good, & O'Neil, 2011). In a randomized trial of the intervention across the two states, approximately 30 % of the 106 participants were children with disabilities. In the study overall, children who had disabilities made significantly smaller gains on the First Sound Fluency measure than children who were not identified as having a disability (Kaminski et al., 2014). Other studies in RTI with school-aged populations have reported similar findings (Denton, Fletcher, Anthony, & Francis, 2006; Wanzek & Vaughn, 2007).

Yet, data from two children with disabilities provide an interesting case study of how children with special needs responded to the Tier 3 early literacy intervention. Figure 10.4 provides an illustration of the pretest/posttest gains for two different children on two early literacy measures (First Sound Fluency and Word Part Fluency) and a comparison group (children who qualified for Tier 3 but who had not yet been identified as having a disability). Child 3 had a speech/language delay and was also a dual language learner. His teacher reported that he requires repetition and/or different teaching strategies when learning something new. Child 4 was also a dual language learner and was receiving special education services for both a speech/language delay and a general developmental delay. Figure 10.4 indicates that Child 3 made no gains in WPF and only moderate gains in FSF (+6). He also gained a few points in the TOPEL PK (+3), and although he did not make any gains on the TOPEL PA, his scores were above those of the comparison group (see Fig. 10.5). In contrast to Child 3, Child 4 made some noticeable gains in all measures, WPF (+10), FSF (+4), TOPEL PA (+2), and TOPEL PK (+19; see Figs. 10.4 and 10.5). His TOPEL PK posttest score was 14 points higher than the comparison group.

A preliminary but important conclusion is that the Tier 3 early literacy intervention resulted in gains for many students both with and without identified disabilities. Children who took longer to respond to the intervention or who showed smaller gains were often those who had behavioral challenges and were less engaged in the intervention. These children may take longer to

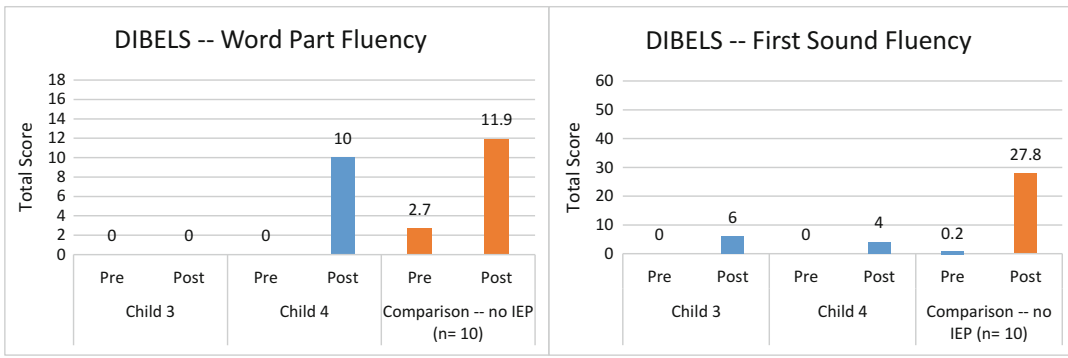

Fig. 10.4 Tier 3 pretest and posttest scores on the TOPEL—Phonological Awareness and Phonological Knowledge. Both Child 3 and Child 4 are children who participated in the T3 intervention and have IEPs. The comparison group is the average scores for children who participated in the intervention but do not have IEPs

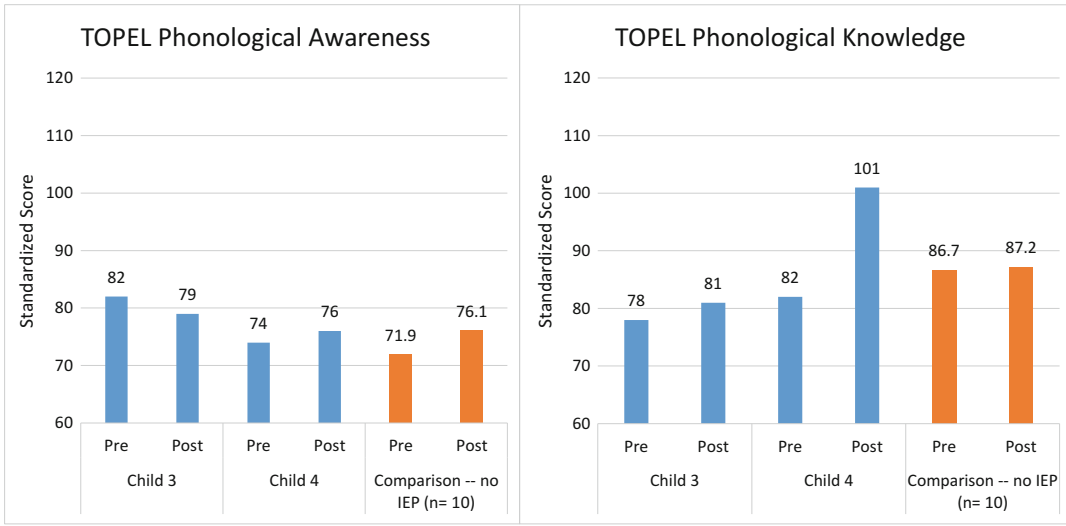

Fig. 10.5 Tier 3 pretest and posttest scores on the TOPEL for children with and without IEPs

respond because more time is needed to teach preliminary behaviors such as turn taking, following rules, and attending. As children learn the expectations, their opportunities to practice early literacy skills within the intervention typically increase and lead to increased skills. This points to two critical aspects of Tier 3 intervention for children with special needs: (1) that it requires skilled teachers to assure high-quality implementation to achieve maximum benefit and (2) that it should be flexible and responsive to the needs of individual children (Kaminski et al., 2014).

Conclusions

While we are just learning how best to implement RTI with young children, we are beginning to understand how tiered approaches such as this might effectively include children with special needs. Here are some lessons we have learned with regard to children with identified disabilities in our work:

1. While not all children receiving special education services show growth in early literacy and language, many children with identified disabilities have demonstrated growth in response to high-quality intentional instruction in these areas.
2. Universal screening and progress monitoring in early tiered models in early literacy and language afford a means of identifying children who might need more than the core curriculum and a mechanism for ascertaining quickly whether they are responding to higher tiers of intervention or require greater levels of intensity.
3. Some children who receive special education services demonstrate good progress in response to Tier 2 and Tier 3 interventions. Regular progress monitoring can help instructional teams determine when children are not showing adequate growth. Collaborative problem solving to identify barriers to individual children's progress might consider how well the intervention has been implemented, child variables that may be interfering (including behavioral management issues or adequacy of dosage of the intervention) or child variables such as language or attention.
4. Critical to all aspects of the model is high fidelity of implementation of every tier of the model.

While this factor is critical for RTI in general, it is fundamentally important to address the individual needs of young children with special needs. We have long known the many practitioner practices necessary to successfully and meaningfully include children into community-based early education programs: skills such as intentional teaching, data-based decision making, and collaborative consultation. Now with RTI systems that employ ongoing formative assessment, we have a framework to see whether those practices are moving children toward school readiness. These approaches have the potential for informing us not only about children's growth but whether our programs are making a difference for children with and without special needs.

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A *Consumer Reports*-Like Review of the Empirical Literature Specific to Preschool Children's Peer-Related Social Skills

11

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This chapter is concerned primarily with a *Consumer Reports*-like review of the empirical literature specific to the promotion of preschool children's peer-related social skills. Additionally, the review is targeted on young children with identified special needs. As a precedent to that review, we first consider two important questions: (a) what does it mean to be a social competent preschooler and (b) why should practitioners be so concerned about social competence? Following the *Consumer Reports* review, practitioner implications are presented.

What Does It Mean to Be a Socially Competent Preschooler?

The natural and purposeful development of young children's social competence has been the focus of both theoretical and empirical work for nearly a half century (Bell, 1968; Bowlby, 1969; Roff, 1961). The vast majority of intervention-related work, as it applies to young children with special needs, has centered on efforts to identify behavioral competencies associated with the development of meaningful social relationships with peers and instructional practices to enhance behavioral competencies where they are deficient (Greenwood, Walker, & Hops, 1977; Strain, Shores, & Timm, 1977; Tremblay, Strain, Hendrickson, & Shores, 1981). From this work, it is possible to draw several conclusions about the "profile" of a socially competent preschooler. Specifically, being socially competent requires that the individual participates with peers in a broad range of activities (e.g., snack, games, imaginary play, greetings, and good-byes) that demand a broad range of discrete skills (e.g., sharing, asking for turns, following rules, communicating positive affect).

Another way to think about these competence requirements is to consider them as reflecting a necessary level of skill generalization across contexts and a broad range of discrete skills that fall far beyond the boundary that the field often uses with the ubiquitous "social domain" label to identify a host of "other" domain skills that happen to get used in a social context. Guralnick (1999) has spoken eloquently to this latter point. Put simply, being socially competent requires a variety of cognitive, communicative, motor, and, yes, social skills as well.

To illustrate the skill complexity and generalization requirements for social competence, consider two brief scenarios from a typical preschool day. First, in Jayden's preschool, at arrival, children go directly to their choice of four tabletop activities. The teachers then select the first child

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to "sign in," making a mark next to their name. Then, a teacher instructs the child to go find "child's name" and ask her to sign in. This sequence then continues until all children have "signed in." For Jayden, who happens to be the second child in the sequence, his peer "social" demands are as follows: (a) accept the sign-in marker from child one; (b) receptively process the third child's name; (c) associate third child's name with that peer; (d) approach peer; (e) hand peer the marker; and (f) tell them to sign in.

In the second scenario, Jayden wants to join a group of peers playing with Fisher-Price people in the form of Power Rangers. All the potential Power Rangers are in use so, to successfully join, Jayden needs to: (a) ask for a turn, (b) perhaps negotiate a swap with another object, (c) wait until someone leaves the group, or (d) perhaps enjoy watching the play. All of these options require complex cognitive, communication, and social skills.

As we review the extant intervention literature, we will pay particular attention to generalization of skill use across contexts, partners, materials, etc., and also emphasize the ability of interventions to affect a broad range of needed behavioral competencies.

Why Social Competence Is an Intervention Priority

In early childhood, a primary developmental task for young children is to become socially competent during interactions with peers. Learning throughout the preschool day is organized around these social experiences, and, therefore, knowledge acquisition across developmental domains relies on a child's social competence. Not all children naturally develop social competence. Many children, and particularly children with special needs, must be taught how and when to demonstrate the broad range of discrete skills that are demanded across early childhood activities.

In addition to what some might consider the more obvious anticipated result of intervention to improve peer-related social skills (i.e., to enable children to independently and effectively engage with peers), a number of rationales exist that further underscore the importance of teaching social competence in early childhood. The remainder of this section focuses on four of these: (a) social contexts offer opportunities for learning across a full range of developmental domains; (b) the social competence of a young child predicts adult status; (c) the use of peer-related social skills prevents challenging behavior; and (d) informal but powerful networks of peer instruction can improve behaviors in other than the social domain.

Social Contexts Offer Opportunities for Learning

For young children, peer interactions are one of the most relevant contexts through which to learn new skills. By embedding learning opportunities and intervention strategies into social situations, a multitude of goals, in addition to those associated with social-emotional benefits, can be achieved for young children (Barton & Wolery, 2008; Kohler & Strain, 1999; Kohler, Strain, Hoyson, & Jamieson, 1997; Wolery, 1994). Learning can occur across a number of social contexts and through a variety of teaching and intervention strategies. However, the best outcomes have been associated with intervention that provides instruction to both typically developing children and children with special needs (Odom & Strain, 1986). For this intervention, then, there is obviously a requirement for typically developing children who are able to demonstrate age-appropriate peer-related social skills and who have also been taught to use facilitative strategies that promote social competence (Kohler & Strain, 1999). However, the mere presence of typically developing peers does not necessarily lead to positive outcomes. Therefore, we also stress the importance of adult facilitation and the purposeful planning and embedding of learning opportunities into social opportunities to achieve optimal learning outcomes.

Peer interactions can be used to address a multiplicity of skills and learning objectives through systematically planned activities and also during naturally occurring opportunities for teaching that present throughout the preschool day. By

continually embedding learning objectives into social contexts involving typically developing peers and children with special needs, the frequency of response opportunities and the quality of engagement in activities that promote skill acquisition can be increased considerably (McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992; Strain, McGee, & Kohler, 2001).

There are a number of ways to go about planning and embedding social skills into the preschool day. One place to start is to consider what regularly occurring, adult-directed tasks could be performed by a child (e.g., passing out and collecting materials, greeting children at arrival time, and asking peers to complete sign-in activities). By embedding social opportunities into regularly occurring tasks, it ensures that enough opportunities are provided for children to practice peer-related social skills. Additionally, it frees adult time to provide support to children who may need assistance performing the tasks. If done within regularly occurring activities, children become more fluent in regard to their understanding and performance of expectations associated with the social routines. The social opportunities also become integrated into the daily routine, and they eventually occur without necessitating a great deal of planning or a significant amount of adult support.

To further maximize learning opportunities for children with special needs, IEP objectives can be addressed through peer interactions focusing on an identified needed range of skills (e.g., cognitive, social, communication, motor) (Kohler & Strain, 1999; Kohler, Strain, Hoyson, & Jamieson, 1997; Strain et al., 2001). Data from studies considering this form of instruction have shown that teachers are able to incorporate IEP objectives into social contexts 75 % of the time and that peer-mediated learning (e.g., peer provides antecedent, skill demonstration is directed toward peer, peer modeling) can address an average of .75 objectives per minute and result in targeted responses for children with special needs in 91 % of learning opportunities (Kohler et al., 1997).

The facility of embedding IEP objectives into daily social routines and interactions is illustrated by the following brief example. During art, Malik's teacher organizes small groups of 3–5 children who sit together at a table. Each child at the table is given only some of the materials needed to complete an art project, and a child must request items from his/her peers in order to obtain other needed materials. Adult supervision and involvement is provided at varying support levels as needed. Malik and his peers initially require substantial adult prompting and support to request and share the art materials and to follow the steps required to complete the art project. However, with practice and through increased use of peer modeling and imitation, the children soon are able to complete most art activities with limited adult supervision. Through organizing art activities or other suitable activities in this way, peer mediation is being used to teach the following IEP objectives: follow directions, take turns, share, cut, match simple shapes, and imitate the actions of others.

Prediction of Adult Status

Throughout the early childhood years, the social development of young children becomes increasingly important. Children must become socially competent to master developmental tasks such as establishing friendships, learning to be considerate of other children, and becoming more self-aware (Copple & Bredekamp, 2009). In addition to the more immediate and short-term benefits of being a socially competent preschooler, long-term adult outcomes exist that correlate with one's social competence in early childhood and that further validate the importance of social competence intervention for children with special needs.

Research has indicated a relationship between low peer status and acceptance during early childhood and problems that occur in adulthood (Parker & Asher, 1987). Without the ability to engage in positive social interactions as a young child, poor adult outcomes can result that include (a) decreased probability of being employed, (b) shortened life expectancy, and (c) reduced likelihood of living independently (Strain, 1991; Strain & Schwartz, 2001). Moreover, longitudinal studies have found that negative adult outcomes

associated with lower levels of social competence also include (a) increased school dropout rate, (b) higher rates of criminality, and (c) poor mental health outcomes (Parker & Asher, 1987; Strain, 1991).

The promotion of social competence in young children significantly aids them in their peer relationships during this early phase of their lives. These intervention activities take on additional importance in light of findings that success in preschool social competence reduces suboptimal outcomes later in life. Put more graphically, for the relatively few preschool years, if a child does not learn necessary social competence, that child may be consigned to decades of increased problems as an adult.

Prevention of Challenging Behavior

Many children who demonstrate challenging behavior also lack the social competence necessary to successfully engage in interactions with others (Asher & Coie, 1990; Brown & Odom, 1995; Webster-Stratton & Lindsay, 1999). Moreover, a lack of peer-related social skills is regularly cited as an underlying function of challenging behavior. That is, it is often perceived by adults that children who demonstrate challenging behavior do so because of an inability to demonstrate age-appropriate, functional social skills that mediate and replace challenging behavior.

Children who are unable to have their needs met through the use of peer-related social skills will do so in alternative ways, such as through the demonstration of challenging behavior. For example, if Sophia is playing next to a peer and she wants her peer's attention but does not know how to go about gaining it in an appropriate manner, Sophia may yell at her peer, hit her peer, or throw a toy in the proximity of her peer that ultimately results in the peer's responding to Sophia. Whether her peer responds positively or negatively, Sophia's challenging behavior successfully gains the attention of her peer. In an environment that lacks systematic instruction to address Sophia's limited peer-related social skills and replace her challenging behavior, she will continue to engage in the behavior that most effectively results in her desired outcome (i.e., challenging behavior that gains a peer's attention).

Rather than reactively addressing challenging behavior after it occurs, challenging behavior can oftentimes be prevented by teaching peer-related social skills as a classroom-wide practice for all children. Of course, some children will need more individualized social intervention. However, as a best practice, social competence should be taught to all preschool children through targeted social-emotional supports (Fox, Dunlap, Hemmeter, Joseph, & Strain 2003). In addition to providing instruction during naturally occurring social situations, opportunities to practice peer-related social skills should be planned and systematically embedded into routines and activities throughout the day.

Social Interactions and Informal Peer Instruction in Multiple Developmental Domains

Another essential reason to be concerned about the peer-related social skills of young children with special needs is the linkage between social interactions and informal peer instruction in multiple developmental domains. Put simply, what happens in the context of ongoing play among children has a profound influence in the broadest developmental sense. For example, research has shown that peer language behavior has a significant influence on the communicative competence of classmates (Justice, Petscher, Schatschneider, & Mashburn, 2011; Mashburn, Justice, Downer, & Pianta, 2009).

On a day-to-day, moment-to-moment basis, children are learning from each other. They learn discrete things such as language forms and functions, new uses for objects, and concepts such as bigger, faster, under, and over (Ramani & Siegler, 2014). They also learn about predispositions to persist, be brave, be generous, and the like (Joseph & Strain, 2003; Strain & Joseph, 2004). In early childhood special education, it is often said that parents are the child's first and best teachers. That may be true, but it is hardly the entire story about learning and socialization in the early years.

While no one, to our knowledge, has actually made a calculation, it is not too farfetched to propose that most children participate in thousands of peer learning opportunities during their preschool years. For children who lack the peer-related skills to access these informal learning networks, they miss out, accordingly, on these thousands of opportunities. It is our suspicion that these missed opportunities represent one, if not the most critical, variable contributing to the powerful association between early peer-related social skills and later child and adult outcomes. Accordingly, as we review various intervention approaches, we will pay particular attention to outcomes that reflect children's enhanced participation in ongoing social networks.

Not only do many children benefit from informal peer learning opportunities but some reap particular benefits as a result of having reciprocal friendships. By reciprocal friends, we refer to the situation in which a certain child, Hector, responds "Ellen" when asked who his best friend is. In turn, when Ellen is asked the same question, she responds "Hector." Preschool friends, as it turns out, do special things for each other. First, friends make sure that their best buddy is always included in an activity, regardless of his/her capabilities. In other words, one's preschool friend ensures the maximum number of informal peer learning opportunities. Second, and relatedly, preschool friends advocate for the other's interest. One can hear best friends saying things like "It's Jessie's turn," "Lotti needs a piece," "Wait for Jose," or "That's Robert's, you can't have it." Again, this pattern of behavior ensures a maximum number of learning opportunities and sends a clear message to the friend that they belong and are valued. Third, and perhaps most important, preschool friends often encourage each other to try difficult things. They encourage with words like "You can do it"; "I'll show you, watch me try"; and "You did it!" The resulting propensity to try new things and to tackle physically or mentally challenging tasks may explain, for example, the correlation between having a friend in preschool and reading fluency in third grade (Raver, 2009). Our review will also examine the likelihood that particular interventions actually impact the development of friendships.

Applying a *Consumer Reports* Type of Analysis to Identify the Social Competence Literature

Goldstein, Lackey, and Schneider (2014) introduced an innovative framework for conducting systematic reviews of the literature. This framework presents ratings of quality indicators of both group and single-subject experimental design (SSED) studies. This is contrary to many systematic reviews of intervention literature, many of which omit single-subject experimental research altogether (e.g., Cochrane Group, Scottish Intercollegiate Guidelines Network). Moreover, it aligns the criteria around four major design components that highlight the parallels in judging the quality of group and SSED studies: (1) design characteristics and internal validity, (2) measurement and reliability, (3) evaluation of treatment effects, and (4) dimensions of external validity. The transparency in analysis is evident in figures with symbols (Harvey Balls) that allow readers to view the strengths and weaknesses of the quality indicators for individual studies and groupings of studies. In Figs. 11.1 and 11.2, the symbols range from open circles representing unacceptable ratings to partially filled circles representing minimal and acceptable ratings to fully filled circles representing exemplary ratings. There are a total of 14 quality indicators that are rated on a four-point scale for SSED studies and a total of 15 quality indicators for group design studies, 12 of which are the same for both design options. The graphic display of the ratings of individual studies bears some resemblance to the ratings of consumer products reported in *Consumer Reports*. But in this case, black circles represent higher quality rather than red circles. Like *Consumer Reports*, the ratings are grouped in logical ways, in this case, by types of social skills interventions.

This framework seems to have particular appeal for at least two reasons. In contrast to other approaches, this framework is methodologically agnostic in trying to place the quality of different experimental design options on equal footing, to the extent possible. Second, the graphic display of results allows readers to make

comparisons among studies, among types of intervention, between group and single-subject designs, and among quality indicators easily and quickly. Goldstein et al. (2014) pointed out that this framework will continue to evolve as investigators elaborate on and refine the definitions of the ratings for the various indicators. They also presented effect size information to help interpret the magnitude of the treatment effects but noted that methods for calculating effect sizes for SSEDs continue to be refined and are currently a source of controversy (Maggin et al., 2011; Parker, Vannest, & Davis, 2011; Wolery, Busick, Reichow, & Barton, 2010). It is fair to say that one cannot compare effect size estimates from group and SSEDs in a straightforward manner. Certainly, the interpretability of effect size estimates will probably improve with further research in this area.

Goldstein et al. (2014) provided an example of the use of the *Consumer Reports* framework with a review of social skills interventions for preschoolers with autism spectrum disorder. In this chapter, we extend that analysis by broadening the analysis to include social skills interventions in early childhood special education generally. Goldstein et al. evaluated nine group and 58 SSED studies published from 1982 to 2011. When we broadened the criteria to include experimental studies of social skills interventions with children with any identified disabilities from birth to age 8, a total of 41 studies were added, 28 SSED and 13 group design studies.

Figures 11.1 and 11.2 present the results of evaluating all 108 studies. The newly added studies are denoted with highlighting in the citations column on the left. There are additional types of interventions indicated as well. The definitions and criteria used to code each quality indicator are included in an appendix in Goldstein et al.'s (2014) publication. Each indicator is rated on a 1–4 scale: unacceptable, minimal, acceptable, and exceptional quality. In Figs. 11.1 and 11.2, the blacker the circle or Harvey Ball, the higher is the rating. The second column presents an average across the row of indicators to give an overall rating of the quality of individual studies, and the studies are ordered within types of intervention from highest- to lowest-rated studies. Keep in mind that readers may consider prioritizing some quality indicators over others, which could influence their overall assessment of the degree to which individual studies contribute to their assessment of a particular practice. For example, some sins of omission may be deemed less important (e.g., lack of consumer satisfaction data) than others (e.g., lack of objective measures or reliability estimates). Likewise, the robustness of treatment effects are likely to be deemed essential but may be downgraded if a poor rating for the design brings up questions of threats to internal validity. Summary rows (highlighted in gray) also are presented for each indicator within each intervention type. The future addition of more studies could, of course, lead to different conclusions about quality indicators individually or collectively than Goldstein et al.'s article, especially if there are numerous studies added to a particular category of intervention.

Summary of Results

Goldstein et al. (2014) argued that their systematic review provided considerable empirical support demonstrating the efficacy of social skills interventions for preschoolers with ASD. Their conclusion was in stark contrast to conclusions forwarded by authors of other meta-analytic reviews (i.e., Scottish Intercollegiate Guidelines Network, 2007; Warren et al., 2011). The differences in conclusions are principally due to a failure to recognize the contributions of the many replications of substantial treatment effects for social skills interventions evident in SSED studies that had been largely ignored. This was compounded by the poor quality and weak results of group design studies.

The current extension to Goldstein et al.'s review provides further evidence of empirical support for social skills interventions for young children with developmental disabilities generally. The additional studies included a wide array of participants including typically developing children and children with hearing loss, vision problems, Down syndrome, language delays or disorders, emotional-behavior disorders, intellectual disabilities, and global developmental

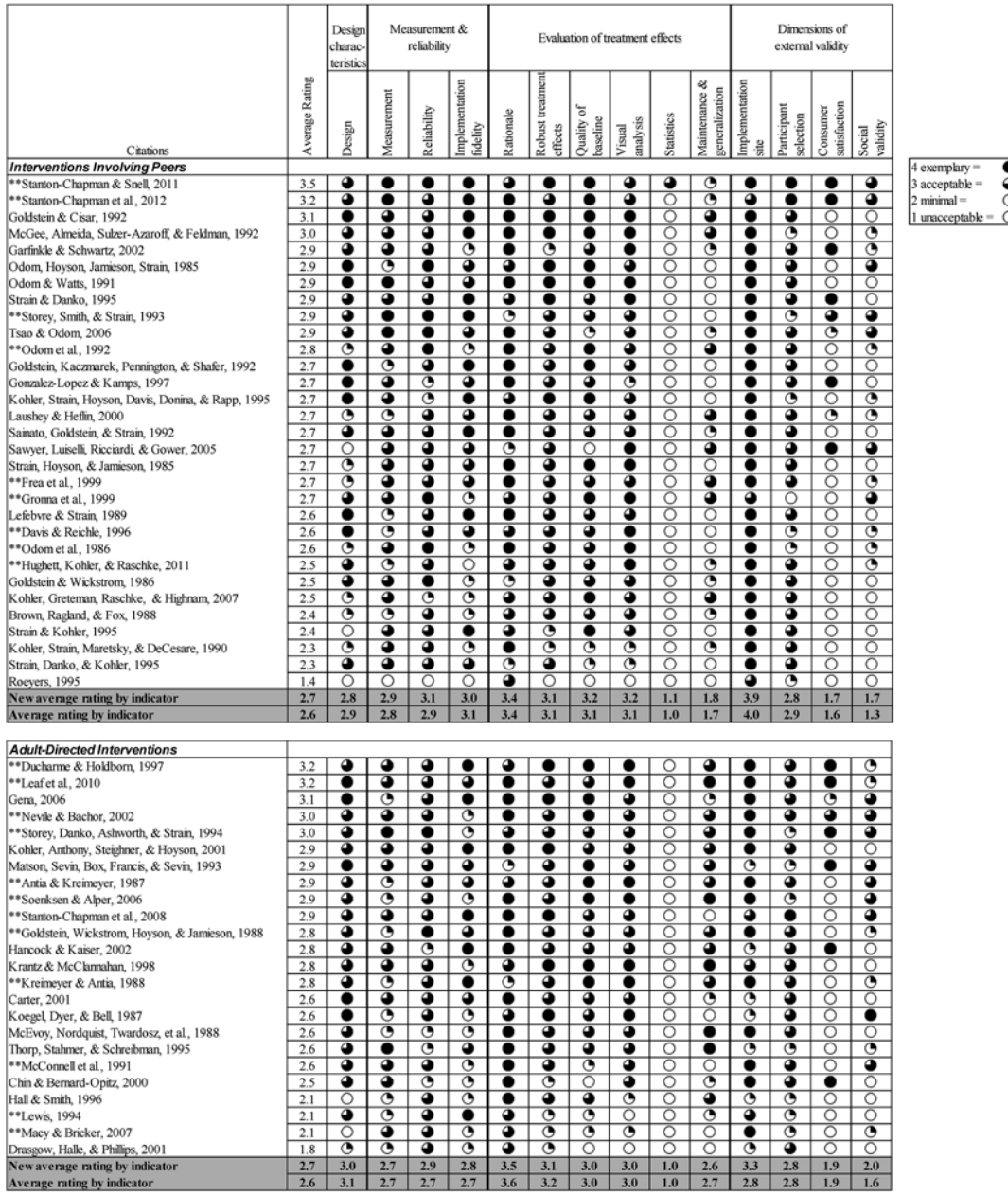
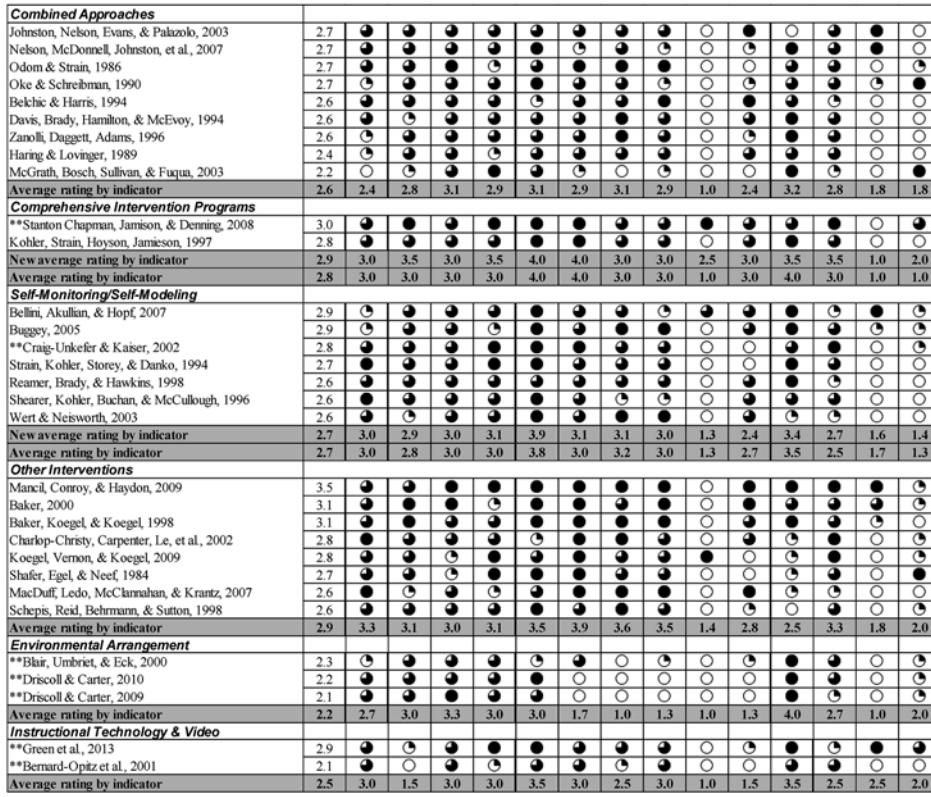


Fig. 11.1 Application of evaluation criteria for single-subject experimental design studies (Goldstein et al. 2014) Copyright © 2014 by Council for Exceptional Children. Doi: 10.1177/0014402914522423

delays. Some participants were described merely as being socially delayed. There are too few studies that would allow judgments of the relative effects of interventions with children with different characteristics. However, there is ample evidence that a variety of strategies or types of intervention are available to remediate social skill deficits in a variety of children with special needs. Efficacy for social skills interventions simultaneously targeting typically developing children and children with disabilities was demonstrated in several studies (e.g., Bernard-Opitz, Sriram, & Nakhoda-Sapuan, 2001; Hyatt & Filler, 2007; Lau, Higgins, Gelfer, Hong, & Miller, 2005; Leaf, Dotson, Oppeneheim, Sheldon, & Sherman, 2010). In the SSED stud-



Combined Approaches															
Johnston, Nelson, Evans, & Palazolo, 2003	2.7														
Nelson, McDonnell, Johnston, et al., 2007	2.7														
Odom & Strain, 1986	2.7														
Oke & Schreibman, 1990	2.7														
Belchic & Harris, 1994	2.6														
Davis, Brady, Hamilton, & McEvoy, 1994	2.6														
Zanolli, Daggett, Adams, 1996	2.6														
Haring & Lovinger, 1989	2.4														
McGrath, Bosch, Sullivan, & Fuqua, 2003	2.2														
Average rating by indicator	**2.6**	**2.4**	**2.8**	**3.1**	**2.9**	**3.1**	**2.9**	**3.1**	**2.9**	**1.0**	**2.4**	**3.2**	**2.8**	**1.8**	**1.8**
Comprehensive Intervention Programs															
**Stanton Chapman, Jamison, & Denning, 2008	3.0														
Kohler, Strain, Hoyson, Jamieson, 1997	2.8														
New average rating by indicator	**2.9**	**3.0**	**3.5**	**3.0**	**3.5**	**4.0**	**4.0**	**3.0**	**3.0**	**2.5**	**3.0**	**3.5**	**3.5**	**1.0**	**2.0**
Average rating by indicator	**2.8**	**3.0**	**3.0**	**3.0**	**3.0**	**4.0**	**4.0**	**3.0**	**3.0**	**1.0**	**3.0**	**4.0**	**3.0**	**1.0**	**1.0**
Self-Monitoring/Self-Modeling															
Bellini, Akullian, & Hopf, 2007	2.9														
Buggey, 2005	2.9														
**Craig-Unkefer & Kaiser, 2002	2.8														
Strain, Kohler, Storey, & Danko, 1994	2.7														
Reamer, Brady, & Hawkins, 1998	2.6														
Shearer, Kohler, Buchan, & McCullough, 1996	2.6														
Wert & Neisworth, 2003	2.6														
New average rating by indicator	**2.7**	**3.0**	**2.9**	**3.0**	**3.1**	**3.9**	**3.1**	**3.1**	**3.0**	**1.3**	**2.4**	**3.4**	**2.7**	**1.6**	**1.4**
Average rating by indicator	**2.7**	**3.0**	**2.8**	**3.0**	**3.0**	**3.8**	**3.0**	**3.2**	**3.0**	**1.3**	**2.7**	**3.5**	**2.5**	**1.7**	**1.3**
Other Interventions															
Mancil, Conroy, & Haydon, 2009	3.5														
Baker, 2000	3.1														
Baker, Koegel, & Koegel, 1998	3.1														
Charlop-Christy, Carpenter, Le, et al., 2002	2.8														
Koegel, Vernon, & Koegel, 2009	2.8														
Shafer, Egel, & Neef, 1984	2.7														
MacDuff, Ledo, McClannahan, & Krantz, 2007	2.6														
Schepis, Reid, Behrmann, & Sutton, 1998	2.6														
Average rating by indicator	**2.9**	**3.3**	**3.1**	**3.0**	**3.1**	**3.5**	**3.9**	**3.6**	**3.5**	**1.4**	**2.8**	**2.5**	**3.3**	**1.8**	**2.0**
Environmental Arrangement															
**Blair, Umbriet, & Eck, 2000	2.3														
**Driscoll & Carter, 2010	2.2														
**Driscoll & Carter, 2009	2.1														
Average rating by indicator	**2.2**	**2.7**	**3.0**	**3.3**	**3.0**	**3.0**	**1.7**	**1.0**	**1.3**	**1.0**	**1.3**	**4.0**	**2.7**	**1.0**	**2.0**
Instructional Technology & Video															
**Green et al., 2013	2.9														
**Bernard-Opitz et al., 2001	2.1														
Average rating by indicator	**2.5**	**3.0**	**1.5**	**3.0**	**3.0**	**3.5**	**3.0**	**2.5**	**3.0**	**1.0**	**1.5**	**3.5**	**2.5**	**2.5**	**2.0**

Fig. 11.1 (continued)

ies, the addition of 28 studies changed the average ratings for indicators very little, with one exception. There was an overall improvement in the reporting of social validity data.

The addition of 13 group design studies in this review more than doubled the number of such studies being evaluated. The bulk of those studies used adult-directed interventions. Although the overall ratings remain a bit lower overall than the SSED studies of adult-directed interventions, there are at least four studies with overall ratings in the acceptable quality range (>2.5) now available. Likewise, the two studies added to the *Interventions involving peers* category were both in the acceptable range. Thus, there appears to be an improvement in the quality of group design studies that were added. Whether the less restrictive participant selection criteria or the nature of populations under study is responsible for these improvements is not clear. Mounting group design studies tends to remain difficult for low-incident populations. Nevertheless, there is continued pressure to conduct high-quality randomized control trials. Greater clarity and agreement about the quality indicators for group and SSED designs should contribute to improvements in the methods employed in intervention research in the future.

One of the group design studies sought to compare social skills interventions (Odom et al., 1999). The study assigned classrooms to one of four intervention conditions: environmental arrangements, child-specific interventions, peer-mediated interventions, or comprehensive interventions. A business-as-usual group served as the control. The intervention conditions targeted students with mild to moderate developmental disabilities. Although this study did not include randomization at the child level, there were multiple classrooms participating in each intervention condition. Despite weaknesses in the design and statistical analyses, as this study fell short of a cluster randomized design, interesting results were obtained. Results indicated that different

Citations	Average Rating	Design characteristics & internal validity				Measurement & reliability			Evaluation of treatment effects				Dimensions of external validity			
		Design	Group equivalence	Comparison group	Attrition	Measurement	Reliability	Implementation fidelity	Rationale	Robust treatment effects	Statistics	Maintenance & generalization	Implementation site	Participant selection	Consumer satisfaction	Social validity
Interventions Involving Peers																
**Matson et al., 1991	2.5	◔	●	◔	●	○	●	◔	◔	◕	◔	◔	●	◕	○	◔
**Tankersley et al., 1996	2.5	○	◔	◔	○	◕	◕	○	●	●	◔	◕	●	●	○	◔
Strain, Hoyson, & Jamieson, 1985	1.8	◔	◔	◔	○	◕	◕	◕	●	○	○	○	●	◕	○	○
New average rating by indicator	**2.3**	**1.7**	**2.7**	**2.0**	**2.0**	**2.3**	**3.3**	**2.0**	**3.3**	**2.7**	**1.7**	**2.0**	**4.0**	**3.3**	**1.0**	**1.7**
Average rating by indicator	**1.8**	**2.0**	**2.0**	**2.0**	**1.0**	**3.0**	**3.0**	**3.0**	**4.0**	**1.0**	**1.0**	**1.0**	**4.0**	**3.0**	**1.0**	**1.0**
Adult-Directed Interventions																
**Lau et al., 2005	3.0	◕	◕	◔	●	●	◕	●	●	◕	◔	◔	●	●	○	◔
**Guralnick et al., 2006	2.9	●	●	◔	◕	●	●	◕	●	○	◔	◔	◔	●	◔	◔
**Coplan et al., 2010	2.8	◕	◕	◔	◔	●	●	◕	◕	◕	◕	◔	◕	●	○	◔
**LeBlanc & Matson, 1995	2.7	◔	●	◔	●	◕	◕	◕	◔	◕	◔	◔	●	◕	○	◔
**Hyatt & Filler, 2007	2.3	○	◔	●	○	◕	◕	◔	●	◔	◔	◔	●	◔	○	◔
Mahoney & Perales, 2003	2.3	○	○	○	◕	◕	◔	◕	◕	●	◔	○	●	●	○	○
**Antia & Kreimeyer, 1997	2.3	◔	○	◔	○	◔	◕	◕	●	◕	◔	◕	◕	◔	○	◔
**Smith, Goddard, & Fluck, 2004	2.1	○	○	◔	●	○	○	◔	●	◕	◔	○	●	◔	○	◔
New average rating by indicator	**2.5**	**2.1**	**2.4**	**2.1**	**2.8**	**3.0**	**2.9**	**2.9**	**3.5**	**2.8**	**2.1**	**1.9**	**3.5**	**3.1**	**1.1**	**1.9**
Average rating by indicator	**2.3**	**1.0**	**1.0**	**1.0**	**3.0**	**3.0**	**2.0**	**3.0**	**3.0**	**4.0**	**2.0**	**1.0**	**4.0**	**4.0**	**1.0**	**1.0**
Combined Approaches																
Kalyva & Avramidis, 2005	2.5	◔	○	◔	●	◕	◕	◔	●	●	◔	◕	●	◔	○	○
Average rating by indicator	**2.5**	**2.0**	**1.0**	**2.0**	**4.0**	**3.0**	**3.0**	**2.0**	**4.0**	**4.0**	**2.0**	**3.0**	**4.0**	**2.0**	**1.0**	**1.0**
Comprehensive Intervention Programs																
**Guglielmo & Tryon 2001	3.3	◕	◕	●	●	◕	◕	●	●	◕	●	○	●	◕	●	◔
McConkey, Truesdale-Kennedy, Crawford, et al., 2010	2.3	○	◔	◔	●	●	○	○	◔	◕	◔	○	●	◕	◕	○
Remington, Hastings, Kovshoff, Espinosa, et al., 2007	2.0	○	◔	◔	○	●	○	○	◔	◕	◕	○	◕	◕	○	◔
Salt, Shemilt, Sellars, Boyd, Coulson, & McCool., 2002	1.9	○	○	◔	◔	◕	◔	○	◔	◔	◔	○	○	●	○	○
Rogers, Herbison, Lewis, Pantone, & Reis, 1986	1.8	○	○	○	○	◕	◔	◔	◔	◔	○	◔	◕	●	○	○
Rogers & DiLalla, 1991	1.7	○	○	○	○	●	◔	◔	◔	◔	○	○	◕	◕	○	○
New average rating by indicator	**2.2**	**1.3**	**1.7**	**2.0**	**2.2**	**3.5**	**1.8**	**1.8**	**2.3**	**2.5**	**2.2**	**1.2**	**3.0**	**3.3**	**1.8**	**1.3**
Average rating by indicator	**1.9**	**1.0**	**1.4**	**1.6**	**1.8**	**3.6**	**1.6**	**1.4**	**2.0**	**2.4**	**1.8**	**1.2**	**2.8**	**3.4**	**1.4**	**1.2**
Other Interventions																
**More et al. 2013	2.2	○	○	◔	○	◕	◕	●	◕	◕	○	◔	●	◔	○	◔
McHale, Simeonsson, Marcus, & Olley, 1980	1.7	○	○	◔	○	◔	◔	○	●	○	◔	○	◔	◕	○	○
New average rating by indicator	**2.0**	**1.0**	**1.0**	**2.0**	**1.0**	**2.5**	**2.5**	**2.5**	**3.5**	**2.0**	**1.5**	**1.5**	**3.0**	**2.5**	**1.0**	**1.5**
Average rating by indicator	**1.7**	**1.0**	**1.0**	**2.0**	**1.0**	**2.0**	**2.0**	**1.0**	**4.0**	**1.0**	**2.0**	**1.0**	**2.0**	**3.0**	**1.0**	**1.0**
Instructional Technology & Video																
**Kroeger et al., 2007	3	◔	◔	◔	●	●	◕	◔	●	◕	◕	◔	●	●	●	◔
Average rating by indicator	**3.0**	**2.0**	**2.0**	**2.0**	**4.0**	**4.0**	**3.0**	**2.0**	**4.0**	**3.0**	**3.0**	**2.0**	**4.0**	**4.0**	**4.0**	**2.0**
Multiple Treatments Comparison																
**Odom et al., 1999	3.133	◔	●	●	●	◕	◕	◕	●	●	◔	●	●	◕	○	◔
Average rating by indicator	**3.1**	**2.0**	**4.0**	**4.0**	**4.0**	**3.0**	**3.0**	**3.0**	**4.0**	**4.0**	**2.0**	**4.0**	**4.0**	**3.0**	**1.0**	**2.0**

Fig. 11.2 Application of evaluation criteria for group design studies (Goldstein et al. 2014) Copyright © 2014 by Council for Exceptional Children. Doi: 10.1177/0014402914522423

types of interventions might be beneficial for specific outcomes. For example, the environmental arrangement group was associated with the highest scores on peer ratings of target children. The peer-mediated intervention had the largest effect on both frequency and quality of child social interactions. Strong effects on social interactions also were found for the child-specific intervention group. It could be that combining multiple types of social skills interventions is necessary to target a broad range of child outcomes. For example, environmental arrangements in addition to peer-mediated interventions may produce more widespread gains than either intervention by itself.

Outcome measures. Overall, there were a large variety of measures used to capture changes in social skills. The majority of studies reviewed utilized observational outcome measures as the primary dependent variables. Although the majority of studies focused on increasing positive social behaviors, several studies concomitantly sought to reduce challenging social behaviors in some children (Antia & Kreimeyer, 1997; Driscoll & Carter, 2009, 2010; Guralnick, Connor, Neville, & Hammond, 2006; Kohler, Greteman, Raschke, & Highnam, 2007; Leblanc & Matson, 1995; Matson, Fee, Coe, & Smith, 1991; Odom, Strain, Karger, & Smith, 1986; Tankersley, Kamps, Mancina, & Weidinger, 1996). As mentioned previously, positive social skills may reduce occurrences of challenging behaviors. Including observational measures of positive social behaviors and challenging behaviors may help us to better understand the connection between the two.

Most observational data collection focused on social skills such as initiating, requesting, or responding or on the frequency or duration of social interactions. Some researchers coded interaction electronically and captured sequential data using the *Multiple Option Observation System for Experimental Studies* (MOOSES; Tapp, Wehby, & Ellis, 1995). Some researchers developed their own operational definitions for coding, and others utilized published scales, such as the *Play Observation Scale* (POS; Coplan, Schneider, Matheson, & Graham, 2010; Rubin, 2001) or the *Social Behavior Observation Form* (SBOF; Lewis, 1994; Lewis & Sugai, 1991). A few studies explored a broader range of social outcomes. For example, Bernard-Opitz et al. (2001) measured social problem-solving skills. However, this study included slightly older children (5–8 years old) than the other studies, which generally included preschool-age children. Other studies (Stanton-Chapman, Denning, & Jamison, 2008; Stanton-Chapman et al., 2012; Stanton-Chapman & Snell, 2011) focused on social communication and utilized language analysis software, such as the *Systematic Analysis of Language Transcripts* (SALT; Miller & Chapman, 1985). A few researchers included measures specific to the skills that were taught in their interventions (such as complimenting a peer or showing appreciation; Leaf et al., 2010). These skills may be difficult to measure without utilizing a contrived environment or activity. Regardless, it is important that future studies continue to expand the scope of social skills that are being used as outcome measures. Certainly, there is a need to evaluate the extent to which social skills interventions yield interpersonal relationships that endure or friendships.

Relatively few studies included standardized outcome measures. Standardized measures were most often used as descriptive measures of the participants or for identifying participants for the intervention. It seems that standardized measures present several challenges. The scoring of assessments are often subjective, and in the case of social skills, informants' perceptions may be influenced by varying expectations. Objective means of tracking progress on social skills is difficult because some behaviors (e.g., aggressive acts) may be low frequency but highly salient. Inherent variability in social skills that can be influenced by a myriad of contextual as well interpersonal factors makes progress monitoring difficult, especially if one is interested in the appropriate use of pro-social behaviors, which require increasing sophistication with development. Thus, a heavy reliance on observational measures seems warranted. Continued research is needed to cross-validate standardized and observational measures. The field would benefit from reliable measures that are useful not only in screening but also for monitoring growth in social-emotional development.

The most notable improvement reflected in the inclusion of the 41 additional studies was in higher ratings of the social validity quality indicator. In several studies, blind coders were used to determine whether social skills gains were readily perceptible. Social validity measures did not always produce positive results. Although statistically significant gains on key outcomes were demonstrated, too often naïve observers were unable to perceive those gains based on observations (Coplan et al., 2010; Lau et al., 2005; Leblanc & Matson, 1995). Gains on specific social skills are a necessary first step. However, interventions are needed that impact overall social and behavioral development and make perceptible changes in social functioning.

Positive social skills may affect other areas of development for young children. For example, positive social communication seems to influence language learning among young children (Stanton-Chapman, Denning, & Jamison, 2008, 2010; Stanton-Chapman & Snell, 2011). It is worth noting that researchers are beginning to investigate the potential reciprocal influences of social skills interventions on language and other cognitive areas of development. Social interactions provide opportunities for modeling and practicing a variety of cognitive skills in the classroom and other environments. Likewise, well-designed instruction on academic tasks may set the stage for use of social skills with peers.

One of the limitations in the social skills intervention literature is the lack of evidence of long-term maintenance and generalization of skills across settings. The high ratings for the implemen-

tation site quality indicator may relate to the lack of attention to this dimension. The overall high ratings for this indicator reflect the fact that studies are largely conducted in the natural environments of young children with special needs. Nevertheless, observations need to sample interactions with different peers with whom children have an opportunity to demonstrate targeted social skills. This may provide evidence for at least some generalization of skills. Several of the included studies noted that generalization across settings only occurred when interventions directly addressed multiple stimulus examples or fading prompts across settings (Ducharme & Holdborn, 1997; Leaf et al., 2010). In several studies, generalization referred to free play or other classroom and playground activities with familiar peers and adults (Antia & Kreimeyer, 1987; Antia & Kreimeyer, 1997; Frea, Craig-Unkefer, Odom, & Johnson, 1999; Gronna, Serna, Kennedy, & Prater, 1999; Soenksen & Alper, 2006). Generalization across settings outside of the school or with unfamiliar peers was not evidenced in the literature and is an obvious priority for future research.

Long-term maintenance may be difficult to measure in the preschool population, as many children move to different schools for kindergarten. Nevertheless, the long-term effects of social skills interventions should be studied. Future studies should investigate the role of social skills interventions across broader domains, such as the development of friendships and long-term social relationships. The findings of Odom and colleagues (1999) suggest that small effects were found 1 year following a peer-mediated intervention. Because social relationships foster development in a range of cognitive and language skills, effective interventions should result in permanent gains in social development.

The observational methods described above are typically used in research contexts. However, there may be some benefit to preparing teachers and paraeducators to monitor social functioning, with the aim of identifying children who may require additional supports. Teachers can learn to identify risk factors for social deficits and provide early intervention to increase pro-social behavior, reduce problem behaviors, and potentially foster development in a variety of developmental domains. The structured observational tools utilized by these intervention studies may provide the foundation for teacher education. Some observational measures also included teacher observations, e.g., number of teacher prompts delivered per session (Hughett et al., 2011; McConnell, Sisson, Cort, & Strain, 1991; Odom, Chandler, Ostrosky, McConnell, & Reaney, 1992; Stanton-Chapman, Jamison, & Denning, 2008). These observational tools have the potential to be used in classrooms, which may in turn encourage implementation of evidence-based practices in school settings.

Types of interventions. The majority of the social skills interventions included in this review were either adult-directed interventions or interventions mediated by peers. These types of interventions may lend themselves to implementation in preschool classrooms, especially within common whole-class activities (e.g., circle time) and small-group peer activities (learning centers). Interventions mediated by peers allow children to immediately practice target behaviors with their socially competent classmates. They also provide the opportunity to teach social skills to multiple students at one time. It is likely that typical children as well as children with special needs benefit from intervention that facilitates positive peer relationships. Interventions involving self-monitoring have shown promise in the literature for children with ASD, but only one additional study was identified that used self-monitoring for children with other special needs (Craig-Unkefer & Kaiser, 2002).

Some additional types of interventions seem to be emerging. For example, several studies focused on what was classified as environmental arrangements. These studies examined the effects of classroom arrangements (Driscoll & Carter, 2010) and the types of toys and activities available to students (Blair, Umbreit, & Eck, 2000; Driscoll & Carter, 2009). Although the differential effects of these interventions were not particularly strong, environmental arrangements may provide a foundation to foster social development of young children in the classroom setting using a low-cost, low-effort strategy. Environments that encourage social interaction also may provide learning opportunities for a variety of other developmental skills such as language.

Another emerging type of intervention includes instructional technologies. The particular studies added to this review focused on types of video modeling of different environments and social situations (Bernard-Opitz et al., 2001; Green et al., 2013; Kroeger, Schultz, & Newsom, 2007). Students are able to see videos or animations of children their own age responding to various social situations. Videos provide an opportunity for students to observe virtually any type of social situation or skill, but care must be taken to ensure that relevant social cues (discriminative stimuli) are highly salient. These interventions may include an adult-directed teaching component (Lau et al., 2005) to help students generalize the skills being modeled to real-life contexts. Future development of these emerging intervention types is warranted.

Practical Significance and Practitioner Implications

In addition to the research implications of the *Consumer Reports*-like review of preschool peer-related social skills, practical significance and a number of practitioner implications can be drawn from the empirical literature to help guide social competence intervention in the classroom. We have identified four key implications that we think are worth noting in regard to their significance in promoting the peer-related social skills of young children. These implications are briefly discussed below and pertain to (a) choosing effective interventions, (b) maximizing social competence outcomes, (c) effectively writing IEP objectives, and (d) focusing on the generalization.

It is clear that multiple, effective interventions are available for practitioners to use for targeting peer-related social skills in preschool classrooms. As a result, classroom teams and practitioners have some choices when deciding on particular approaches to employ with different children and in varying settings and contexts. The number of available social competence intervention choices permits increased child individualization. Certain children may be highly motivated by self-monitoring procedures, but others might demonstrate increased use of peer-related social skills with video modeling. Some children might require the support of adult-directed intervention, while others may show increased improvement with interventions mediated by peers. Practitioners should strive to base their intervention choices on the particular strengths and needs of children within their classroom and, as discussed below, to use a variety of social competence interventions when possible. Another advantage to having multiple, evidence-based practices from which to choose is that a viable "plan B" is available should the initial intervention choice prove unsuccessful.

In order to maximize social competence outcomes, we argue that practitioners do not have to limit themselves to the use of one particular intervention. With so many individually effective social competence interventions, it would make sense that utilizing a variety of strategies to fidelity would produce the best outcomes for young children. A combination of empirically supported antecedent, instructional, and reinforcement strategies, in addition to the individualization of peer-related social skills intervention objectives, need not require significantly more resources to employ than simpler interventions. For example, as previously noted, our review identified several studies that indicated the effect of classroom environmental arrangement on the social development of young children. Environmental arrangements could easily be combined with other interventions to further promote social interaction in the classroom.

A third implication of our literature review relates to the ability of practitioners to effectively write IEP objectives. We have argued that monitoring and targeting the social functioning of all children by identifying their social competence needs as early as possible is important. For children with special needs, the development of objectives and monitoring of progress toward such objectives is essential to ensure positive social competence outcomes. When developing IEPs, practitioners can look to the outcome measures used by researchers in order to develop empirically supported objectives. We identified a number of outcome measures for use in measuring, targeting, and tracking peer-related

social skills (e.g., complimenting peers, initiating, responding, requesting). Practitioners also can reference existing literature when designing data collection systems for IEP objectives. Again, our review revealed an assortment of observational measures such as the number of teacher prompts administered, behavior rating scale ratings, or the frequency or duration of social interactions that can be used in classrooms for data purposes.

Finally, it is our concern that a lack of research on the generalization of social competence may correlate with a lack of practitioner focus on the generalization of peer-related social skills in the classroom. Remediating this issue associates with a topic we discussed earlier in this chapter: embedding IEP objectives into the social routines and interactions preschool children have across their day. More specifically, IEP objectives that exclusively focus on peer-related social skills should be targeted across peers and settings, with a variety of adults when adult-directed intervention is required, and with continuously reducing levels of support as children demonstrate progress through intervention. One way to directly target the generalization of peer-related social skills from the start of a particular intervention is to begin teaching children in the most naturalistic environment possible or to teach and target peer-related social skills during children's interactions with their peers.

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Promoting Communication Development in Young Children with or at Risk for Disabilities

12

Justin D. Lane and Jennifer A. Brown

A young child's communication skills directly influence opportunities to share with and respond to the interests of others and access to preferred items and activities. The ability to meaningfully communicate wants and interests is directly related to children's first understanding that their behaviors impact the surrounding environment (McCathren, Yoder, & Warren, 1999; Prizant & Wetherby, 1987). For example, during infancy, a baby might cry because she is hungry or experiencing some other form of discomfort (e.g., illness, soiled diaper), and her parents respond by providing nourishment, changing the child's diaper, or engaging in other soothing behaviors. The child quickly learns this contingency—her behavior typically leads to a pleasurable change in the environment and, in turn, engages in these behaviors in the future. These early, reciprocal interactions become the building blocks for the child developing more sophisticated, age—appropriate, and meaningful communication (Bruinsma, Koegel, & Koegel, 2004).

Promoting meaningful communication in a young child requires an understanding that communication is dynamic and social and involves multiple persons and settings (Division for Early Childhood of the Council for Exceptional Children [DEC], 2014; Hancock & Kaiser, 2006). Thus, communication develops within a social framework comprised of parents, siblings, relatives, and other persons within a child's community. Each person provides various opportunities for and feedback to the child's communicative behaviors, teaching the child when and how to respond in an ever-changing social environment (Kaiser & Grimm, 2005). For example, a child may use a combination of pointing and vowel-consonant combinations (e.g., /ca/ for car, /ta/ for truck) to approximate words when requesting toy vehicles. Responsive adults (e.g., parents, caregivers) immediately recognize the purpose of the communicative behavior, provide the item, and perhaps model the correct word or phrase. In contrast, a same-age peer in a playgroup may not understand or choose not to honor the request, requiring a modified response from the child. This process promotes flexibility and fluency during interactions, which are necessary skills for successful communication across contexts in early childhood.

To the untrained observer, developing meaningful communication skills, such as transitioning from using consonant-vowel-consonant combinations (e.g., dog, car) to complex sentences describing imaginative play scenarios (e.g., flying to the moon during dramatic play), might appear as a seamless and natural process that requires little to no adult mediation. Although this is true for some young children with typical

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development (e.g., Paul & Norbury, 2012), those with or at risk for disabilities might require more intensive adult supports to learn to meaningfully communicate with others in typical environments. The purpose of this chapter is to highlight the current evidence base for increasing communication skills in young children with or at risk for disabilities. When planning for and providing more intensive adult supports, an understanding of the terminology commonly associated with communication interventions and the typical sequence in which young children develop communication skills for purposes of recognizing atypical patterns of development are valuable first steps (Crais & Roberts, 2004) and will be described in the next sections.

Defining Communication and Related Terms

Communication is the exchange of information between two or more people. To communicate, a sender delivers a message through a shared system to a receiver. Through this process, a child conveys their "needs, wants, interests, and feelings" (Kaiser & Grimm, 2005, p. 447). The shared system or mode of communicating is referred to as form. Specifically, form is the type of behavior a child uses to express these internal states to another person. Common forms of communication include words, signs, gestures, written text, pictures, or vocal output devices (McCauley & Fey, 2006). Regardless of the mode of communication, each communicative behavior serves a function for the child, meaning that the child displays a behavior for a specific purpose (Cooper, Heron, & Heward, 2007; Crais & Roberts, 2004; e.g., a child uses words to request help while another child uses a sign to request help). Functions of communication might include requests for information or assistance accessing needed or desired items, as well as socially related functions such as comments on ongoing activities or previously observed actions, and protesting non-preferred activities (Kaiser & Grimm, 2005). There are two common ways of categorizing communication functions. Children typically communicate to (a) access items or social interactions or (b) escape non-preferred situations (Halle, Ostrosky, & Hemmeter, 2006). Bruner (1981) categorized the typical purposes of communication as one of three reasons: (a) behavioral regulation (i.e., requesting objects, requesting actions, protesting), (b) social interaction (i.e., attention seeking, greeting, social routine), and (c) joint attention (i.e., requesting information, commenting, providing information). Regardless of categorization, it is important to note that form refers to *how* a child communicates and function is *why* a child communicates.

Also, when reviewing communication interventions, consider that an intervention might differentially target a child's *understanding* or *expression*. Understanding involves a child's comprehension of a person's communicative behaviors, while expression involves the production of communication behaviors the child uses to communicate with that person (Paul & Norbury, 2012). Understanding and expression are sometimes referred to as receptive and expressive communication, respectively. Other common terms include speech, which refers to using verbalizations to communicate with others, and language, which refers to the rule-governed symbol system that allows for concepts to be represented in communication (Owens, 2012). Within the context of language development, the following terms are often discussed: (a) phonology (the production of speech sounds), (b) morphology (understanding the meaning of speech), (c) syntax (understanding word order when communicating with others), (d) semantics (communicating clearly with others [related to meanings of words used during interactions]), and (e) pragmatics (using communication skills appropriately in social contexts) (Turnbull & Justice, 2012).

Typical Communication Development

Communication development in young children is marked by progressive increases in form and function as a means of understanding and expressing content. Before children begin to understand and use words, they are learning about language and are communicating in prelinguistic forms, such as

pointing and reaching. Young children progress through stages of intentionality as they develop skills in joint attention, sounds, gestures, words, word combinations, and conversations from infancy to preschool (Justice & Redle, 2014). In the preintentional stage, infants move from crying and reflexive sounds to early babbling without having specific intention to share a message with others. Infants transition from preintentional to intentional communication as they develop joint attention skills. In the early intentional stage, the communication forms are similar to those used preintentionally with the addition of meaningful gesture use. As children begin to attach verbal meaning to objects, people, and actions in their environment and expand their sound repertoire, they shift from pre-symbolic intentional communication (i.e., prelinguistic) to symbolic intentional communication. The connection between communication form and expressed meaning becomes stronger and more direct as intentionality increases.

While early intentional communication is situated in the immediate context, the transition to the symbolic stage allows communication to be decontextualized due to the representation of concepts through symbols. Pre-symbolic intentional communication is dependent on the here and now of the immediate situation. For example, as a child reaches and vocalizes toward her bottle, she communicated a request for milk. However, if that same behavior occurred in a different situation, the meaning could be different—a vocalization and reach do not always express the message of wanting to be fed. As the child develops language (i.e., symbolic representation of concepts), she says "bottle" to make the same request. The word "bottle" means the same thing whether the bottle is present or not, which allows her to communicate that messages effectively beyond the immediate here and now context.

Joint Attention and Gestures

From birth to approximately 6 months of age, infants increasingly attend to the people who interact with them, also known as social partners. They do this by paying attention to faces, particularly those of their caregivers. In the second half of the first year of life, infants begin to shift their attention between people and objects of interest as joint attention emerges. Joint attention is the simultaneous engagement between two or more people and an object or event of focus (Bakeman & Adamson, 1984). Initially, infants respond to joint attention by following the gaze and gestures of others, and later, infants initiate joint attention by using their gaze and gestures to direct the attention of others (Beuker, Rommelse, Donders, & Buitelaar, 2013). In both response to and initiation of joint attention, children are shifting their focus of attention while being continuously engaged (Mundy et al., 2007). Emergence, fluency, and frequency of joint attention skills have been associated with key foundations in meaningful communication (Adamson, Bakeman, Deckner, & Nelson, 2014; Watt, Wetherby, & Shumway, 2006).

Gestures typically serve as the first means of intentional communication and frequently emerge within the context of joint attention (Crais, Douglas, & Campbell, 2004). The frequency of gesture use and the variety of functions expressed through gestures predict later language skills and help to differentiate typical and atypical development (Carpenter, Nagell, Tomasello, Butterworth, & Moore, 1998; Wetherby et al., 2014; Zwaigenbaum et al., 2005). Earliest gestures emerge around 7–9 months with the use of contact gestures (e.g., giving, pushing away), which are followed by the emergence of distal gestures (e.g., reaching, pointing) around 10–12 months (Carpenter et al., 1998; Crais, Watson, & Baranek, 2009; McLean, McLean, Brady, & Etter, 1991). Around 12 months, children begin to use representational gestures, which establish a referent and indicate a specific message (Iverson & Thai, 1998). Representational gestures typically emerge in the context of familiar social routines and games between children and caregivers (Goodwyn, Acredolo, & Brown, 2000).

In contrast, young children with disabilities are more likely than their peers with typical

development to display difficulties sharing attention with parents/caregivers (Bruinsma et al., 2004; Warren et al., 2006). Prelinguistic communication delays are especially prevalent among young children with intellectual disability and those with autism spectrum disorder (ASD) (Zager, Wehmeyer, & Simpson, 2012). Although these early prelinguistic delays might be subtle, attending to these early markers of language development is critical for decreasing the developmental gap likely to emerge as children get older and enter preschool (Adamson et al., 2014; Watt et al., 2006).

Sounds

Children attend to the sounds around them long before they produce speech sounds. They use specific characteristics of speech to break down the long speech streams they hear into meaningful smaller speech segments (Saffran, Aslin, & Newport, 1996; Tsao, Liu, & Kuhl, 2004). Nathani, Ertmer, and Stark (2006) categorized prelinguistic vocalizations into five levels. Infants shift from the first level of reflexive sounds (e.g., crying, fussing, burping) in the newborn period to beginning to control phonation by making vowel-like sounds between 1 and 4 months of age. From 3 to 8 months, infants enter into a level of vocal expansion where they produce isolated vowels, squeals, and marginal babbling. Infants use canonical syllables in babbling (single and repeated consonant-vowel combinations) between 5 and 10 months. Children typically reach the highest level between 9 and 18 months as they produce advanced forms, such as complex multisyllabic strings and jargon (i.e., a series of syllables with different consonants and vowels and speechlike intonation and stress patterns). Young children with disabilities might display difficulties producing sounds or sounds many be absent altogether (Crais & Roberts, 2004). Similar to the development of prelinguistic communication skills, if any child displays difficulties producing sounds, parents/caregivers should be encouraged to seek professional supports.

Single Words and Early Word Combinations

Children typically begin to use single words during a period in which their use of advanced vocalizations and vocalization and gesture combinations is frequent. As children approach their first birthday (range 10–15 months), the first word appears and children typically have an expressive vocabulary of at least five words by 15 months. For a word to be considered a true word, it must meet the following criteria: (a) the child must say the word with a clear and distinct intention; (b) the pronunciation of the word must resemble the adult production of the word; and (c) the word must be used consistently and be generalized beyond the original context to other relevant meanings. The rate of communication increases during this stage as children use various forms—gestures, vocalizations, and words—to intentionally share messages. These communication acts are used to express multiple functions (e.g., making requests, commenting, asking questions). First words typically include words with one or two syllables and fall under the categories of foods, animals, people, and toys with a predominance of nouns (Bates et al., 1994; Bornstein et al., 2004). The quantity, quality, and content of words that children are exposed to, as well as the opportunities for children to communicate, are predictive of current and future language skills (Harris, Jones, Brookes, & Grant, 1986; Hart & Risley, 1995; Hoff & Naigles, 2002; Weizman & Snow, 2001).

Children continue to use gestures as they add new words to their vocabulary (Bavin et al., 2008). Typically the combination of gestures and single words together precedes the transition from single word use to word combinations. As children produce approximately 50 single words between 18 and 24 months, they begin to combine words together into two-word phrases. Children's early word combinations often do not include key grammatical markers, making their speech telegraphic or "choppy." After a gradual start to learning the first approximately 50 words, rapid word learning occurs (Houston-Price, Plunkett, & Harris, 2005; Mervis & Bertrand, 1995). At this

point, children are often learning around 7–9 new words a day. Children learn how to assign a word to a referent, known as mapping, through a combination of their existing language knowledge and the social cues and interaction provided by the person talking. When children hear words that are related to their current focus of interest and are provided with gestural and speech emphasis cues, the situation is primed for mapping words.

Until a child is 1–2 years of age, parents/caregivers of young children with or at risk for disabilities might be unaware that their child is producing sounds and words at a substantially lower rate than their same-age peers with typical development. This is typically the time period when parents/caregivers are likely to seek professional supports and services for their young children. The level of support required for children to successfully begin to or readily use words or combinations of words can vary. Children might display difficulties producing beginning, medial, or ending sounds, making it difficult to successfully communicate wants and needs to social partners. In addition, children might use a few words but display challenges acquiring other words without direct support (Paul & Norbury, 2012). Some young children, such as those with intellectual disability or ASD, might not use words to communicate and instead use nonfunctional words or speech sounds. Also, young children with ASD might be echoic (repeating another person's word or phrase) or use scripted phrases from preferred television series or movies but not spontaneously use any words or combinations or words (Alpern, 2012). This may lead to confusion for some parents/caregivers and professionals who assume that their child can readily communicate with social partners.

Conversation

Communication advances, including understanding and talking about events that are decontextualized, participating in conversations with adults and peers, and producing narratives, mark the preschool years. Children continue to rapidly expand their vocabularies, use advanced syntactic features including multiple clauses, use advanced morphological markers, and produce speech that is intelligible to most listeners. Early conversations of 2- and 3-year-old children typically are focused on topics introduced by and/or of interest to the child and consist of only a few contingent turns. Frequent topic switching decreases and sustained turn taking increases in 4–5-year-old children. Compared to peers with typical development, young children with disabilities are more likely to display difficulties initiating interactions and responding to peers (Crais & Roberts, 2004), limiting opportunities for sustained and meaningful conversations. Difficulties in initiating conversations are especially prevalent among children with ASD and those with related social delays (Koegel, Koegel, & Carter, 1999). When considering remediation for conversational skills, special attention should be given to semantics and pragmatics (Alpern, 2012).

Atypical Development

Children's communication development can deviate from typical development in rate of acquisition (i.e., following typical progression at a slower rate) or quality (i.e., breakdown in development of semantics, syntax, morphology, phonology, and/or pragmatics). Communication disorders can occur along with or in the absence of other developmental disorders. Another important consideration is that early childhood language disorders not only impact current and future oral communication and social interactions but also are strongly associated with later written language (i.e., reading and writing) and academic difficulties (Johnson, Beitchman, & Brownlie, 2010; Rescorla, 2002). Being familiar with typical development provides adults contextual support when determining if communication challenges are present and thus impeding a child's independence within his or her social environment, as well as threatening long-term development socially and academically. Regardless of the pattern of deviation from typical peers, remediating communication delays requires immediate attention and systematic supports.

History of Communication Interventions

Historically, communication interventions were conducted in laboratory settings with a practitioner or researcher focusing on increasing specific forms of speech sounds or words and reinforcing correct articulation with items or activities unrelated to the communication target(s). Sessions were commonly conducted in rooms devoid of age-appropriate materials, family members, and same-age peers—things and people often present when young children with typical development are learning age-appropriate communication skills (LeBlanc, Esch, Sidener, & Firth, 2006; Schreibman et al., 2015; Stokes & Baer, 1977). Interventions conducted in these highly controlled contexts typically resulted in successful acquisition of specific forms of communication but often led to minimal to no generalization outside of the instructional context. Oftentimes hundreds of instructor-led trials, or opportunities, were necessary to observe even minimal changes in communication skills, thus, from a practical standpoint, almost immediately decreasing the feasibility of conducting such interventions in more typical contexts. For children with more severe disabilities, such as those with ASD, additional challenges, such as problem behaviors (e.g., self-injurious behaviors, tantrums, noncompliance), arose during these sessions, adding to the number of trials necessary for success.

Pioneers in the field of communication and special education recognized and attempted to remediate these challenges by evaluating environmental modifications, such as settings, materials, and adult behaviors used during intervention sessions. Through decades of research, researchers identified strategies for promoting acquisition and generalization of communication skills in young children with or at risk for disabilities. From this work, overarching recommendations, or considerations, are available for today's teachers, practitioners, and researchers: A key recommendation is the importance of teaching in typical settings or natural environments that include age-appropriate materials. It is critical to teach, support, and include family members and peers in communication interventions. Other recommendations include targeting a variety of forms of communication that consider the function of a child's communicative behaviors (e.g., multiple forms of greetings to peers, statements that allow flexibility when requesting preferred items) and reinforcing attempts to communicate with related items and activities (e.g., providing a miniature car following a child saying "car" for the function of requesting access to a preferred item). It is worth noting that these recommendations are not exhaustive and stem from studies that evaluated various combinations of strategies and adult behaviors designed to improve communication skills in young children. The remainder of this chapter will review these specific interventions, as well as highlight implications for the field and future research needs in this area.

Current Evidence Base

Prelinguistic Communication and Oral Language

Environmental Arrangement

An often overlooked or misunderstood approach to promoting communication in young children is attending to and altering the child's immediate environment (Halle, Baer, & Spradlin, 1981). A child's environment is comprised of two parts: (1) the physical environment (physical space and items within the space) and (2) the social environment (persons within a space with whom the child might interact) (Hemmeter & Kaiser, 1990). The interworking of these two components provides many natural, often unplanned, opportunities for children to communicate. For example, during snack a preschool teacher maintains access to that day's snack by holding the box of animal crackers (natural cue). Many of the children seated across from the teacher attempt to obtain his attention by pointing or verbalizing for the purpose of obtaining animal crackers. Recognizing natural cues for communication is critical for children's long-term success when interacting with social partners (Halle et al., 1981). Teaching children when and

how to communicate under antecedent conditions increases the likelihood that they will independently and appropriately initiate communication with a social partner, thus experiencing a pleasant consequence for their behavior (e.g., receiving a toy; Hart & Risley, 1968). Environmental arrangement is commonly included in many multicomponent communication interventions, limiting analysis of environmental arrangement alone, and has been used with a variety of young children across many settings, including schools, homes, and clinics. The current recommended practices in early intervention and early childhood special education from the DEC (2014) stress the importance of modifying the environment to promote opportunities for learning, including arrangements that promote age-appropriate communication skills. It is worth noting that Kaiser and colleagues have conducted a great deal of research describing and utilizing environmental arrangement strategies in typical settings and, as such, the following descriptions stem from their work (Hancock & Kaiser, 2006; Hemmeter & Kaiser, 1990; Kaiser, Hancock, & Nietfeld, 2000; Kaiser & Hester, 1994; Kaiser, Ostrosky, & Alpert, 1993; Kaiser & Roberts, 2013).

When using environmental arrangement strategies, adults first select preferred materials; the adult might simply make these preferred items available to children to promote engagement or present these materials in a manner in which children cannot readily access them without some form of adult or peer support (Hancock & Kaiser, 2006). Environmental arrangement strategies include, but are not limited to, the following: (a) provide materials during typical activities (offering preferred materials in a systematic manner to promote engagement and create opportunities for shared attention); (b) present materials within view but out of reach (typically used to promote requests; an example is placing a musical toy on a high shelf or withholding access to action figures); (c) present materials that require assistance to access (also typically used to promote requests; examples include placing toy trucks in a container with a screw lid or spinning tops in a sealed container); (d) provide inadequate amounts of materials (typically used to promote requests and possibly comments related to inadequate amounts of a material; an example is providing only a pinch of Play-Doh); (e) provide materials but remove key pieces (sabotage) (typically used to promote requests and possibly comments; examples include providing only a few pieces of a Mr. Potato Head or presenting half of the pieces that can be used to complete a puzzle); (f) block access to materials (adults use their bodies as a barrier between children and preferred materials; this strategy is typically used to promote requesting); (g) engage in unexpected actions with materials (adults engage in "silly situations" with materials to typically promote commenting or other form of shared attention; an example is an adult placing a doll's shoe on their head); and (h) allow the child an opportunity to protest a nonpreferred action (adults systematically plan to engage in an action in which the child can indicate ownership of materials or indicate some form of disapproval; an example is an adult indicating they want to take a child's snack) (Hancock & Kaiser, 2006; Kaiser et al., 1993; Kaiser & Grimm, 2005).

Milieu Teaching

The following four interventions, (a) modeling, (b) mand-model procedure, (c) time delay, and (d) incidental teaching, are commonly referred to as milieu teaching strategies or interventions (Hart & Risley, 1975; Kaiser et al., 1993), which are often described as behavioral methods of instruction (based on the principles of applied behavior analysis [ABA]; Schreibman et al., 2015). Milieu teaching involves interspersal of opportunities or trials to orally communicate during typical activities. Each of the common interventions that comprise milieu teaching may be used in isolation or as part of a planned hierarchy of prompts. If used as part of a hierarchy, prompts are typically arranged from most to least intrusive, meaning an adult would scaffold a child's communicative development by first providing more intensive support and shifting to less intensive support over time (Kaiser & Grimm, 2005; Wolery, Ault, & Doyle, 1992). Prompts may also be arranged from least to most intrusive. Each of these interventions has been

used to increase oral language skills in children with or at risk for disabilities and has been implemented by parents/caregivers, teachers, and researchers in typical and clinical settings. These procedures have also been used to promote prelinguistic *and* oral language skills with infants and toddlers (Hancock & Kaiser, 2006; Schreibman et al., 2015; Snyder et al., 2015; Warren & Gazdag, 1990; Yoder et al., 1995; Yoder & Warren, 2002), with prelinguistic forms of communication discussed in a later section.

Modeling

Modeling is the first intervention that should be selected when targeting increases in oral language skills in young children (Kaiser & Grimm, 2005). When using modeling, an adult presents an opportunity to communicate and then verbally models the correct form of an oral language target. The expectation is that the child will imitate the verbal model and then receive access to a preferred item or activity (Wolery et al., 1992). A prerequisite of this intervention is that the child be verbally imitative; otherwise this intervention may lead to frustration and subsequent challenging behaviors. Although some previous studies required correct articulation of an oral language target, the current recommendation is to reinforce approximations (Schreibman et al., 2015), reducing the likelihood of frustration.

Mand-Model

The mand-model procedure was designed to promote use of oral communication during typical activities, especially oral language acquired during more structured therapy or treatment sessions (Rogers-Warren & Warren, 1980). The mand-model procedure involves an adult interrupting an ongoing routine or activity and asking a question (a non-yes-or-no question) or providing some form of a directive to communicate (mand). Wolery et al. (1992) indicate that this procedure may be especially useful for children who do not readily initiate interactions. Following the adult's question or directive, if a child does not respond, the adult provides a model of the oral language target. Reinforcement of a spontaneous or prompted oral language target typically occurs in the form of allowing the child to continue an activity (Warren, McQuarter, & Rogers-Warren, 1984). Traditionally, when used in isolation, the mand-model procedure is an adult-directed intervention—the adult obtains a material from a child or interrupts an ongoing activity in some other capacity with the goal that the child will respond to the question or directive (Wolery et al., 1992).

Time Delay

Time delay, sometimes referred to as naturalistic time delay, has a long-standing history in the communication literature (e.g., Halle et al., 1981; Halle, Marshall, & Spradlin, 1979). The primary purpose of time delay is promoting spontaneous oral language, especially during typical activities where the natural cue or antecedent to communicate is emphasized during planned opportunities or trials. Traditionally, an adult selects a prearranged routine or activity and, following an initiation from the child, withholds access to a preferred material, waiting a certain amount of time (delay) for the child to display the correct oral language target. If the child displays the correct target, they receive access to the preferred material. In contrast, if the child does not respond or uses an unrelated oral language target, the adult provides a verbal model of the target, followed by access to the preferred material. An alternative to waiting a specified delay is to immediately provide the correct verbal model (referred to as a 0-s delay), with a systematic plan to increase the delay before providing a model prompt. Time delay can also be used to prompt the child to use a more sophisticated or advanced form of the same function in response to the child's naturally initiated communication act (e.g., child requests a drink by using a reach gesture; time delay can be used to prompt a verbal approximation of the word "drink").

Incidental Teaching

Incidental teaching is an intervention designed to increase initiations and provide opportunities for adults to expand on a child's previously acquired forms of oral language (Hart & Risley, 1968,

1975). Like time delay and other milieu teaching interventions, incidental teaching has been used in numerous studies over the last few decades. First, the adult uses an environmental arrangement strategy to promote initiations. Like time delay, instruction can only occur when a child initiates an interaction. The adult decides to expand on a child's initiation by using a model prompt, mand-model procedure, or time delay, with a model prompt almost always used as a final prompt for a correct response, meaning the child imitates a verbal model and receives access to a related material (Wolery et al., 1992). Wolery et al. (1992) stress the importance of the adult determining if a child's initiation is indeed a teachable moment, meaning the adult determines if they can focus their attention on the child and provide the level of support necessary for the child to display the correct form of the oral language target; otherwise, the adult is expected to provide the child with the preferred material, to avoid punishing the communicative behavior (McGee, Morrier, & Daly, 1999; Warren & Kaiser, 1986).

Contingent Imitation

Imitating a child's communicative act provides opportunities for teaching imitation skills to children by reinforcing their communication as well as supporting sustained communicative exchanges by encouraging turn taking (Dunst, Gorman, & Hamby, 2010; Ingersoll & Gergans, 2007; Pelaez, Virues-Ortega, & Gewirtz, 2011). Contingent imitation as an independent strategy is typically used in response to child vocalizations or gestures (Gazdag & Warren, 2000). It is also often used as a prerequisite and/or combination strategy with expansions and recasts as well as within the context of responsive interactions.

Expansions and Recasts

Expansions and recasts have a long history as strategies used to increase language complexity (Camarata, Nelson, & Camarata, 1994; Hassink & Leonard, 2010; Kaiser et al., 1993). Expansions are responses given to the child by imitating the child communication while adding more communicative input (e.g., child says "go" and adults expands by saying "go ball"). An expansion immediately connects the child's communication to additional new communication—including new semantic information and increased length of utterance. Recasts are responses that specifically target a grammatical form (e.g., child says, "Mommy walk fast," and adult recasts by saying, "Mommy walked fast," emphasizing the past tense -ed). Both expansions and recasts are interactively and conversationally relevant to the child's initiated communication act. Interventionists can use expansions and recasts with children as well as coach teachers and parents to use expansions and recasts in home and school routines (Leonard, Camarata, Pawłowska, Brown, & Camarata, 2006; Roberts & Kaiser, 2011; Woods, Kashinath, & Goldstein, 2004).

Video Modeling

One line of scholarship that has received increasing attention over the last decade or so is video modeling for young children with disabilities, especially those diagnosed with ASD (Alexander, Ayres, & Smith, 2015; Charlop-Christy, Le, & Freeman, 2000). The primary appeal of using video models with children with ASD is that instruction via video allows children an opportunity to watch the model multiple times, building on the visual strengths of children with ASD (Zager et al., 2012). Traditionally, video models for communication skills involve targeting more advanced forms of communication with older children, where previously acquired forms of oral language are targeted in social situations, such as conversations with social partners. Using video models to teach young children early forms of communication, including prelinguistic and oral communication, is an emerging literature base in the field (Charlop-Christy et al., 2000; Shukla-Mehta, Miller, & Callahan, 2010; Wert & Neisworth, 2003).

When designing video models, multiple options are available. Adults may video themselves, other adults, or peers engaging in target oral language skills. In addition, adults may prompt the child with whom they are working to display the oral language target and edit the video for later use (Mason, Ganz, Parker, Burke, & Camargo, 2012). Advances in technology, especially mobile technology such as smartphones

and tablets (McNaughton & Light, 2013), have increased the efficiency of using video models in typical settings. Video models may also be used in isolation or in conjunction with other adult prompts (Mason et al., 2012). Another important consideration, especially when instructing children with ASD using video models, is to include models of multiple forms of oral language that serve the same function (e.g., commenting that includes "whoa," "look," and "cool" instead of "whoa" alone) to decrease the likelihood of telegraphic speech.

Multicomponent Interventions

Early Start Denver Model

The Early Start Denver Model (ESDM) is a multicomponent manualized intervention specifically designed for improving communication, language, and play skills in young children with ASD, with a strong emphasis on strengthening a child's pragmatic skills (Dawson et al., 2010). The overall focus of ESDM is training parents/caregivers to implement behavioral strategies (e.g., adult prompts, reinforcement), in conjunction with social interactionist strategies (relationship-based approach to encouraging interactions between children and caregivers; Ingersoll, 2010), during typical activities (Vismara, Colombi, & Rogers, 2009). Typically, researchers train parents/caregivers to implement and eventually combine multiple components, such as methods to promote engagement and imitation. Early findings of studies evaluating ESDM indicate that this comprehensive intervention may improve spontaneous and prompted forms of oral language (measured using standardized assessments) and imitative play behaviors in young children with ASD (Dawson et al., 2010; Rogers et al., 2012; Vismara et al., 2009), with one study reporting decreased stress among parents who were trained to implement these procedures with their child (Estes et al., 2014).

Early Social Interaction

Early Social Interaction (ESI) is a parent-implemented social communication intervention for toddlers with ASD. ESI was designed to incorporate the National Research Council's (NRC, 2001) recommendations within a family-centered natural environment approach that is community viable to support young children's development of communication skills within reciprocal interactions that occur in everyday routines and activities (Wetherby & Woods, 2006). Trained early interventionists visit the family's home 2–3 times a week for approximately 1 hr to coach parents to use specific transactional supports to increase their child's social communication and active engagement. The coaching process involves direct teaching, guided practice with feedback, caregiver practice and reflection with feedback, and the interventionist backing out to increase caregiver independence. In an RCT comparing the parent-implemented individual ESI with a group ESI (one group parent session per week), Wetherby et al. (2014) found differential improvement in social communication skills and receptive language for children in the parent-implemented individual-ESI condition. Generalization was targeted throughout the intervention by teaching 3–5 varied naturally occurring home and community routines each session.

Enhanced Milieu Teaching

Enhanced Milieu Teaching (EMT) is a hybrid intervention comprised of components traditionally associated with a behavioral approach to instruction, as well as components commonly ascribed to social interactionist interventions, especially responsive interaction strategies (e.g., social turn taking). EMT is a child-directed intervention where the adult follows the child's lead in regard to materials and activities and uses an environmental arrangement strategy (e.g., withhold access to a preferred item) to evoke spontaneous communication, followed by using a prompt hierarchy comprised of modeling, mand-model procedure, time delay, and incidental teaching. The level of prompt selected is dependent on the child and level of support required for the child to be successful (Hancock & Kaiser, 2006; Kaiser & Grimm, 2005; Kaiser & Roberts, 2013). Throughout sessions, the adult attempts to promote social turn taking and material exchange,

as well as be responsive to any communicative behavior displayed by the child. Traditionally, any approximation or communicative attempt is reinforced with access to a related item or activity. Hancock and Kaiser (2006) report that EMT will more likely benefit children who are verbally imitative, who produce at least ten words, and whose mean length utterance (MLU) is between 1.0 and 3.5. A number of studies have evaluated EMT when implemented by parents, researchers, or a combination of the two in a clinic setting, with some studies conducting evaluations in children's homes and classrooms (e.g., Brown & Woods, 2015; Hemmeter & Kaiser, 1994; Kaiser et al., 2000; Kaiser & Hester, 1994; Kaiser & Roberts, 2013).

Hanen Programs

Two Hanen Parent Programs have similar approaches and formats designed to support communication skills in toddlers and preschoolers. *It Takes Two to Talk* (ITTT; Pepper & Weitzman, 2004) was developed for young children with language delays or disorders, and *More Than Words* (MTW; Sussman, 2012) was developed for young children with ASD. In both programs, a Hanen-certified speech-language pathologist (SLP) provides 6–8 group training sessions to parents along with three individual video feedback sessions with each parent and child (Girolametto & Weitzman, 2006). Parents are primarily taught responsive interaction and modeling strategies (e.g., observe, wait, and listen; follow the child's lead; highlight your language). There is empirical support for some of the intervention strategies included in the programs as well as for including parents in the intervention process. Based on recent controlled examinations, it appears that MTW may be more effective for children with low levels of object interest (Carter et al., 2011). Further examination is needed to determine if ITTT and MTW support parents to a level of fidelity needed to use the strategies throughout the day so children receive intervention strategies and supports at a frequency and intensity needed for sustained outcomes.

Joint Attention Intervention

Joint Attention Intervention (JAI), also known as the Joint Attention and Symbolic Play Engagement and Regulation (JASPER), is designed to improve shared attention among caregivers and young children with or at risk for ASD (Kasari, Gulsrud, Wong, Kwon, & Locke, 2010; Schreibman et al., 2015). Parents are trained by researchers, who use a series of modules that teach parents how to set up and modify the environment, promote engagement, and eventually improve joint attention skills while concurrently monitoring concomitant improvements in language development. The rationale for targeting shared attention in young children and their parent is that joint attention is considered a precursor to later language development. Current research indicates reliable increases in joint attention skills for young children with ASD, with intervention sessions typically implemented by parents or researchers in a clinic or preschool (Goods, Ishijima, Change, & Kasari, 2013; Gulsrud, Kasari, Freeman, & Paparella, 2007; Kasari, Freeman, & Paparella, 2006; Kasari, Gulsrud, Paparella, Hellemann, & Berry, 2015).

Pivotal Response Training

Pivotal Response Training (PRT) is a manualized hybrid intervention that utilizes behavioral strategies and supports within typical activities to improve spontaneous oral communication in young children (Koegel et al., 1989); much of the work using PRT has focused on children with ASD or those who display characteristics commonly associated with a diagnosis of ASD (e.g., Harper, Symon, & Frea, 2008; Koegel, Symon, & Koegel, 2002; Minjarez, Williams, Mercier, & Hardan, 2011; Pierce & Schreibman, 1995, 1997; Sherer & Schreibman, 2005). The basis of PRT is targeting "pivotal behaviors," meaning the focus of interventions is targeting behaviors that, if improved, will likely lead to collateral improvements in related communicative and other social behaviors. Pivotal behaviors include (a) motivation to persist with communication with social partners, (b) responding to multiple cues in the environment, (c) self-management skills, and (d)

increased initiations to social partners (Koegel et al., 1999). The PRT literature base encompasses a large number of studies that utilize varying combinations of strategies and procedures; adults may use model prompts or other related milieu teaching strategies to promote oral language. In addition, PRT is considered an evidence-based practice in reviews of interventions for individuals with ASD (e.g., Wong et al., 2014).

Prelinguistic Milieu Teaching

Prelinguistic Milieu Teaching (PMT) is a comprehensive intervention designed to improve intentional communication, including gestures and vocalizations, in young children with developmental delays (Warren et al., 2006). Similar to many of the multicomponent interventions, PMT uses environmental arrangement strategies, adult prompts (modeling, mand-model procedure, and time delay), and reinforcement during typical play activities, with a focus on shared engagement with a social partner who promotes turn taking and uses related responsive approaches during sessions. When adult prompts are used, they are systematically removed to reduce the likelihood of prompt dependency. Research on PMT indicates increased intentional communication in young children with or at risk for disabilities, especially when parents display increased responsivity during interactions with their children (e.g., Fey et al., 2006; Warren et al., 2008; Yoder & Warren, 1998).

Responsive Interaction Intervention

Responsive Interaction Intervention (RII) is a conversational approach to promoting positive interactions between parents and young children with developmental delays (Girolametto, 1988; Trent, Kaiser, & Wolery, 2005). Parents are encouraged to follow their child's lead by joining in ongoing play activities, imitating the child's action on toys, and responding to any communicative attempts. Parents promote turn taking during play and conversation but do not provide any prompts for oral communication or other communicative behaviors, such as gestures. Many of the comprehensive interventions mentioned in this section (e.g., EMT, ESDM), to some extent, utilize strategies commonly associated with the RII intervention. Kong and Carta (2013) conducted a systematic review of RII and found improvements in parents and teachers' responsive behaviors, with less robust increases in children's prelinguistic or oral language skills (7 of 31 identified studies).

Summary

Given the rich history of using milieu teaching interventions to improve oral language in children with or at risk for disabilities, a separate summary is warranted. When reviewing the literature, a common theme emerges: behaviorally based interventions, like milieu teaching, that are embedded during typical activities that support social interaction have a strong evidence base. For example, the mand-model procedure has successfully been used to target a variety of communicative behaviors in young children with disabilities in clinics, homes, and schools, with parents, teachers, or peers implementing procedures in these settings (Hawkins & Schuster, 2007; Hemmeter, Ault, Collins, & Meyer, 1996; Mobayed, Collins, Strangis, Schuster, & Hemmeter, 2000; Venn et al., 1993; Warren et al., 1984). More so, incidental teaching, modeling, and time delay have a rich history in the literature, with a variety of indigenous implementers conducting sessions in typical settings (e.g., McGee et al., 1999; Snyder et al., 2015; Warren & Kaiser, 1986; Wong et al., 2014). More recent reviews have found mixed results regarding generalization of communicative behaviors (Hepting & Goldstein, 1996; Snyder et al., 2015), with some participants displaying difficulties using target behaviors outside of instructional contexts. Applying and evaluating strategies to promote generalization require further attention in the literature.

Also, a number of comprehensive intervention programs are available in the literature. Given that many of these programs are manualized, oftentimes a trained therapist or researcher affiliated with an intervention should train others to implement procedures. This is an important consideration when recommending any multicomponent intervention to parents, teachers, and other

early childhood professionals. Without appropriate training and monitoring of implementation, success or lack thereof might or might not be related to the intervention. In addition, many of these programs were specifically designed for toddlers and preschoolers with ASD (i.e., ESDM, ESI, JAI, MTW) or are commonly recommended and used with children with ASD (PRT) and, as such, should be considered when providing recommendations of interventions to families and educators. As highlighted in the descriptions of each comprehensive intervention, multiple experimental studies have been conducted evaluating the effectiveness of procedures with young children with or at risk for disabilities. Each intervention has typically led to statistically significant findings or demonstrations of functional relations within one or more studies. However, for relatively newer interventions (e.g., ESDM, ITTT), additional research is necessary, especially data related to generalization and maintenance of communication skills. Long-standing interventions such as EMT and PRT are supported by a substantial number of studies, but research is ongoing, with studies focused on better understanding and refining each approach. See Table 12.1 for a summary of each intervention.

Alternative and Augmentative Communication

Young children with or at risk for disabilities may not develop functional speech during early childhood, even after participating in an intensive oral language intervention; thus teachers and practitioners are tasked with seeking alternate modes of expressive communication for children. An often overlooked area for improving expressive communication in young children in typical settings is using some form of alternative and augmentative communication (AAC). Unfortunately, AAC is often seen as a "last resort," typically introduced long after attempts to promote oral language have failed (Romski & Sevcik, 2005, p. 178). AAC refers to teaching a child to use "manual signs, communication boards with symbols, and computerized devices that speak" and can be divided into two categories—(1) unaided and (2) aided AAC (Romski & Sevcik, 2005, p. 179; Romski, Sevcik, Barton-Hulsey, & Whitmore, 2015). Unaided AAC refers to intervening on nonverbal means of communication in young children, including gestures, manual signs, and American Sign Language (ASL). Aided AAC refers to using a device or other external supports to improve expressive communication. Often highlighted in the AAC literature is that using aided or unaided AAC to promote expressive communication in young children may lead to increases in oral language and does not lead to deleterious effects in oral language (Branson & Demchak, 2009; Romski et al., 2015). In addition, Branson and Demchak (2009) reported that, at least initially, aided devices might lead to improvements in oral language in toddlers with developmental disabilities. The AAC literature is wide ranging; reviewing all the AAC options available to young children is beyond the scope of this chapter. This section will highlight some of the more well-known and studied unaided and aided AAC technologies. In addition, many of the previously mentioned interventions, such as milieu teaching, may be used when transitioning a child to unaided or aided AAC.

Sign Language

Sign language includes a broad and wide-reaching literature base that has been used with a variety of young children with or at risk for disabilities to improve expressive communication (Branson & Demchak, 2009; Romski et al., 2015). Although the literature on this topic is vast, we want to highlight a few considerations when selecting sign language as an appropriate form of communication for young children. First, consider if a child has the adequate fine motor skills to successfully produce signs, and second, ensure that social partners are trained to understand the meanings of signs that will be used by the child (Romski & Sevcik, 2005). As with many of the unaided and aided technologies, we recommend working closely with a speech-language pathologist or related professional when considering sign language for young children with or at risk for disabilities.

Table 12.1 Early childhood communication strategies and interventions

Intervention/strategy	Description
Environmental arrangement	Planned modifications or alterations to a child's environment to promote interest in age-appropriate materials and activities, as well as provide natural cues for communicative behaviors.
Milieu teaching	A process of embedding opportunities to communicate during typical activities and using behavioral methods of instruction to promote communicative behaviors (i.e., modeling, mand model, time delay, incidental teaching).
Modeling	An adult presents an opportunity to communicate and models the correct form of an oral language target. The child is reinforced with access to a related preferred material or activity.
Mand model	An adult interrupts an ongoing activity, asking a non-yes-or-no question or providing a directive to communicate. If the child does not respond or responds inappropriately, the adult provides a model prompt. The child is reinforced with continuation of the interrupted activity.
Time delay	An adult withholds access to a preferred material and waits a specified delay for the child to respond. If the child does not respond or responds inappropriately, the adult provides a model prompt. If a child responds independently to the time delay or to the model prompt, they receive access to the preferred material.
Incidental teaching	An adult uses an environmental arrangement strategy to promote an initiation from the child. Following an initiation, an adult attempts to expand the child's communicative behavior using a model prompt, the mand-model procedure, or time delay. The child receives access to the preferred material whether their behavior is independent or prompted.
Contingent imitation	A responsive interaction strategy where an adult imitates a child's communicative behavior. This strategy is typically used to promote turn taking between an adult and child and commonly interrelated with expansions.
Expansions and recasts	Expansions involve an adult imitating a child's spontaneous communicative behavior and adding additional input. Recasts refer to an adult restating a child's communicative behavior by modeling the correct grammatical form.
Video modeling	An adult presents a video of a person or persons demonstrating target communicative behaviors. The expectation is that a child will imitate the model during related activities. Video models may be used in isolation or as part of a prompting hierarchy.
Multicomponent interventions	
Early Start Denver Model	A manualized intervention for training parents to implement strategies during typical activities to promote increased communication, language, and play behaviors in young children with ASD.
Early Social Interaction	A comprehensive intervention where therapists coach parents at home and in community activities to implement strategies to promote social communication skills in their toddlers with ASD, as well as increase engagement in age-appropriate activities.
Enhanced milieu teaching	A play-based intervention where adults (e.g., parents/caregivers) are trained to use responsive interaction strategies and milieu teaching interventions to promote oral language in young children with disabilities.
Hanen: *It Takes Two to Talk* and *More Than Words*	Parents/caregivers participate in small group trainings where they are taught to use responsive interaction and modeling strategies. *It Takes Two to Talk* (ITTT) and *More Than Words* (MTW) are used to promote communication skills in children, with ITTT designed for young children with language delays or disorders and MTW for young children with ASD.
Joint attention intervention	A systematic training where parents/caregivers are taught methods to promote shared attention with their young child with ASD. Although not directly targeted, oral language is assessed throughout sessions.
Pivotal response training	An intervention approach that targets improving pivotal behaviors in children with ASD. Pivotal behaviors refer to child behaviors that, when targeted, are likely to lead to improvements in related social and communication skills, along with promoting increased independence. Pivotal response training typically involves some form of environmental arrangement and modeling to promote oral language in children.

(continued)

Table 12.1 (continued)

Intervention/strategy	Description
Prelinguistic milieu teaching	A comprehensive intervention designed to promote intentional communication and vocalizations in young children with developmental disabilities. Typically, parents/caregivers are trained to use environmental arrangement strategies to promote communicative behaviors, along with adult prompts and reinforcement.
Responsive interaction intervention	A collection of strategies (e.g., following the child's lead, promoting turn taking) designed to promote positive interactions between parents/caregivers and their child. It should be noted that adults do not use prompts to promote communicative behaviors.
Augmentative and alternative communication	
Picture exchange communication system (PECS)	A manualized intervention where children with disabilities, especially those with ASD, are initially trained to exchange pictures, photographs, or objects affixed to cards for purposes of requesting preferred materials or activities. Children move through six phases of instruction, with each phase targeting more advanced forms and functions of communication with a social partner.

Speech-Generating Devices

Rispoli, Franco, Van Der Meer, Lang, and Camargo (2010) conducted a review of speech-generating devices and found that many studies with young children used single-switch or micro-switch devices, especially for those who never or rarely displayed functional speech; additional identified devices were the DynaVox, Go Talk, and AlphaTalker. Following instruction using speech-generating devices, the majority of data indicated increased expressive communication in young children; inconclusive data was typically related to methodological limitations. Branson and Demchak (2009) reported similar findings. Criticisms of speech-generating devices are typically related to usability/portability, especially related to children meaningfully and actively participating in age-appropriate activities with same-age peers and caregivers (e.g., cumbersome due to size; McNaughton & Light, 2013).

Portable Technology

Advancements in mobile technologies, such as smartphones and tablets, have increased the utility of aided AAC in typical settings, especially in dynamic environments such as the community (e.g., grocery store, municipal playground) and preschool classrooms (Ayres, Shepley, Douglas, Shepley, & Lane, 2016; McNaughton & Light, 2013). This technology has the potential to increase access and reduce stigma; however, it is important that the emphasis stays on communication, not on technology (McNaughton & Light, 2013). A number of software packages are available for tablets, such as an iPad (e.g., Proloquo2Go), with promising results (e.g., Hill & Flores, 2014), but additional data assessing generalization and maintenance of communication skills are needed (Alliano, Herriger, Koutsoftas, & Bartolotta, 2012). Also, initial studies on the use of visual scene displays have shown promise as a context for interaction and communication with young children with complex communication needs (Wilkinson, Light, & Drager, 2012); additional research is necessary before specific recommendations can be made.

Pictorial Communication Systems

Arguably, the most well-known pictorial communication system is PECS (Bondy & Frost, 1994), which is a manualized intervention that teaches children to exchange a picture or photograph to request or share information with social partners. PECS is considered an evidence-based intervention for improving expressive communication, especially for children with ASD (Wong et al., 2014). There are six phases of instruction: (1) basic picture exchange to request, (2) persistence to request when social partner is further away, (3) discriminate between multiple pictures, (4) use a sentence strip to request, (5) answer questions, and (6) comment to a social partner (Charlop-Christy & Jones, 2006). PECS has been compared to PMT, which focuses on intentional communi-

cation such as gestures, as well as PRT, which typically focuses on oral language development (Schreibman & Stahmer, 2014; Yoder & Stone, 2006a, 2006b). When compared to PMT, PECS was more likely to lead to increases in spontaneous oral language, but these effects were mixed when children did not readily display object exploration (Yoder & Stone, 2006a, 2006b). PECS and PRT were relatively equal regarding development of oral language; Schreibman and Stahmer (2014) recommend additional research regarding long-term effects as they relate to generalization and maintenance of oral language.

Summary

AAC offers parents/caregivers, teachers, and researchers multiple options when considering if additional supports are necessary to remediate delays or supplement development of oral language in young children with or at risk for disabilities. AAC should be considered as a viable option, along with interventions that specifically target oral language (e.g., EMT, PRT), when selecting an intervention for improving expressive communication, especially oral language (Branson & Demchak, 2009; Romski & Sevcik, 2005; Schreibman & Stahmer, 2014). Also, aided AAC may be most beneficial when beginning a communication intervention with young children who display delays in speech and language development (Branson & Demchak, 2009). Regardless of the type of AAC system used, it is important that systematic and intentional instruction is used to teach the child and caregivers how to use the system and then to continue to provide instruction to expand communication skills. A system, device, or software package alone is not the answer to improved communication—but providing an appropriate mode for communication is an essential step in intervention for young children with significant communication needs.

Instructional Context

Many of the intervention practices and multicomponent interventions discussed in this chapter have been implemented in varied contexts (e.g., clinics, homes, schools, and community settings) with various communication partners (e.g., interventionists, teachers, parents/caregivers, and peers). Examining and using interventions that align with recommended practices for young children with or at risk for developmental disabilities to embed communication instruction into natural environments are important in supporting meaningful communication outcomes (ASHA, 2008; DEC, 2014). Generalization can be systematically addressed throughout intervention when communication is taught within the routines and activities in which the child needs to communicate and with the people for whom the child typically would communicate. In home and school settings, parents and teachers can embed systematic instruction into everyday routines and activities. Instruction is planned within the typically occurring activity without significantly altering the routine. For infants and toddlers in home settings, this approach is typically referred to as routine-based intervention (McWilliam & Scott, 2001) or family-guided routine-based intervention (Woods, 2005). In preschool settings, this approach is often referred to as embedded instruction and shares many features with incidental teaching (Snyder et al., 2015). Within both settings, parents and teachers are often coached to provide the intervention, but the majority of research has focused on parent-implemented interventions.

Parent-Implemented Interventions

Systematic reviews of parent-implemented communication interventions have shown that parents can implement communication intervention strategies and that children can make targeted communication gains (Law, Garrett, & Nye, 2004; Roberts & Kaiser, 2011). Within parent-implemented interventions, it is important to examine the systematic procedures to teach/coach the parent, the parents' use of intervention strategies, and child outcomes. Within that triadic framework, it is also critical to explore fidelity at the level of the interventionist and parent (Barton & Fettig, 2013; Lieberman-Betz, 2015). The extent of child outcomes is dependent on parents using tailored intervention strategies at a frequency that supports multiple

learning opportunities, which is first dependent on the process used to teach the parents. Therefore, all parent-implemented interventions are not equal. Beyond fidelity, there are also differences in the role of parent decision-making, intervention strategies used, and the extent to which the routines used were guided by the family's typical participation.

Implications

Young children with disabilities are more likely than their peers with typical development to display communication delays (McCauley & Fey, 2006). In the early stages of development, young children may display difficulties recognizing that others mediate access to preferred materials and social interactions. Also, children may not readily use prelinguistic communication to share attention with their parents/caregivers (McCathren et al., 1999). As children progress through their early childhood years, additional challenges related to oral language and subsequent development of more sophisticated conversational skills might emerge, especially as children enter daycare or preschool programs (Crais & Roberts, 2004). Regardless of the point in a child's life where others recognize that exceptionalities may be present, helping parents/caregivers, along with early childhood teachers and practitioners, implement evidence-based interventions is critical for a child's long-term success, not only in early childhood but across their lifespan (Odom & Wolery, 2003). In this chapter, a number of interventions were reviewed; in the following sections, we provide implications for practice and research, first highlighting how parents/caregivers or early childhood educators might plan to intervene with young children, followed by recommendations for future research.

Selecting Communication Targets

Planning to remediate communication delays is a daunting task, but with careful planning that includes familiarity with typical communication development and the current evidence base, persons who work with families or early childhood educators can assist in creating an effective program plan likely to improve a child's communication skills. We first want to highlight that while understanding typical communication development is highly recommended, first and foremost, functional communication skills should be the focus on any intervention plan. Functional communication refers to behaviors that are immediately useful to the child, meaning they can clearly communicate wants and interests to others with whom they interact on a day-to-day basis (Kaiser & Grimm, 2005; Odom & Wolery, 2003; Wolery et al., 1992). Although some of the reviewed interventions focused on various forms of expressive communication, common across almost all interventions was the goal of improving and subsequently increasing the complexity of a child's expressive communication. Along with language complexity, it is important to target increasing frequency of communication and expanding to additional communication functions. When creating a program plan, adults should consider the target child's age, especially the forms of communication same-age peers with typical development use, and use that as guide for selecting expressive communication targets.

Children who display difficulties recognizing that their behavior leads to pleasant consequences should receive ample opportunities for adults to reinforce (or shape) any potential communicative behavior, regardless of the form (e.g., gesture, vocalization), until the child readily recognizes the impact their behavior has on the environment. As children make progress, adults should begin to target specific forms of communication, potentially beginning with prelinguistic forms of communication, while reinforcing any approximations of vocalizations. At this point, we want to stress that if children are displaying difficulties imitating other physical or verbal models, then a specific plan to remediate this delay should be implemented. When children are verbally imitative and/or are beginning to use approximations for words, adults should focus their efforts on improving oral language. We also want to stress that if children are displaying difficulties with prelinguistic com-

munication or oral language, then unaided or aided AAC, such as PECS, should be considered. If adults choose to incorporate AAC in an intervention, it is important that the alternative form of expressive communication be reinforced, instead of requiring the child to use the alternative form plus a vocalization of some kind (frustration and problem behaviors might arise). Adults may choose to transition from an alternative form of expressive communication to a more traditional oral language intervention as children begin to display spontaneous oral language. Adults should select the most appropriate form of expressive communication that leads to successful, independent communicative behaviors in children.

Environmental Considerations

A child's environment provides many natural cues for communication. A child may miss opportunities for communication because they do not readily recognize under what conditions to communicate. Also, an adult may simply always anticipate a child's wants and needs and thus provide a preferred item or activity without allowing the child an opportunity to communicate (e.g., child is standing near an unopened toy box and the adult immediately opens it for them). Regardless of the reason, when planning to remediate communication delays, adults should utilize the physical and social components of a child's environment as a first line of support for promoting spontaneous communication under typical conditions.

Environmental Arrangement

A number of environmental arrangement strategies are available for promoting prelinguistic communication and oral language. First, adults should select an environmental strategy or strategies that are likely to promote the intended function of a child's expressive communication (oral language to request versus comment). These strategies are highlighted in a previous section of this chapter. Second, adults should use these strategies to highlight under what conditions a child should expressively communicate (e.g., ask for lunchbox at the beginning of lunch time in the classroom). When possible, environmental arrangement strategies should be utilized by indigenous implementers in typical environments, which will increase the likelihood of children generalizing communication skills across persons, settings, and materials.

Age-Appropriate Materials

It is imperative that adults use age-appropriate materials when intervening with young children. Also, adults should include a variety of age-appropriate materials and activities when planning to provide opportunities for children to expressively communicate. After repeated exposure, young children are likely to lose interest in materials and activities, even when adults incorporate their most highly preferred toy during a session. Selecting age-appropriate materials might be problematic for some parents/caregivers and early childhood educators who work with children with moderate to severe disabilities. For example, a preschool child with ASD and moderate intellectual disability may prefer cause-effect materials designed for infants (e.g., pop-up toys). If this occurs, adults should select materials that lead to the same type of response but are designed for children who are 4–5 years of age versus those who are 9–12 months old.

Responsive Adult Behaviors

In conjunction with using environmental arrangement strategies and age-appropriate materials, adults should engage in behaviors that promote appropriate and reciprocal interactions with children. Many of the interventions reviewed in this chapter included some form of responsive adult behaviors, most of them rooted in the RII and social interactionist literature, which are interventions designed to promote positive interactions between adults and children. This approach provides a foundation for embedding natural opportunities to communicate during typical activities. Responsive adult behaviors include, but are not limited to, (a) promoting social turn taking (responding to a child's expressive com-

munication and waiting a few seconds for a response from the child), (b) promoting turn taking with objects (like social turn taking, responding to a child's actions on objects by engaging in similar actions and waiting a few seconds for a response), (c) following a child's lead (waiting for a child to initiate to materials and activities and joining in their play), and (d) expanding on any communicative behavior or actions on objects (as children display unprompted actions, adults repeat and add to their verbalizations or actions by providing models of more advanced forms of communication or play behaviors). It is worth noting that each of these behaviors occurs in absence of an adult prompt; they are simply used to promote positive interactions and engagement. In addition, using responsive behaviors across a child's day aligns with current recommendations for early childhood environments (DEC, 2014; Odom & Wolery, 2003).

Adult Prompts and Maintaining Motivation

As we progress through these recommendations, it should become more apparent that planning a program to remediate communication delays is a layered process of first determining what forms of expressive communication to target and at what point to intervene, followed by multiple environmental considerations to promote age-appropriate communication in typical settings, as well as engaging in behaviors likely to promote positive interactions with children. Within this framework, adults plan systematic opportunities to teach children more advanced forms of expressive communication.

Prompts

Each of the interventions we reviewed typically included some form of adult behavior that showed children how to respond. Showing a child how to respond should not be confused with showing a child when to respond. Showing a child *when to respond* refers to providing opportunities for the child to communicate under certain antecedent conditions (e.g., child needs a fork to eat dinner; parent has access to the fork), whereas showing the child *how to respond* refers to modeling a behavior or providing some clue to the child as to what behavior will lead to a pleasant consequence (e.g., snack, tickle; Wolery et al., 1992).

Almost all of the interventions included milieu teaching to promote prelinguistic communication, oral language, or some form of expressive communication that included unaided or aided AAC and were used in isolation or as part of a prompting hierarchy. Milieu teaching includes interventions that use varying levels of intrusiveness—model prompts are considered the most intrusive while time delay is less intrusive. As highlighted in this chapter, typically, adults should initially use more intrusive prompts and, based on the child's behavior, systematically transition to less intrusive prompts over time. When selecting which prompt or prompts to use, we recommend reviewing the literature to identify studies that included participants who display similar pre-intervention skills to the child with whom intervention procedures will be used. The reviewed interventions in this chapter should be considered a starting point for understanding the focus and purpose of available interventions for young children with or at risk for disabilities.

Maintaining Motivation

Many of the comprehensive interventions include strategies to encourage children to persist with using more advanced forms of expressive communication, especially oral language. The most common strategies are as follows: (a) include a number of age-appropriate materials and plan a variety of activities to reduce the likelihood that children will become satiated on a single item or activity (e.g., Hemmeter & Kaiser, 1994; Ingersoll, 2010; Koegel, Koegel, Green-Hopkins, & Barnes, 2010; Venker, McDuffie, Weismer, & Abbeduto, 2012), and (b), common with PRT interventions, intersperse opportunities to use acquired forms of oral language to request items and activities (e.g., Schreibman, Stahmer, Barlett, & Dufek, 2009).

Future Research

To say that progress has been made in communication interventions for young children with or at risk for disabilities is an understatement. Early childhood researchers have conducted many studies evaluating various combinations of components for improving communication in young children, which have influenced current recommendations for the field. The field recognizes the importance of parents/caregivers and other related individuals implementing interventions in typical settings, utilizing strategies likely to promote active engagement and meaningful communication in young children. Although this body of work is impressive, additional questions and interventions require additional study—such is the nature of the research.

A disproportionate amount of studies have been conducted in clinic settings, and to some extent homes, but interventions conducted in more dynamic environments, such as centers in preschool with peers present, are lacking. Future studies should conduct and evaluate the impact of interventions in these less studied but often typical environments for young children. This line of inquiry is especially important given the need to promote generalization and maintenance of communication skills across settings and persons. Closely related to this recommendation is the importance of assessing fidelity of implementation, especially manualized interventions that involve multiple considerations for parents/caregivers and early childhood educators.

Conclusion

Promoting meaningful, functional communication in young children with or at risk for disabilities is critical for a child's long-term success, not just in early childhood but also into adolescence and adulthood (Kaiser & Grimm, 2005; Wolery et al., 1992). Communication skills provide children a means to act on their environment, expressing wants, needs, and interests. Developing age-appropriate communication skills, especially expressive communication such as oral language or aided AAC, is closely tied to other developmental areas such as social and academic skills (Dawson et al., 2012; Reichow & Wolery, 2008; Warren et al., 2011). Within the communication literature are a number of well-studied intervention approaches, including systematic procedures such as milieu teaching and more comprehensive programs like EMT and PRT. Regardless of the intervention selected, adults should provide opportunities to communicate across a child's day during typical activities, using responsive interaction strategies to promote positive interactions among children and their parents/caregivers, teachers, and related individuals. As the field continues to grow, early childhood researchers should be at the forefront, continually modifying and identifying the most effective and efficient communication interventions for young children.

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Motor Skill Acquisition for Young Children with Disabilities

13

Paddy C. Favazza and Gary N. Siperstein

We have long known the benefits of early motor activities for young children's motor skill development and other developmental domains (Iverson, 2010; National Center for Physical Development and Outdoor Play, 2010). Not only is motor skill development important in and of itself, but it has been linked to social, language, and cognitive development as well. And while motor skills develop naturally for most typically developing preschoolers, young children with disabilities often experience delays in this area. Therefore, it is essential to intervene, providing direct and intentional motor programs for children with disabilities during their early years when fundamental motor skills such as locomotion and manipulation develop. These skills form a foundation for skill development in other developmental areas.

In this chapter we will present an overview of motor development including a theory of motor development, motor challenges for children with disabilities, myths about motor development, and research that clearly demonstrates that high-quality motor programs can enhance motor abilities and overall development. In addition, using a developmental framework, we will present key features of high-quality motor interventions with examples of motor programs that exemplify these features. Lastly, we will discuss the implications for practice and policy given our current knowledge in the area motor skill development.

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Theory of Motor Development

Regardless of culture or country of origin, parents around the world see signs of early motor development when their child rolls over, sits independently, reaches and grasps objects, crawls, and walks. Over time they see motor skills becoming more refined as their child moves in increasingly more complex ways. Indeed, motor development comprises the changes in motor behavior over the lifespan and includes gross motor skills, fine motor skills, muscle tone, and the child's sensory systems.

Gross motor development refers to children's progressive ability to move about their environment using their large muscles. They include overall body coordination, balance (while moving or while stationary), agility, and strength. Early on we see infants and toddlers using their large muscles in their torso, arms, and legs to roll over, sit, crawl, stand, and walk, which enables the child to explore his/her environment by moving in increasing more efficient ways. Later, children use their gross motor abilities when undertaking everyday tasks in seated position such as eating, dressing,

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or toileting and when completing tasks in a standing position such as getting out of bed, climbing the stairs, or walking to school. *Fine motor development* refers to children's progressive ability to manipulate objects in their environments using their small muscles to grasp and release objects and modulate or change grip strength needed to manipulate objects. Fine motor skills refer to dexterity and finger speed, wrist flexibility, and steady or fluid use of fingers and hands. These skills are also important for tasks such as eating, brushing teeth, and dressing as well as school and play activities such as drawing, writing, cutting, throwing, and catching.

The development of gross motor and fine motor skills follows a somewhat predictable sequence within the child, from top to bottom and from inner body to outer body. For example, early on, infants learn to lift their head and turn their head side to side. Each time they do this, they are strengthening their muscles as they move their head with smoother, more fluid movement so as to gain a better view of the world around them. In the same way, children later develop the use of their hands and, still later, their feet, becoming increasing more proficient at manipulating objects and using their feet to walk, run, jump, and hop. These examples illustrate that young children's motor development is occurring from top to bottom. In addition, children tend to gain the use of their inner body (trunk control, arms, legs) before their outer body (hands, fingers, feet). For example, young children learn to move their arms to reach for an object, and later, they develop more proficient use of their fingers to grasp and release objects.

The progression in motor skill development is also influenced by two important factors: the child's *muscle tone* and *sensory system*. Muscle tone refers to a child's muscle development as well as their effective use of muscles. For example, strong muscle tone is initially needed for an infant to lift his head and control head rotation as well as for upright sitting, crawling, standing, and so on. In addition, the child's sensory system, especially the vestibular and proprioceptive systems, plays a major role in motor development. The vestibular system, located in the inner ear, sends input via the nervous system that controls eye movement, which enables the stabilization of eyes during head and body movement and ultimately aiding in balance and sense of spatial orientation. At the same time, the brain is receiving messages or input from the proprioceptive system, which involves the inner ear, muscles, joints, and tendons, allowing the brain to understand where the body is located and coordinate the use of muscles, joints, and tendons to continually maintain balance as a child's position and posture change. These two systems work in tandem to control motor and muscle activity to ensure the body position is balanced, regardless of the body's position. For example, when a child is learning to walk, she may be a bit wobbly, as she tries to maintain balance while moving forward. To maintain an upright position, the child may sway to the left or right, extend her arms, or bend her knees to maintain balance needed for standing and walking. In this example, the vestibular and proprioceptive systems utilize the adjusted positions of the arms, legs, and trunk to enable the child to gain balanced and coordinated movement.

Taken together, early motor progression is influenced by a child's gross motor abilities, fine motor abilities, the sequence of motor development, the child's muscle tone, and vestibular and proprioceptive systems, all of which work in tandem to support motor movement. It becomes clear that motor development is a complex and dynamic progression of motor abilities, which may not be as simple as it appears to the parent or even teachers. But as we turn our attention to the sequence of motor skill acquisition, we see how each of these interconnected aspects of motor development (gross motor skills, fine motor skills, muscle tone, sensory system) steadily progresses and shapes the child's motor skill acquisition during the childhood years (Clark, 1994, 2005; Payne & Isaacs, 2012).

Clark's "mountain of motor development" (Fig. 13.1) represents one of the most commonly accepted conceptualizations of the sequential and cumulative progression in acquiring motor skills (Clark & Metcalfe, 2002) and is consistent with

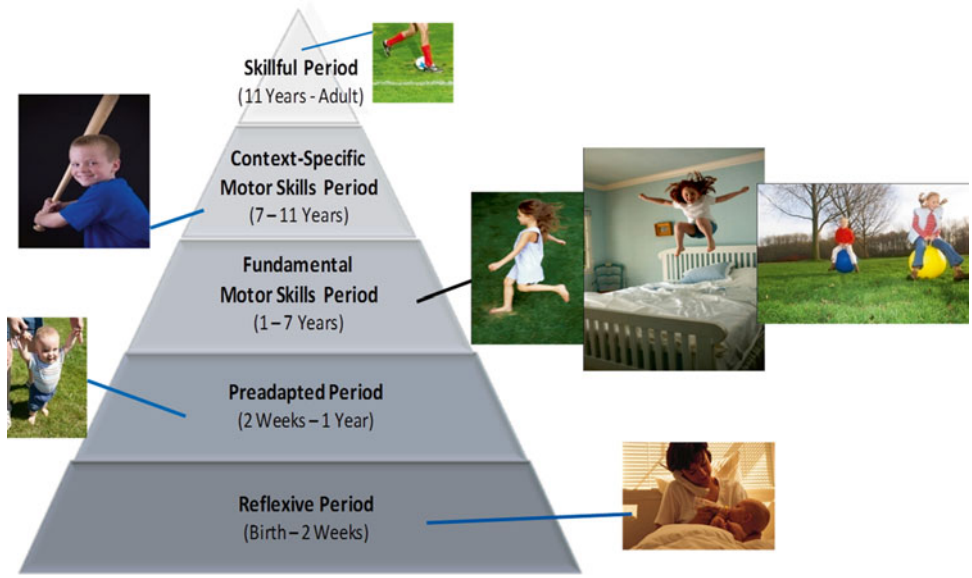

Fig. 13.1 *Clark's pyramid of motor development. Source: Adapted from Fig. 1, in Clark, J. E., & and Metcalfe, J. S. (2002). The mountain of motor development: A metaphor. In J. E. Clark & J. Humphrey (Eds.), Motor development: Research and reviews. Reston, VA: NASPE Publications*

Lerner's stage approach to development (Lerner, 1976). During the reflexive period (birth–2 weeks), motor movement is characterized by stereotypical movement elicited by specific stimuli such as the oral motor movement of the sucking reflex. The preadaptive period (2 weeks–1 year) is characterized by the attainment of new object manipulation skills needed for independent feeding (e.g., eye–hand coordination, grasp and release needed to hold a bottle, cup, or finger foods) and intentional locomotion skills such as creeping, crawling, cruising, and walking. The fundamental motor skill (FMS) period (1–7 years) includes the development of more sophisticated motor skills in both locomotion and manipulative coordination, which serve as a basis for later skills (e.g., walking and running, hopping, jumping, throwing, catching, kicking). The context-specific motor skill period (7–11 years) involves the refinement and elaboration of motor skills and often entails the complex combination of movements (e.g., run and catch at the same time), as well as qualitative cognitive shifts (e.g., learn the rules of games). The skillful period (11–adulthood) involves a young person or adult in a motor or sports environment whereby they gain very specific refinement of skills to achieve mastery (e.g., golf swing, swimming strokes, etc.).

As can be seen in Fig. 13.1, the motor skills learned during the early years correspond to the FMS development period (i.e., locomotion skills, play game manipulative skills, fine motor manipulative skills). Moreover, the acquisition of skills depends on and builds upon the motor skills in the previous period. For example, a toddler becomes proficient at walking (preadaptive period), and then those locomotion skills are honed further and combined with other skills as he learns to run with greater ease, run and stop quickly or change directions, run and jump, and run and catch or kick a ball (FMS period). In essence, the early development of motor skills form the foundation for later skill development and participation in physical activities, enabling children to control their bodies and manipulate their environment to perform complex movements used in everyday activities.

It is important to note that the development of these FMSs is not maturationally driven but requires environmental support and multiple opportunities to acquire and hone more efficient and effective skills. While motor development

occurs among most children, fluid motor development does not occur for all young children. Many young children with disabilities may experience deficits with balance/stability, gross and fine motor abilities used for locomotion, and object manipulation, all of which negatively impact their motor abilities (Goodway, Crowe, & Ward, 2003; Pan, Tsai, & Chu, 2009). In the next section, we will highlight three unique populations of young children who are recognized as having deficits in motor abilities that warrant attention during the early years: children with autism and developmental delays, children with intellectual disabilities, and children who are disadvantaged.

Children with Autism and Developmental Delays

In a meta-analysis on motor abilities of children with autism from 83 studies, Fournier, Hass, Naik, Lodha, and Cauraugh (2010) found that children with autism had challenges with motor coordination, arm movements, and gait. In addition, they have challenges with proprioception (their sense of their body's position and orientation as they move), which impacts gross motor abilities (Redlich, 2005). Several studies also confirmed that young children with autism have deficits with fine motor skills (Ozonoff, Heung, Byrd, Hansen, & Hertz-Picciotto, 2008; Pan et al., 2009; Staples & Reid, 2010). More recently, Duchan and Patel (2012) found that at least 75 % of children with autism have challenges related to muscle tone, posture, manipulative abilities, and coordination, all of which impact motor skill acquisition. Taken together, these motor challenges indicate a need for intentional motor skill interventions to ensure that the FMSs (Clark, 2005) are supported, especially during the early years.

Uzgiris (1999) theorized that an underlying factor that may contribute to these motor deficits is the absence of motor imitation, which is considered one of the earliest learning strategies for social, language, and cognitive development and a predictor of later play skills in children (Stone & Yoder, 2001). This was substantiated by McDuffie et al. (2007), who found that 2- and 3-year-old children with autism lacked the capacity to imitate behaviors, which had a negative impact on their motor as well as social and language development. Results from this collection of studies are consistent with Gowen and Hamilton's (2013) review of motor deficits found in young children with autism, confirming the presence of challenges in motor imitation, motor planning, motor coordination, balance, locomotion, and object manipulation. Likewise, in studies of young children with developmental delays (DD), Provost, Heimerl, & Lopez, (2007) and Provost, Lopez, & Heimerl (2007) found that both children with autism and DD exhibit significant motor impairment in locomotion, object manipulation, and stationary skills (such as balance) when compared to same-age peers without disabilities.

Children with Intellectual Disabilities

Similarly, children with intellectual disabilities (ID) exhibit challenges with motor abilities. Vuijk, Hartman, Scherder, and Visscher (2010) found that children with ID performed significantly low in motor abilities, with the most notable deficits in fine motor skills (manual dexterity, ball skills) and balance. Likewise, when compared with typically developing children, Westendorp, Hartman, Houwen, Smith, and Visscher (2011) found deficits in both fine motor skills and gross motor skills in children with intellectual disabilities and stressed the importance of providing attention to the development of locomotion skills and object control skills in young children with ID.

Hartman, Houwen, Scherder, and Visscher (2010) identified one possible contributing factor to motor deficits in young children with ID when they compared the motor abilities (locomotion and object manipulation) and executive functioning skills (planning, decision-making, problem solving) of children with ID to children without ID. The findings indicated that children with ID performed significantly lower on all tests of

motor abilities and executive function with a positive correlation between executive functioning and motor abilities (locomotion and object manipulation). That is, children with the low motor scores had lower executive functioning scores, and children with lower object control scores had longer execution times (took longer to perform the motor tasks). Taken together, the findings highlight the interrelatedness of motor abilities and executive functioning, suggesting the need to address both during the early years. Similar to children with autism and intellectual disabilities, there are other populations of children who do not have a disability diagnosis but who have notable deficits in motor abilities.

Children Who Are Disadvantaged

In a review of the relationship between socioeconomic status (SES) and child development, Bradley and Corwyn (2002) present a comprehensive and compelling overview of the negative impact of poverty on cognitive and academic attainment, socio-emotional development, and health. While several variables serve as moderators for child and family outcomes (i.e., family characteristics, resources), the general consensus is that children from a low SES background are at risk when they are young and the negative impact will be felt for years to come. For example, Goodway and Branta (2003) and Venetsanou and Kambas (2010) found a negative impact of low SES on motor development. McPhillips and Jordan-Black (2007) also confirmed the negative effect of low SES on motor, language, and reading abilities of over 500 preschool-age and elementary-age children. Collectively, these studies echo the findings from previous research on developmental impact associated with children from disadvantaged backgrounds (Bradley & Corwyn, 2002; Ginsborg, 2006; NICHD Early Child Care Research Network, 2005), making a strong case for motor skill intervention to address the needs of this at-risk population too.

A contributing factor to these findings can be found in the related research on physical activity of both children who are from disadvantaged backgrounds and those with disabilities. Simply put, young children with disabilities and those who are considered at-risk engage less in active motor play when compared with typically developing peers. For more discussion on this topic, see Barton's chapter on *Play* and the Brown et al. chapter entitled *Physical Activity and Young Children with Developmental Delays*. Given that active motor play is the primary context for honing motor skills and the context for learning in general, motor deficits are exacerbated by more sedentary behavior, increasing a child's risk for poor motor skill development, poor overall health, decreased self-esteem, and decreased social acceptance associated with inactivity (Fragala-Pinkham, Haley, Rabin, & Kharasch, 2005; Murphy, Carbone, & The Council on Children with Disabilities, 2008). This array of negative outcomes makes a compelling case for providing intentional motor skill programs, especially for children with disabilities and those from disadvantaged backgrounds.

Myths About Motor Development

There are several misconceptions or myths about motor development that are worth discussing before turning our attention to the connection between motor development and other developmental domains. One myth is that motor development is merely a series of milestones experienced in the same way by all children. What becomes clear from the previous section is that while motor development occurs in a general pattern for many children, there are wide variances in motor abilities. Motor skill development is shaped by both the strengths and challenges within the child (such as poor motor imitation, poor executive functioning skills associated with autism and ID, respectively). Moreover, motor development is shaped by the presence or absence of supportive opportunities to advance motor abilities needed by both children with disabilities and those from disadvantaged backgrounds.

Another myth is that motor milestones are universal and develop at approximately the same time among all children, as Clark's pyramid has

us believe. Rogoff (2003) shed some light on this myth with her extensive description of how the many aspects of one's culture can impact human development as she examined the traditional cultural aspects of gender roles, independence, and autonomy. Let us look at examples from diverse regions of the world that illustrate how cultural differences may result in variances in motor development.

In a Mayan village, boys as young as 8 or 9 hone their gross motor abilities as they cut and carry the family's wood, while young girls walk great distances, carrying their younger siblings and fetching water needed for cooking. These gender-related expectations provide early opportunities to utilize motor skills, and yet in many Western cultures, these expectations and early motor opportunities do not exist. In a Bolivian village, a 5-year-old walks 2 miles, balancing atop his head food or wares to sell at market, while a child of similar age from other countries may not be allowed to move independently until much later. These examples could accelerate the development of specific motor skills because of cultural expectations and views about independence, gender roles, and the need for young children to work to support the family. In stark contrast, far away in a Kenyan village, the cultural views of children with disabilities may serve to limit a child's motor skill development as a young child with intellectual disabilities may be restricted to an empty room in the home. In this culture, the expectations for children with disabilities are very limiting as the pervasive view is that they cannot learn or improve upon their limited motor, social, or language abilities. Not surprisingly, as the child ages, she has no language, social, or motor abilities, despite her capacity to develop all three (Favazza, Siperstien, & Ghio, 2014). These few examples illustrate that motor skill development is influenced by cultural expectations related to gender and child development and the opportunities they are given (or not given) which impact motor development. So while there is a general pattern to the developmental timing of specific motor abilities, children have culture-related influences that can accelerate or limit motor development.

A third myth is that if "critical periods" of development are missed, opportunity for development is lost forever. This myth was examined in the seminal and often quoted study of the Hopi Indians (Dennis & Dennis, 1940). They found that some infants are raised using the native tradition of tightly carrying the swaddled child on the mother's back in a cradleboard for the first 6 months of life, limiting the use of their hands and arms. They also found other infants were allowed to lay and sit on their beds, moving their arms and legs freely. The assumption was that the infants in their cradleboards would miss the critical period of motor development, when infants begin extensive motor movement of arms and legs, delaying and/or limiting their ability to walk. As it turns out, both groups of children walked roughly at the same time, dispelling the myth that missed or delayed experiences during "critical periods" limit motor development.

A fourth motor development myth is that increased motor development automatically leads to increased physical activity or vice versa that when children are engaged in play and physical activity, they will naturally become proficient in motor skill development (Goodway & Branta, 2003; Payne & Isaacs, 2012). In truth, all children are born with strengths and challenges. Some children may have talents in motor abilities, while others may have talents in their social and communication abilities. Therefore, as with all other areas of development, children need multiple opportunities to hone all of their abilities, including the area of motor development (Gallahue & Ozmun, 1998). And while motor skills are developed in the *context* of physical activity, increase in motor development does not naturally lead to increase in physical activity nor does increased physical activity automatically lead to strong motor skills. Opportunities for learning motor skills need to be intentionally supported, and opportunities for physical activity need to be intentionally provided (Brown, Pfeiffer, McIver, Dowda, Addy, & Pate, 2009).

Simply put, motor development occurs within a flexible temporal sequence and is influenced by a child's abilities or disabilities and the cultural

norms, which sometimes determine a child's early motor experiences. As we discuss in the next section, motor development can also be influential, enhancing or inhibiting development in other areas.

Connection Between Motor Development and Other Developmental Domains

During the early childhood years, there is rapid and simultaneously development and growth in young children in many areas such as communication, social, and cognitive development. Because of this rapid growth and development, it is important to understand the role that motor development plays for these developmental domains. Let us look at how FMSs (also referred to as the "building blocks" of motor development) are scaffolded from one period to the next, serving as a foundation for other areas of development (Gabbard, 2000; Payne & Isaacs, 2012) and setting the stage for school readiness.

Communication and Socialization

Motor skill development has been linked to communication and language development (Iverson, 2010; Oja & Jorimae, 2002; Piek, Dawson, Smith, & Gasson, 2008); understanding of spatial, temporal, and sequential concepts (Rapoport, van Reekum, & Mayberg, 2000); verbal fluency (Iverson, 2010; Wassenberg et al., 2005); and adaptive behavior skills (MacDonald, Lord, & Ulrich, 2013). When infants and toddlers turn their head or body toward someone speaking, crawl toward their parent, or raise their arms to be picked up, they are using motor movement to support early communication. Motor development can also impact social and emotional development as children develop social skills (Burdette & Whitaker, 2005; Provost, Heimerl, et al., 2007; Provost, Lopez, et al., 2007) or a sense of belonging and experience enhanced self-esteem and improved personal confidence (Calfas & Taylor, 1994; Dykens, Rosner, & Butterbaugh, 1998). For example, when children play on the slide or swing, they often engage in social interactions with others and, in doing so, become a part of the motor play activity using phrases such as "Look at me!, Push me!, and My turn!" These and other social exchanges serve to support social and emotional development in the context of motor play.

Cognition and Learning

When a child uses his locomotion and object manipulation skills to explore his/her environment, people, and materials, it provides stimulation that in turn leads to increased knowledge about their world. Research supports the connection between motor development and cognitive development with links to higher intellectual functioning (Ayers, 1972), pre-academic skills, and later cognitive performance (Piek et al., 2008). For example, using play equipment (cones, balls, Hula-Hoop, bean bags), children learn colors, shapes, and sizes. While lining up for a turn on the swing, they learn ordinal number words representing position (first, second, third) or use sequencing as they learn the steps to catching a ball (stand in ready position, hold hands out, eyes on ball, grasp thrown ball with hands and fingers, pull ball into chest). Through active engagement in motor play, they are learning pre-academic skills such as basic concepts (i.e., shapes, which are the precursor to learning letters and numbers) or sequencing tasks that will be used repeatedly in facilitating working memory and many other cognitive tasks. As children move, they explore their surroundings, are stimulated by the people and the objects, use both to actively engage in motor play, and, in the process, have the opportunity to develop a wide array of skills (see Fig. 13.2). Clearly motor play provides opportunities to hone not only motor skills, which in turn supports other developmental domains, all of which are vital to children's readiness to succeed in school (Bredekamp, 2005; Phillips & Shonkoff, 2000).

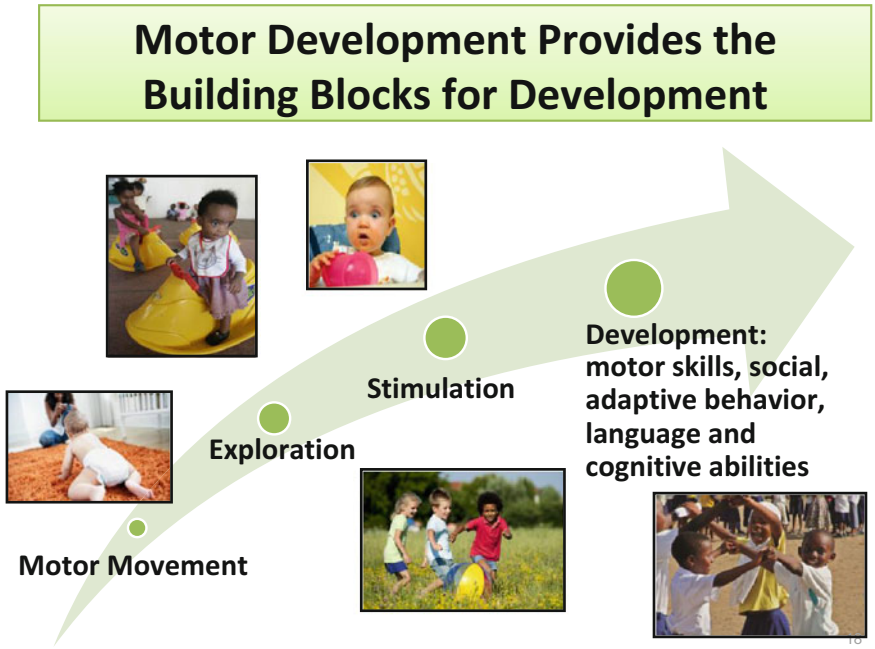

Fig. 13.2 Motor development serves as building blocks for development. Paddy created this

School Readiness

One might say that these developmental skills fall under the larger, broader umbrella of school readiness. While there are many definitions of school readiness, there is consensus that school readiness is represented by a combination of *interrelated skills* that cover a range of developmental domains that include the following: (1) physical well-being and motor development, (2) socio-emotional development, (3) language development, (4) cognitive skills (such as pre-math and pre-reading) and general knowledge, and (5) approaches to learning (Ackerman & Barnett, 2005; Howard, 2011; Kagan, Moore, & Bredekamp, 1995). For example, active participation in motor activities provides important opportunities for preschoolers to develop pre-reading, prewriting, and pre-math skills considered precursors to kindergarten readiness (Iverson, 2010; Oja & Jorimae, 2002). More recently, Becker, McClelland, Loprinzi, and Trost (2014) found that active motor play is associated with self-regulation and academic achievement in preschool children.

In sum, there is a growing evidence that links motor development to other interrelated areas of development such as social skills, language skills, and cognitive functioning, all of which influence school readiness and success in the classroom. Motor skill development facilitates participation in all aspects of the child's life. However, because of the motor challenges faced by children with disabilities and those who are from disadvantaged backgrounds, there is clearly a need for direct and intentional instruction of motor skills to support the motor development of young children, especially given the importance of motor skills for overall development. Simply put, many other areas of development depend on motor development as it impacts not only locomotion and object manipulation, but it is interrelated to language, social, and cognitive development.

Motor Skill Intervention

We have a good understanding about how motor skills develop, the myths about motor development, the unique motor challenges faced by young children, and the interconnectedness of motor development to other developmental domains and school readiness. But what do we know about the

effectiveness of motor skill intervention, the features that should be considered when selecting motor skill interventions, or the learning factors that need consideration when planning and implementing a motor skill intervention? This section will be focused on these important issues, which ensure that motor skill interventions reflect evidence-based practices and standards shaped by current professional guidelines.

Effectiveness of Motor Skill Interventions

There is a wealth of research demonstrating that the FMSs of young children with and without disabilities are amenable to change. This finding was confirmed in a meta-analysis of the effectiveness of preschool motor interventions that examined whether motor improvement for locomotion and object manipulation were similar across motor interventions and if there was a correlation between duration of motor interventions and improved FMS (Logan, Robinson, Wilson, & Lucas, 2011). The results of the meta-analysis confirmed that children who participate in motor skill interventions made significant improvements from pre-post on overall motor skills as well as gains on locomotion and object manipulation. Interestingly, the duration of the intervention was not significantly related to improvements on FMS. While this unexpected finding seems counterintuitive, the authors speculated that perhaps children reach a plateau in the development of the FMS after a period of focused instruction.

The conclusion drawn from this meta-analysis is that *intentional* motor skill interventions are effective at improving the FMSs of young children with developmental disabilities. It is also clear that these same gains in FMS do not happen for children who participate in only unstructured free play or recess. Rather, they need to be practiced with models and guidance by teachers and parents. These results have implications for the nearly 60 % of preschool-age children in the USA who are in preschool or early education centers (U.S. Department of Education, Institute of Education Sciences, 2009), many of which do not provide intentional motor skill intervention (Gagen & Getchell, 2006). The motor movement opportunities in early education settings need to include *intentional motor skill interventions* where children can learn all of the FMS through repeated practice *and* have multiple and varied opportunities to apply the motor skills learned in the context of ongoing motor play.

Evidence-Based Features of Motor Skill Interventions

Prior to implementing intentional motor skill interventions, it is important for teachers and practitioners to think about what to look for in selecting an evidenced-based motor skill program. In a meta-analysis of preschool motor interventions, Riethmuller, Jones, and Okely (2009) demonstrated the challenge of identifying evidenced-based motor skill interventions as they sought programs that possessed several key research indices such as (a) randomized design, (b) strong methodological qualities (e.g., comparable groups at baseline, documented fidelity to treatment), (c) valid measures with the individual child as unit of analysis, and (d) demonstrated effectiveness at posttest and follow-up. In addition, they sought to identify programs that possessed key intervention indices such as interventions that had (a) strong theoretical basis as evident by addressing all of the FMSs, (b) adequate duration and intensity of program, and (c) teacher/staff training and family involvement to support sustainability of outcomes. Only 17 studies of motor skill interventions met the criteria, and of these studies, less than 20 % of them possessed robust research as evidenced by high methodological quality. Subsequently, the authors made recommendations for preschool motor interventions, stressing that attention should be given to these key indices when selecting preschool motor skill interventions.

Factors to Consider When Planning Motor Skill Interventions

In addition to ensuring that motor skill interventions possess features that demonstrate evidenced-based practice, teachers and practitioners also need to think about the process by which learning

occurs so as to understand how to foster motor skills development. For this section, we turn to Newell (1986) who proposed that young children acquire motor skills through the interactions between the organism (child), the environment, and the task. Using this dynamic systems theory, we examine how learning occurs with three interacting factors: aspects of the child, the environment, and the motor task itself.

Aspects of the organism are in reference to the child. For example, if the child has a disability such as communication challenges, sensory deficits (vision or hearing), or cognitive challenges, it will influence the way in which instruction is provided. If the child has an easygoing or rigid temperament, it may impact the structure and strategies used. *Aspects of the environment* also impact instructional approaches. These could include the equipment (type and amount, appropriateness of size, and multisensory features), the space (large, small, noisy, cluttered, indoor, outdoors), or the people (number of adults and peers). *Aspects of the motor task* also impact instructional approaches. This includes considerations such as the motor movement needed for specific tasks (e.g., balance for hopping, visual tracking, and eye/hand coordination for catching) or motor activities that utilize specific motor skills. In essence, children acquire new skills through the interaction between the child, the environment, and the motor task.

Let us look at an example that illustrates how all three of these factors interact and influence a motor skill activity such as "human tunnel" (see Fig. 13.3). The successful completion of a "human tunnel" requires that a child go down on his hands and knees and hold that position, while other children crawl under the tunnel (made of several children side by side in kneeling position).

In addition to these motor movements, the ability to successfully complete this skill involves the interaction of child characteristics (cognitive understanding of the knee and the kneeling position, the ability to tolerate children in close proximity) and environmental factors (identification of a carpeted surface comfortable for kneeling, the noise level, the use of child motivators for desired behavior).

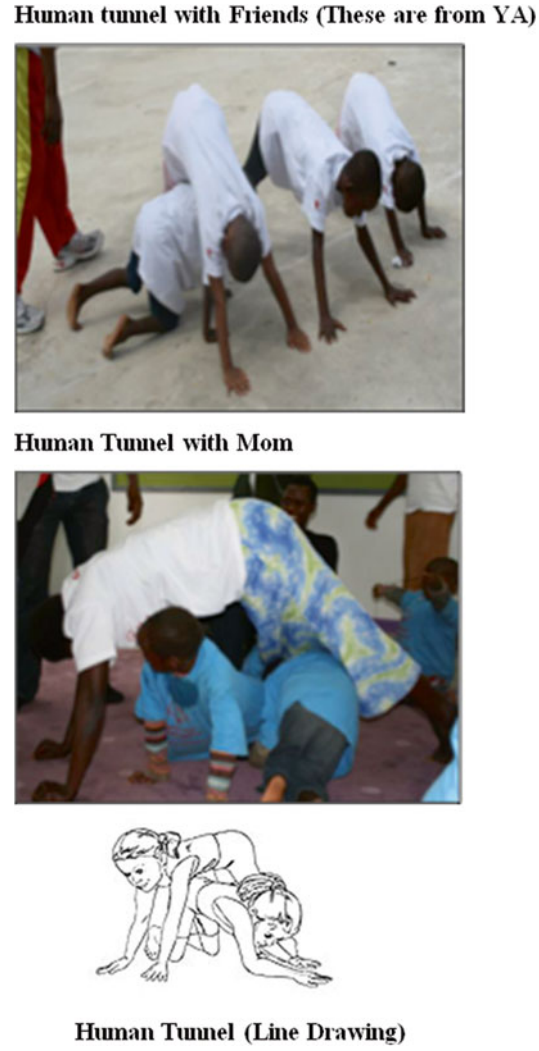

Fig. 13.3 Human tunnel with friends (these are from YA). Human tunnel with mom. Human tunnel (*line drawing*)

Therefore, factors related to the motor task (upper body strength, sustained kneeling position), the child (understanding of body parts and position, ability to tolerate the close proximity of others), and the environment (instructional approach, noise, carpeted surface) all influence the child's ability to successfully complete the motor activity and need consideration to optimize the motor outcomes of children as they participate in motor skill interventions, physical activities, and daily life. Now we turn our attention to the developmental framework and standards of National Association for Sport and

Physical Education (NASPE) and NAEYC, which are used to inform practice.

Professional Guidelines That Inform Motor Skill Interventions

While Riethmuller et al. (2009) and Logan et al. (2011) stress the need to utilize the professional guidelines to inform motor skill interventions, only a few states have a comprehensive preschool curriculum dedicated to health, motor, and physical activities (Barnett, Robin, Hustedt, & Schulman, 2003). Moreover, most preschools do not have motor skill programs that follow the requirements from the NASPE on appropriate practices in movement programs, and they are often led by teachers who lack both training and experience (Gagen & Getchell, 2006). Clearly, motor skill interventions should reflect the principles from the National Association for the Education of Young Children (DEC/NAEYC, 2009) and the recommendations of NASPE (2010, 2013) which have been carefully vetted by experts in early childhood, early childhood special education, and motor development specialist and which provide extensive information regarding planning and implementing high-quality motor skill interventions. Both organizations emphasize play as a context for learning, the need for interventions that are responsive to the developmental needs of *all* children, the need to provide interventions that includes the child's family and peers, the use of culturally responsive strategies, activities and equipment, and the provision of motor programs that address all developmental domains.

Lastly, because motor interventions provide a context for addressing child development in an integrated fashion as children acquire motor, social, communication, and cognitive skills (NASPE, 2010), the interventions need to be rooted in a developmental framework. A developmental framework *informs practice*, shedding light on the key features of motor skill interventions so as to optimize the impact on the child. In addition, a developmental perspective *focuses the attention and expectations of parents and teachers* on intentionally addressing the development of the whole child. As a result, interventions cannot be viewed simply as play as the developmental perspective *draws attention to the breadth of development* that is occurring in the context of motor skill intervention and *affects expectations for program outcomes*. The National Association for the Education of Young Children (DEC/NAEYC, 2009) identifies 12 basic principles that reflect the developmental perspective (see Table 13.1), recognizing the collateral benefits of motor programs on other areas of development. This is a critical point given the converging realities: the decrease in time allotted to motor play and physical activity (Elkind, 2007; Tucker, 2008); the need for evidence-based programs to support all areas of development (No Child Left Behind Act, 2001); the research on benefits of motor interventions on improvements in language and social skills (MacDonald et al., 2013); working memory, verbal fluency, and understanding of spatial, temporal, and sequential concepts (Jensen, 2005; Wassenberg et al., 2005); pre-reading, pre-math, and prewriting skills (Iverson, 2010; Oja & Jorimae, 2002); and self-regulation and academic achievement (Becker et al., 2014; Fedewa & Ahn, 2011). The need for motor skill interventions from a development perspective becomes apparent when we consider the potential impact on all children, especially those who are from disadvantaged backgrounds or with disabilities.

Collectively, these principles illustrate that the young child learns through active motor play with peers and family members through engagement in culturally relevant activities that match their strengths and challenges while utilizing all of their senses. As can be seen in Table 13.1, these principles are highlighted with specific examples of how each principle might be reflected in a motor skill program that informs practice (structure of programs, types of activities), focuses parent and teacher attention, shapes their expectation of developing the whole child, draws attention to the breadth of development that can occur in motor skill programs, and affects expectations for program outcomes.

Table 13.1 Principles of child development: implications for motor interventions

Play is an important vehicle for developing self-regulation and promoting communication skills, cognition, and socio-emotional competence. *Because motor play supports multiple areas of development, motor programs should provide intentional opportunities to support communication, social, and cognitive development*
Children develop best when they have secure relationships. *Secure relationships begin with the family and expand to include peers. It is critical that motor programs include family members and peers in positive motor play experiences as these experiences have the potential to positively influence overall development*
Early experiences have profound effects on development and learning. *Because the early years are a critical time period, which lays the foundation for future learning, it is important that both parents and teachers understand the broader impact that motor play can have on a child's overall development and be a participant in the motor intervention*
Learning and development follow sequences. *Therefore, to ensure success, skills addressed* in *motor programs should build upon one another with careful attention to the scope and sequence of skills and children's abilities at each developmental stage*
Development proceeds toward greater complexity, self-regulation, and symbolic or representational capacities. *A continuum of early motor experiences should reflect this gradual progression toward more complex and abstract aspects of motor play (*e.g.*, rules of a game and different roles of team members should be introduced later in the developmental continuum of early motor play activities)*
Development and learning proceed at varying rates. *Therefore, expectations and guidelines for age of transition from one motor program need to be flexible with regard to the age of transition in/out of motor programs with decisions based on abilities and interests of the child, not strictly based on chronological age*
Development and learning occur in and are influenced by multiple social and cultural contexts. *Motor play is a social experience with family members, siblings, and/or same-age peers that should include culturally relevant, interactive motor activities, songs, dance, and games*

Now we turn our attention to motor skill interventions that utilize the NASPE and NAEYC guidelines to inform practice, address the recommendations of Riethmuller et al. (2009), and employ Newell's (1986) dynamic systems theory to address the individual needs of children.

Motor Skill Interventions

There is an abundance of information and online resources on preschool motor movement programs (www.pecentral/preschool/preschoolindex.html; www.peacefulplaygrounds.com; SPARK, 2009). However, while many existing programs meet many of the NASPE and NAEYC guidelines for preschool motor programs, not all programs employ Newell's (1986) dynamic system theory or address the recommended indices for evidenced-based programs (Riethmuller et al., 2009). We will highlight four programs that meet all or most of these indices.

The SKIP Program

The Successful Kinesthetic Instruction for Preschoolers (SKIP) program (Goodway & Branta, 2003) is a 9-week instructional motor skill program designed to improve FMSs of young children through developmentally appropriate activities delivered in twice weekly sessions. Each 35-min session consists of three 10-min periods of skill instruction with time allotted for introductions and transition. The skills targeted in SKIP include locomotion (running, galloping, skipping, and jumping) and object manipulation (ball handling, striking/kicking, catching/throwing) and involve children rotating through stations, while the teacher uses a direct instruction to teach motor skills. SKIP uses developmentally appropriate practices and is adapted to individual children, the tasks, and the environment (Newell, 1986). In addition, program efficacy was demonstrated in a randomized experimental study with 57 at-risk children (4–5 years of age). The pre- to post-intervention scores on the Test of Gross Motor Development (TGMD) (Ulrich, 1985) indicated that children in SKIP had significant improvement on locomotion and object control skills as compared to children in the control group who did not make significant motor skill gains (Goodway & Branta, 2003). Similar findings were found when SKIP

was implemented with at-risk Hispanic preschoolers (Goodway et al., 2003).

JumpStart

The JumpStart intervention (Jones et al., 2011) is a 3-day a week, 20-week motor program to support five motor skills (e.g., run, jump, hop, catch, kick). The potential efficacy of JumpStart was examined in a pilot study using a randomized controlled trial with 97 preschoolers. After receiving training, teachers implemented each 20-min lesson using direct instruction of one of the motor skills, a series of fun activities to practice using the skill taught, and unstructured free play with the same equipment used in lesson. Results on the TGMD indicated that children in JumpStart showed significantly greater improvements in overall motor skill abilities and increased activity level when compared to children in control group. In addition, attention was given to components of each motor skill task, the equipment, and the environment (Newell, 1986).

The Young Athletes Curriculum

The Young Athletes (YA) Curriculum (Favazza, Zeisel, Parker, & Leboeuf, 2012) is a 3-day a week, 8-week program designed to promote the motor skill development of young children with disabilities through motor play activities that correspond to the FMS. After receiving training, teachers provide 24 comprehensive lessons (30 min each) with 187 motor activities to support the following FMS: foundational skills (visual tracking, motor imitation), walking/running, balance/jumping, trapping/catching, throwing, striking, and kicking. Teachers were encouraged to adapt the intervention with regard to the needs of the child, task, and environment (Newell, 1986) and include families, by sending suggestions for YA activities for families each week. A randomized experimental design was used to study the impact of YA on the motor skills of 234 preschool children with disabilities. Results indicated that YA participants exhibited significant gains in locomotion and object manipulation on the PDMS (Folio & Fewell, 2000) as compared to children in the control group (Favazza et al., 2013). Additional benefits reported by teachers were improvements in social/play skills and kindergarten readiness skills. These findings were replicated in Kenya and Romania with significant motor skill gains found in children with developmental disabilities (Favazza et al., 2014; Favazza, Siperstein, Ghio, Wairimu, & Masila, 2016).

Mighty Moves

The Mighty Moves intervention is an 18-week motor program that occurs for 20 min, 4 days a week (or 80 min per week) (Bellows & Anderson, 2013; Bellows, Davies, Anderson & Kennedy, 2013) and is implemented by classroom teachers utilizing 72 lessons comprised of 143 music and motor play activities. The intervention focused on all of the FMS and includes a home component and a Food Friends component to encourage children to try new healthy foods. The effectiveness of Mighty Moves was examined using a randomized experimental treatment design to study its impact on the motor skills of over 200 Head Start preschoolers. Using the PDMS (Folio & Fewell, 2000) to measure motor skills, researchers found that children in the intervention made significant gains in motor skill abilities (stability/balance, locomotion, object manipulation) as compared to children in the control group.

All of these motor skill interventions illustrate how motor skill interventions could be evaluated to ensure the use of evidenced-based practice by using the recommendations of Riethmuller et al. (2009), Newell (1986), and NASPE (2002, 2010) and NAEYC (2003) to inform decisions when selecting motor skill interventions (see Table 13.2).

Table 13.2 Indices for evaluating motor skill interventions

		SKIP	Mighty moves	YA	JumpStart
Represents evidence-based practice (Riethmuller et al., 2009)	Randomized experimental design	*	*	*	*
	Strong methodological quality	*	*	*	*
	Valid measure with child as unit of analysis	*	*	*	*
	Demonstrated effectiveness (for improving motor skills)				
	At post	*	*	*	*
	At follow-up			*	
	Comprehensive intervention components				
	Strong theoretical basis (as evidenced by addressing *most* or *all* FMS: balance/stability, walk, run, jump, hop, gallop, skip, throw, catch, strike, kick, ball manipulation)	*	*	*	
	Appropriate duration and intensity	*	*	*	*
	Family component		*	*	
	Training component	*	*	*	*
Utilizes Newell's (1986) dynamic systems theory	Attention to *at least two* of the following aspects: child, environment, and motor task	*	*	*	*
Informed by NAEYC (1998) and NASPE (2002, 2010)	Provides appropriate structure and strategies (i.e., variety of ways to engage child with motor tasks, people, equipment, space)	*	*	*	*
	Uses unstructured and structured motor experiences	*	*	*	*
	Provides guidance for adults (i.e., active involvement, observation, modeling)	*	*	*	*
	Encourages/addresses multiple developmental domains (integrates all areas of development in regularly scheduled movement experiences)				
	Is culturally responsive	*		*	
	Involves families		*	*	

*Indicates that the recommendation is addressed within the program and/or the research on the program

Moving Forward: Implications for Practice and Policy

As we look to the future of motor skill interventions, we turn our attention to implications for practice and policy, with the understanding that each of these influences the other.

Implications for Practice

There are several implications for practice that can be derived from what we know about motor skill acquisition such as the need to set the bar high when selecting motor skill interventions, rethinking motor play as a place where learning across domains intersects, intentionally addressing the needs of all children, and finding ways to increase family engagement in motor skill development. Each of these will be discussed next followed by implications for policy.

Set the bar high when selecting motor skill interventions. It is important that we examine existing motor interventions using all of the knowledge, research, and expertise available to ensure the intentional inclusion of the essential ingredients for a high-quality program. The paucity of preschool motor interventions that met high standards highlights the need to address this challenge (Gagen & Getchell, 2006; Riethmuller et al., 2009). Using the broad indices presented in Table 13.2 would be a step in that direction, ensuring that motor skill intervention addresses key ingredients. Indices such as these can be used by researchers to guide the improvement of existing motor skill interventions and used by practitioners to tailor the program

to specific programmatic needs. To do this well implies close attention to the broader context in which children and families live, so as to recognize the added value of a motor skill intervention for each unique community of learners. Only when we have done all of this will the potential of a motor skill intervention be fully realized.

Rethink motor play as a place where learning across domains intersects. For young children, learning ignites in active and interrelated ways in the context of motor play. Learning does not happen in quiet, disconnected silo fashion, separately learning skills in the three traditional domains of learning—physical, cognitive, and socio-emotional development (Stork & Sanders, 2013). Moreover, motor skill development has a corner stone role to play as it supports areas such as school readiness, which includes socio-emotional development, language development, cognitive development, and approaches to learning (Ackerman & Barnett, 2005; Howard, 2011). Because of the interrelatedness of motor skill development to other developmental domains, we can no longer afford to view motor interventions in isolation or view motor interventions in competition with academic content or view motor interventions as optional. All of these views would undervalue the importance of motor skill interventions for child development.

As suggested by Goodway, Robinson, and Amui (2007), motor skill activities present an ideal opportunity for reinforcing many pre-academic skills as children could learn counting while jumping on ten poly-dots counting by ones, twos, fives, and tens or could learn new vocabulary related to body parts, affective feelings (tired, thirsty, sweaty), and spatial, temporal, and sequential concepts (over/under, next/then, first/second) while running an obstacle course (Wassenberg et al., 2005; Westendorp et al., 2011). In the context of active motor programs, children may also hone executive function skills such as following directions and sustained attention (Best, 2010). This point is especially important for children with disabilities and those who are disadvantaged, who experience delays and deficits across multiple developmental domains.

Intentionally address differences. It is no longer optional to include children with diverse abilities in early childhood classes. Their presence is well documented and growing, reflecting the broad push for more inclusive society. And given that many inclusive school-based programs have music and motor movement classes and adaptive physical education, attention needs to be given to specific strategies that accommodate the multiple needs of children with disabilities when planning all activities. To do less would be a disservice to the children with diverse abilities. Our professional organizations have chimed in on this point in the joint position statement on early childhood inclusion, stressing the use of strategies such as universal design for learning (UDL) to ensure full access and meaningful inclusive programming (DEC/NAEYC, 2009).

UDL enables *all* children to access *all* learning opportunities, activities, and environments (Cunconan-Lahr, 2006) and provides a strategy for addressing Newell's (1986) dynamic systems theory. Specifically, UDL emphasizes the need for *multiple means of representation* (i.e., instruction and learning activities include various formats and differences in task complexity and/or expectations in response to different ability levels), *multiple means of engagement* (i.e., employing a variety of ways to motivate and obtain children's attention in response to different learning styles, interests, preferences), and *multiple means of expression* (i.e., variety of response modes used to demonstrate knowledge or skill in response to different ability levels) (CAST, 2010) to accommodate all learners. For example, using motor task of walking across a balance beam, a teacher could provide multiple means of representing a balance beam by using a taped line on the floor, a 1-in. soft foam beam and a 4-in. raised beam. This would allow children a variety of ways to access the beam task by having multiple representations of the beam. In addition, allowing a variety of graduated steps for walking on the beam illustrates multiple means of expression as some children walk with one foot on the beam, others with 2 ft on the beam, and others with 2 ft on the beam with heel/toe steps, or some could

walk backward on the beam. Another way to apply multiple means of representation could be to use balls of different sizes and density to increase the "clutch ability," which increases the likelihood of success in catching a ball for children with varying grasping strength. Such variations allow each child to fully participate, ensuring that the motor skill intervention meets the diverse needs of children in inclusive early childhood settings.

In addition, motor skill interventions have a unique potential in providing support across domains for young children who are living in poverty. Currently, international policy guidelines such as the New Millennium Goals (2013) and the Convention on the Rights of Persons with Disabilities (CRPD) (UNICEF, 2006) stress the rights of children with disabilities in all corners of the world to high-quality early childhood programs. These and other global efforts from organizations such as Special Olympics International (2015) and the Right to Play (2000) echo the voices of millions, to harness the power of motor play, especially in impoverished corners of the world to stem the negative impact on development, stigma, and isolation (Britto, Yoshikawa, & Boller, 2011). Especially in low-income urban and rural settings around the globe, motor skill interventions present a promising opportunity for halting the diminished development of children.

Embrace family-centered programs to increase family engagement. While most motor programs occur in school-based settings, there are long-held beliefs that strong family involvement is essential for optimizing child development of all children and especially those with disabilities (Booth & Dunn, 1996; Bronfenbrenner, 1979). When we place families at the center of programming in order to optimize child development, it is referred to as *family-centered programming*. Family-centered programming refers to practices that support the family's capacity to promote child development by utilizing strategies that are culturally relevant, individualized, flexible, and responsive to family needs, provide families with opportunities to make choices and decisions, and require parent–professional collaboration and partnerships to optimize child and family outcomes (e.g., Dunst & Bruder, 2002; Shelton & Stepanak, 1994).

Motor skill interventions represent an ideal programmatic match for family-centered programs as it provides a natural opportunity to replicate school-based motor skill interventions at home, as used in Mighty Moves (Bellow et al., 2013) and YA (Favazza et al., 2012). Simply put, motor skill intervention is the main stage of learning for children, and parents have a leading role to play. When planning for motor skill interventions, families should be part of the discussion, identifying motor goals for their child and identifying ways in which they can play their role in their child's development.

Moreover, while school settings should provide opportunities for planned motor programs to support child development (Logan et al., 2011), we should not rely solely on school-based programs to promote motor skill development, especially given the lack of substantive time at school for physical activity (Elkind, 2007; Tucker, 2008). When we think about home-based strategies to support motor development, we turn to the research on routine-based interventions (McWilliams, 2010) to engage families in naturally occurring home activities. These strategies take advantage of the daily interactions that occur between young children and their parents or teachers by intentionally embedding learning goals into daily routines to address all aspects of development (Campbell & Sawyer, 2007; Stremel & Campbell, 2007). Using this approach, parents identify the routines (i.e., mealtimes, bathing, or going to bed) and other regularly occurring activities (i.e., playing with siblings, going to the park, going to grandparents' home) to embed activities that support their child's development. Parents also identify common household items and materials that can be used for the motor skill intervention (i.e., kitchen towels for scarves, paired socks for small balls, tile lines on floor for balance beam, and so on). By using child and family routines and common household materials, multiple opportunities to use school-based motor intervention occur in motivating motor play with family members.

In summary, to ensure that motor skill programs meet the highest level of quality, attention needs to be given in setting a high bar when

selecting motor skill interventions, rethinking motor play as a place where learning across developmental domains occurs, intentionally addressing the needs of all children, and finding ways to increase family engagement in motor skill development. Doing so will ensure that motor skill acquisition is intentionally and thoughtfully addressed for all children without leaving it for chance development for children who have challenges or by mistakenly thinking it will automatically happen during recess.

Implications for Policy

If we are to set the bar high when selecting motor skill interventions, we need to turn our attention to implications for policy at the national and global level. Policy makers could address two specific areas: the types of motor experiences that are needed in the early years and attention to the time for and quality of motor skill interventions.

First, there are three common types of motor experiences found in early childhood settings: *unstructured motor play* (such as daily recess monitored by teachers and volunteers), *structured motor intervention* (such as physical therapy, occupational therapy, adaptive physical education for children with disabilities 1–2 times a week), and *motor and music movement* (brief motor experiences for the whole class led by early childhood teachers). What is notable is that neither of the class-wide motor experiences (recess, motor and music movement) addresses the need for *intentional* strategies to support the development of the FMS in all children. Early educators may assume the natural attainment of motor skills even though that assumption does not reflect the reality for many children. It is time to address this challenge by informing policy makers about the disconnect between the typical kinds of motor experiences found in early childhood programs and what we know it should be given about the importance of motor skills on physical activity, general health, self-esteem, and other areas of development. Relatedly, we need to engage policy makers in advocating for *class-wide* motor skill interventions that teach FMSs.

Second, it is time to utilize policy to address the time for and quality of motor skill programs in early childhood classes in this moment when national and international attention is focused on universal preschool and early education for at-risk children. According to the US Department of Education, Office of Special Education Programs' 2011 Report to Congress on the Implementation of IDEA (http://nces.ed.gov/programs/digest/d11/tables/dt11_048.asp), over the past two decades, there has been a steady increase in the number of children with disabilities who are educated in the USA. Suffice to say, the growing numbers of young children with disabilities in inclusive settings, many of who could benefit from motor skill programs. At the same time, there is increasing attention on academics and pre-academics during the early childhood years due to the No Child Left Behind Act (2001). An while most would agree that children's academic success is critical, perhaps one of the unintended outcomes of the increased focus on young children's academic success has been decreased time and programming dedicated to motor skill development, physical activities, and play, the very contexts that support overall development.

Both NAEYC (1998) and NASPE (2002, 2010) recommend substantial daily time for motor play and physical activity. However, nearly half of the preschoolers are not sufficiently engaged in motor (Tucker, 2008), and between 20 and 40 % of US schools have eliminated recess altogether (Center on Education Policy, 2008; Elkind, 2007). Diminished time for motor play, the context for honing motor skills, presents an alarming picture given that physical activity is important for general health and the need for intentional motor programs to support motor skill acquisition (Trevlas, Matsouka, & Zachopoulou, 2003; Williams et al., 2008). Clearly, motor skill programs are needed, not for a few children but for all children. Beyond offering occupational therapy and physical therapy for children with significant disabilities, motor skill acquisition needs are not given the same attention or value in the class schedule as reading, math, and sciences, which belies the foundational role that motor skill acquisition and motor movement play in all of these. Inherent in this suggestion is addressing

the squeeze on time with the implication for length of school day, which could bring resolution to the half-day versus full-day debate. Having full-day universal preschool and full-day kindergarten would ensure that there is enough time to address all pre-academic/academic areas as well as provide both unstructured and structured motor opportunities. In doing so, it could serve as a foundation for other areas of development and be in sync with the call for attention to academics and pre-academics.

Closing Remarks

The time for active learning at school and home through intentional motor interventions for all children is now. There is enough evidence of the positive and critical role that FMSs play in overall child development. It is time to intentionally address motor skill acquisition, going beyond the traditional understanding of play, and move motor interventions into the current landscape. Most early childhood classes have increasing numbers of children who have developmental delays and/or disabilities, and there is significant research on these children's motor skill deficits—such as challenges with balance, locomotion, and object manipulation. For these children, play is not a luxury but a necessity, especially given the links between active motor interventions and cognitive development, self-regulation, language and social development, self-esteem, and sense of belonging. Thus, it is time to do more than recognize the importance of play but to legitimize and expand upon the conventional view of play. Such an expanded view would include intentionally teaching motor skills with efficacy-based motor play programs during regularly scheduled school time, providing opportunities for daily physical activity to utilize those skills, and developing strategies to engage families in both. Such motor skill programs have a prominent role in our current push to nationalize preschool and the global push to open early education to all children, emphasizing the understanding that the majority of learning during the early childhood years occurs through active motor play.

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Supporting the Implementation of Tiered Models of Behavior Support in Early Childhood Settings

14

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The design and delivery of effective interventions to address challenging behavior in young children is a critical concern for practitioners, families, and researchers. Challenging behavior in the early years of development, defined as "any repeated pattern of behavior or perception of behavior that interferes with or is at risk of interfering with optimal learning or engagement in prosocial interactions with peers and adults" (Smith & Fox, 2003, p. 5), can have pervasive deleterious effects on the child's social-emotional functioning, learning, and longitudinal outcomes over time (Dunlap et al., 2006; National Research Council & Institute on Medicine, 2009). In this chapter, we describe a framework of promotion, prevention, and intervention practices with a focus on effective practices for children who have persistent challenging behavior. We begin the chapter by describing the developmental trajectory of challenging behavior and the importance of a prevention framework for implementation of evidence-based practices that promote social-emotional competence and prevent or reduce challenging behaviors. We then describe the design and implementation of individualized behavior interventions and the importance of partnerships with families. The final section of this chapter describes how professionals can support practitioners and programs in the implementation of effective interventions through coaching and consultation.

During the early years of development, families and professionals should be vigilant in their monitoring of the child's social-emotional development and alert to anomalies in social interaction and behavioral regulation that might indicate risks of behavior challenges (National Research Council & Institute on Medicine, 2009). There is ample evidence that young children who have difficulty regulating their emotions and interacting with others and who have challenges with behavior, social interactions, and aggression are at increased risk of behavior challenges, academic failure in school, and difficulties in adulthood (e.g., Brennan, Shaw, Dishion, & Wilson, 2012; Broidy et al., 2003; Denham, 2006; Ladd, Herald, & Kochel, 2006; Thompson & Raikes, 2007; Welsh, Nix, Blair, Bierman, & Nelson, 2010). Moreover, longitudinal studies indicate that a little over half of children who show initial symptoms of emotional and behavioral disorders in early childhood will develop mental health disorders in middle childhood and adolescence (National Research Council & Institute on Medicine, 2009).

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In the research literature, estimates of the prevalence of challenging behavior among children from 2 to 5 years old range from 10 % to 17 % (Briggs-Gowan, Carter, Skuban, & Horwitz, 2001; Carter et al., 2010; Egger & Angold, 2006; Lavigne, LeBailly, Hopkins, Gouze, & Binns, 2009). However, these rates are increased when examining the prevalence for young children who live in poverty. For example, in studies that included children enrolled in Head Start programs, the rates of challenging behavior range from 23 % to 33 % (Del'Homme, Sinclair, Kasari, & Sigman, 1994; Gross, Sambrook, & Fogg, 1999; Kaiser, Hancock, Cai, Foster, & Hester, 2000; Qi & Kaiser, 2003; Webster-Stratton & Hammond, 1998).

Of particular concern to early childhood special education and early intervention professionals are the data on prevalence rates that are much higher for children who have disabilities. Data indicate that individuals with intellectual and developmental disabilities have increased rates of challenging behavior that range from 33 % to 50 % (Cormack, Brown, & Hastings, 2000; Dekker & Koot, 2003; Einfeld & Tonge, 1996; Emerson, 2003; Koskentausta, Iivanainen, & Almqvist, 2007). In a longitudinal study of 236 families with preschool-aged children who were typically developing and with developmental delays, 57.9 % of the children with developmental delays were diagnosed with a mental health disorder at age 5 (with the most prevalent being oppositional defiant disorder and attention deficit hyperactivity disorder) in comparison to 36.7 % of the children who were typically developing (Baker, Neece, Fenning, Crnic, & Blacher, 2010). Interestingly, the stability of externalizing behavior from ages 3 to 5 years for both children with developmental delays and children who were typically developing was similar, with externalizing behavior at age 3 being significantly correlated with externalizing behavior at age 5 (Baker et al., 2010). Differences between the rates of challenging behavior in young children with developmental delays and children without cognitive disabilities in Australia and England have also been noted in two national studies, with rates being significantly higher among 2- and 3-year-olds with developmental delays (Emerson & Einfeld, 2010). In the USA, data indicate that behavior is a concern among the youngest children served through Part C of the Individuals with Disabilities Education Act. In a national longitudinal study (Hebbeler et al., 2007) of children receiving early intervention services, early intervention providers reported that social-emotional or behavioral concerns were related to eligibility for only 4 % of the children, while more families reported important concerns about the social-emotional and behavioral status of those children. The concerns noted by parents included aggression for 11 % of children, difficulty with peer interactions for 25 % of the children, and distractibility in 22 % of children. In addition, 32 % of the parents expressed lack of confidence on how to address their child's behavior (Hebbeler et al., 2007).

In summary, data on the prevalence of challenging behavior in young children and in children who have developmental delays make a compelling argument for the importance of ensuring the delivery of effective interventions to address this issue. However, because the onset of behavioral challenges might happen at any point in time for an individual child (versus at a particular age or developmental milestone) during this period of rapid early development, the optimal approach for addressing challenging behavior is an intervention framework that includes promotion and prevention strategies. In the next section of this chapter, we provide a description of the *Pyramid Model* as a tiered intervention framework that can guide professionals in a consideration of practices that are important for the promotion of social-emotional skills and addressing challenging behavior.

Pyramid Model for Promoting Social-Emotional Competence and Addressing Challenging Behavior

The *Pyramid Model* for Promoting Social and Emotional Competence in Infants and Young Children (Fox, Dunlap, Hemmeter, Joseph, &

Strain, 2003; Hemmeter, Ostrosky, & Fox, 2006) is a tiered framework for organizing practices that promote the social-emotional competence of all young children, prevent challenging behavior by addressing social-emotional skill instructional needs of children at risk for challenging behavior, and provide individualized intervention to children who have persistent challenging behavior (see Fig. 14.1). The *Pyramid Model* was developed by faculty affiliated with two national technical assistance centers to provide guidance to early educators and early childhood special educators on the research-based teaching practices that should be a part of their repertoire related to the social-emotional competence of young children. The arrangement of practices within tiers was designed to mirror the three-tiered framework for implementing positive behavior interventions and supports (i.e., school-wide positive behavior support (PBS)) that is used within K-12 schools (Sugai & Horner, 2009). While the *Pyramid Model* uses tiers similar to school-wide PBS, the *Pyramid Model* offers guidance specific to the evidence-based practices that are developmentally and contextually appropriate for use within the variety of settings and programs that comprise the early education and early intervention service system (e.g., public schools, child care, Head Start).

The arrangement of practices in a tiered framework ensures that professionals and programs are equipped to address the specialized needs of the young children with developmental delays. The universal practices for the promotion of children's social-emotional skills that should be present in early care and education programs and provided by families in the home are described in the first tier of the *Pyramid Model* framework. If the child has social-emotional skill delays or is at risk for delays, second-tier practices are identified for providing more focused interventions designed to result in positive social-emotional outcomes and to reduce the likelihood that skill delays will lead to challenging behavior. For children who have social-emotional skill delays and persistent challenging behavior, the

Fig. 14.1 Pyramid Model

Pyramid Model includes tier three practices for developing and implementing intensive individualized interventions that result in a reduction of challenging behavior.

The universal level of the *Pyramid Model* includes practices related to providing nurturing and responsive relationships and high-quality environments. Research related to these practices provides support for the critical importance of caregiving relationships and quality environments to the promotion of children's development of social-emotional competence (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; National Research Council, 2001). The secondary tier of the *Pyramid Model* includes instructional practices for understanding and expressing emotions appropriately, using social problem solving, and peer-related social interaction skills. At the tertiary level, the use of assessment-based individualized positive behavior support (IPBS) is recommended to address children's persistent challenging behavior.

There is substantial research that supports each tier of practices included in the *Pyramid Model* (see Hemmeter et al., 2006 for discussion) and published descriptions on the implementation of the model within early care and education programs (Branson & Demchak, 2011; Frey, Park, Browne-Ferrigno, & Korfhage, 2010; Hemmeter, Fox, Jack, Broyles, & Doubet, 2007). In addition, a randomized controlled experiment has been conducted to examine outcomes associated with the implementation of the *Pyramid Model* in classrooms that included children with disabilities (Hemmeter, Snyder, Fox, & Algina, 2011). The findings from this study provide promising evidence that the implementation of the *Pyramid Model* by classroom teachers was related to improvements in teachers' ratings of children's social skills and behavior.

An important concept related to *Pyramid Model* implementation is the provision of practices at the universal and secondary levels to ensure that all efforts to promote social-emotional learning and prevent challenging behavior are in place. However, in any program implementing the *Pyramid Model*, there might be children with persistent challenging behavior who require individualized and intensive intervention to reduce challenging behavior and promote skill development. In the next section of this chapter, we describe the process, elements, and evidence that support the use of IPBS to effectively address persistent challenging behavior.

Individualized Positive Behavior Support

PBS is a defined approach to behavior intervention that addresses both lifestyle goals and meaningful outcomes while addressing challenging behavior that can impede the achievement of those goals (Dunlap, Sailor, Horner, & Sugai, 2009). The four core features that define PBS as a technology for behavior change are applications of behavioral science, multicomponent interventions, a commitment to lifestyle outcomes, and an emphasis on systems change (Carr et al., 2002; Dunlap et al., 2009; Lucyshyn, Dunlap, & Freeman, 2015). PBS became defined as an approach in the late 1980s in response to research and values that supported a non-aversive approach to the behavior management of individuals with disabilities and severe challenging behavior. The need to develop a new and more humanistic technology for behavior intervention was driven by controversies related to the use of punishing and aversive consequences and the deinstitutionalization movement that resulted in individuals being served in the community where intrusive and aversive techniques were rejected as being dehumanizing, harmful, and socially unacceptable (Lucyshyn et al., 2015).

Over two decades of research has defined, tested, and documented the effectiveness of PBS (Dunlap et al., 2009; Lucyshyn et al., 2015). Research has examined applications of the approach with adults, students with behavior disorders, and very young children and longitudinal efforts over a variety of individuals (Lucyshyn et al., 2015). In addition, research in PBS has expanded to applications for all students within a school. In this effort, the science of PBS was informed by prevention science in the design of a

PBS model that included primary, secondary, and tertiary tiers of prevention to address behavior within school settings (Colvin, Kameenui, & Sugai, 1993; Walker et al., 1996). School-wide applications of PBS, also known as Positive Behavior Intervention and Support (PBIS), have been implemented in thousands of schools across the country (McIntosh, Horner, & Sugai, 2009). Research on school-wide implementation has demonstrated the link between implementation of the approach with decreases in classroom disruptions and fighting (McCurdy, Mannella, & Eldridge, 2003), reduction in office referrals and suspensions for challenging behavior (Bradshaw, Mitchell, & Leaf, 2010; Nelson, Martella, & Marchand-Martella, 2002), lower levels of bullying and peer rejection (Waasdorp, Bradshaw, & Leaf, 2012), and reduction in school expulsions (Sadler, 2000).

In the following sections of this chapter, we describe individualized applications of PBS to address the severe and persistent challenging behavior of young children within early care and education settings and the community. We begin by describing the core components of the process of PBS and the elements that should comprise a behavior intervention plan followed by a discussion about the research literature that supports the implementation of this approach with children and in collaboration with families.

The Process of IPBS

There are several core assumptions that drive the process of implementing IPBS in support of children with persistent challenging behavior. The first assumption is that challenging behavior is functional for the individual. This means that the behavior serves a purpose for the individual (Brown & Anderson, 2015). Moreover, in many circumstances the challenging behavior might also be communicative and convey a "message" that has social intent (Dunlap, Harrower, & Fox, 2005). A second important assumption is that positive strategies are effective in addressing most challenging behaviors, and intrusive strategies are unnecessary (Brown & Anderson, 2015). Finally, a core assumption is the behavior plan will focus on behavior reduction with a primary emphasis on the acquisition of meaningful skills and improvements in outcomes related to quality of life (Carr, 2007).

The assumption that challenging behavior is functional and might be communicative is directly linked to a foundational process in the development of an IPBS plan. Intervention is designed by determining the "function" of the challenging behavior prior to the development of a function-based behavior intervention plan (Dunlap & Fox, 2011). This process, called functional assessment or functional behavioral assessment, uses observation and interviews to determine the relationship of environmental conditions and events to the challenging behavior and results in hypotheses about those relationships that drive intervention design (Bambara, 2005). In PBS, the hypotheses about behavior function are used to identify the antecedent events that trigger challenging behavior and the consequences that maintain the behavior. Once teams understand these elements, an intervention plan (also referred to as a behavior support plan) is designed that addresses changes in antecedents, the instruction of skills to replace the challenging behavior, and changes in consequences that result in skill acquisition and the reduction of challenging behavior.

In Fig. 14.2, the steps involved in the process of IPBS are listed. These steps are widely recognized as the process to be used to develop and implement effective individualized interventions (Bambara & Kunsch, 2015; Dunlap, Wilson, Strain, & Lee, 2013; Scott, Anderson, Mancil, & Alter, 2009). The first step is to establish a team that will collaborate on behavior support plan design and implementation. This process is typically led by a facilitator who is a professional with behavioral expertise or training in the PBS process (e.g., behavior specialist, disability coordinator, consulting professional, school psychologist). The membership of the team should always include the teacher(s) or practitioner(s) who work with the child on a regular basis, a family member, and the person who facilitates plan development and evaluation. Teams might

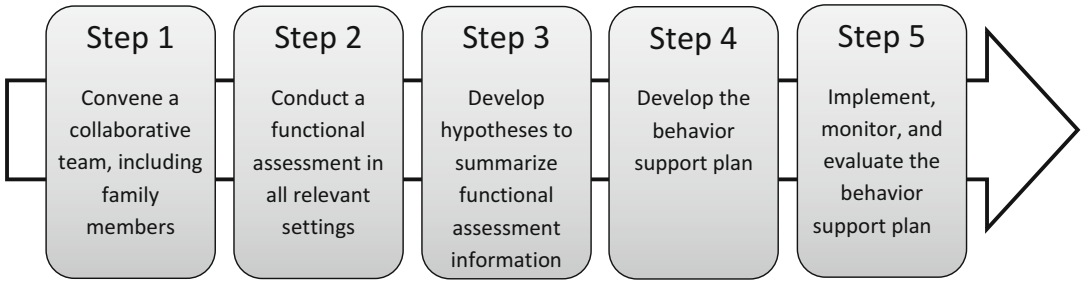

Fig. 14.2 Steps for the implementation of individualized positive behavior support

be larger and comprise all professionals and family members with a vested interest in supporting the child. When the team first convenes to design a behavior support plan, the team identifies the challenging behavior that will be addressed and has a discussion to define the behaviors and identify the conditions and activities where challenging behavior is most likely to occur. The second priority for the initial team meeting is to have a discussion about the meaningful outcomes for the child that the team hopes to achieve as a result of the intervention.

The second step of the process is to conduct a functional assessment. The functional assessment is an information-gathering process that is used to identify the triggers for challenging behavior, the consequences that follow challenging behavior, and the likely functions that challenging behavior serves. The functional assessment process will include direct observation of the child and interviews that allow for information to be gathered efficiently about the child's activities, responses, and the circumstances related to the presence and absence of challenging behavior. When the functional assessment information gathering is completed, the team meets to discuss the hypotheses that might be generated from the pattern of data gathered from the observation and interview and other information-gathering efforts. The third step, hypothesis development, involves a translation of the information gathered from the functional assessment into hypotheses about the functions of challenging behavior as it occurs within activities or interactions with others. A hypothesis statement serves as the foundation of the individualized behavior support plan by identifying the antecedents associated with challenging behavior, describing the nature of the behavior, identifying the consequences that maintain behavior, and articulating a hypothesized purpose of the behavior (Kern, 2005).

Functional assessment might be followed by a process known as functional analysis if there is uncertainty about the behavior hypotheses or a desire to experimentally confirm the hypothesis because the behavior is severe (e.g., self-injury) and must be reduced as quickly as possible (Wacker et al., 2015). Functional analysis procedures involve testing the hypotheses by manipulating variables thought to be related to the challenging behavior across different conditions and examining the frequency of the behavior under those conditions (Kern, 2005). Conditions are ordered, and data are collected in short assessment trials or observation episodes with different conditions tested systematically so that a pattern of data can be analyzed to determine the circumstances in which behavior occurs most frequently. Functional analyses are not commonly conducted in early childhood applications of IPBS, as most teams are confident in their identification of hypotheses after completing the functional assessment process.

Once hypothesis statements are developed, the fourth step of the process involves the design of behavior supports that are aligned to the major components of those statements. For example, strategies are developed to address the antecedent circumstances that trigger challenging behavior and to teach functionally equivalent replacement skills that might be used by the child

instead of the challenging behavior. In addition, the team examines the consequences that maintain challenging behavior to identify what changes might be made to ensure that challenging behavior is not reinforced or strengthened by the responses of others.

The design of the behavior support plan (step 4) occurs in a team meeting with guidance from the facilitator. This meeting involves a summary of the functional assessment information by the facilitator and a description of the hypotheses that are yielded from that information. After reviewing the hypotheses, the team discusses strategies that might be used in the individualized behavior support plan. The major elements of the behavior support plan are: (1) behavior hypotheses, (2) prevention strategies that address the antecedents of behavior, (3) replacement skills that serve as functional equivalents to the challenging behavior, and (4) consequence strategies to ensure challenging behavior is not maintained and that appropriate behavior, including replacement skills, are reinforced (Bambara, 2005; Dunlap et al., 2013). In addition to designing the behavior support plan, the team identifies how the effectiveness of the plan will be evaluated and when the team will reconvene to review those data and make any needed adjustments to the plan. The evaluation of the behavior support plan is often addressed by developing simple data collection tools that can be used by the teacher in the classroom and family at home and in the community. The information collected in the evaluation might be frequency counts of incidents of challenging behavior or durations of challenging behavior and the child's use of the replacement skills that are targeted in the plan.

Collaborating with Families Around Behavior Support

The family is a critical and highly valued member of the collaborative team that designs and implements the behavior support plan. The family brings deep knowledge of their child and the child's behavior patterns in a variety of settings and is a key implementer in the delivery of the behavior intervention within home and community activities (Lucyshyn, Dunlap, & Albin, 2002). A goal for the design of the behavior support plan is to identify the strategies that might be used in all environments by all natural support providers (e.g., home, community, early childhood program) so that the child's use of challenging behavior is addressed in all activities and interactions. When comprehensive behavior support plans are designed by a collaborative team that considers all aspects of the child's life, the outcomes that might be achieved are substantial (Lucyshyn et al., 2002). Ideally, family members play pivotal roles on the collaborative team by assisting with defining the challenging behavior that is the concern for the PBS intervention, identifying lifestyle outcomes that serve as goals for the plan, identifying routines and activities that should be the focus of intervention, contributing observations and information that inform hypothesis identification, offering ideas for behavior intervention strategies and reinforcers, and assisting in the design of evaluation measures.

In the design of PBS interventions for implementation within home and community settings by family members and other support providers, the behavior support plan must be technically sound (i.e., linked to the functional assessment, comprise all components, use evidence-based strategies) and contextually appropriate. Contextual appropriateness refers to the goodness of fit of the behavior support plan with the context of family life including a consideration of family demands, routines, values, and resources (Albin, Lucyshyn, Horner, & Flannery, 1996; Lucyshyn et al., 2002). Moreover, the team should consider the supports that will be provided to the family and other implementers of the plan (e.g., siblings, service providers) that will maximize the likelihood that the plan will be implemented with fidelity. Those considerations include the provision of coaching with performance feedback to learn how to implement the plan, the use of simple data collection tools to track child responsiveness to the intervention, and periodic plan review meetings with the collaborative team.

Evidence of Effectiveness of IPBS

There is ample evidence that the use of assessment-based and IPBS strategies is effective for reducing challenging behavior and supporting individuals with challenging behavior in achieving meaningful outcomes. Several syntheses of research have validated the effectiveness of the approach for individuals with disabilities (Carr et al., 1999; Kurtz, Boelter, Jarmolowicz, Chin, & Hagopian, 2011), children with autism (Horner, Carr, Strain, Todd, & Reed, 2002), and in school environments (Goh & Bambara, 2010).

Support for the use of IPBS for young children with and at risk of disabilities as a recommended practice has been articulated by the Division of Early Childhood (DEC) of the Council for Exceptional Children (CEC) in their position statement on interventions for young children with challenging behavior (2007). The DEC statement encouraged the use of prevention efforts, using positive intervention strategies that are linked to the function of the child's challenging behavior, and partnering with families as critical members of the intervention team. The relevance of this approach was validated when several other early childhood professional organizations also endorsed the DEC position statement, including the National Association for the Education of Young Children, National Head Start Association, National Association of Child Care Resource and Referral Agencies, National Black Child Development Institute, National Association for Bilingual Educators, and the Infant and Toddler Coordinators Association. Further, the updated DEC Recommended Practices support this approach (Division for Early Childhood, 2014).

Numerous studies have been conducted on the use of IPBS with young children (e.g., Blair, Umbreit, & Eck, 2000; Duda, Dunlap, Fox, Lentini, & Clarke, 2004; Gettinger & Stoiber, 2006; McLaren & Nelson, 2009; Schindler & Horner, 2005; Wood, Ferro, Umbreit, & Liaupsin, 2011). Early research provided demonstrations that the identification of function and the design of interventions that were assessment-based were effective in reducing challenging behavior in young children. For example, Arndorfer, Miltenberger, Woster, Rortvedt, and Gaffaney (1994) used both descriptive (i.e., interviews) and analytic tools for conducting a functional assessment and functional analysis to confirm the hypotheses and demonstrated that an intervention based on the identified function could be used to effectively address child challenging behavior in the home environment. Of note in this study was the use of functional analysis procedures implemented by the parent in natural situations with guidance from the researcher. Similarly, Umbreit (1996) validated the use of functional assessment and the effectiveness of an assessment-based behavior intervention for a child with intellectual disabilities and disruptive behavior within an inclusive kindergarten classroom. In this study, the functional assessment procedures includes strategies to identify the motivations of the child's disruptive behavior, interviews and observations to identify the antecedents and consequences that were related to disruptive behavior, and a functional analysis procedure to test hypotheses prior to the design of the intervention package. Based on a review of this information, the effective intervention for the child was comprised of curricular modifications to reduce child frustration and teaching the child to ask for a break or request assistance when frustrated.

Research on the use of IPBS for young children has continued to examine the use of assessment-based behavior interventions by families in home and community settings (Fettig & Barton, 2014). While these studies have demonstrated evidence that this approach can result in reductions of challenging behavior of young children, an analysis of elements of experimental rigor indicates that there is a need for continued research that will offer strong evidence for intervention effects and the strategies that might be used to support families in high-fidelity implementation of assessment-based intervention (Fettig & Barton, 2014). In a different analysis of literature from 1990 to 2007 that examined studies developing assessment-based interventions for young children, Wood, Blair, and Ferro (2009) noted the need for more research that included the elements described as important to IPBS (assess-

ment-based, interventions that included antecedent and teaching components, implementation in natural environments, and involving families as partners). In their review of 35 studies, the authors noted that relatively few studies (a) included parents or teachers as partners in conducting the functional assessment, (b) included all recommended components of the intervention plan (often missing were antecedent manipulations and teaching replacement skills), and (c) involved families and teachers collaborating in the design of the intervention (Wood et al., 2009).

Supporting Practitioners and Programs in the Implementation of Effective Interventions Through Coaching and Consultation

In the previous sections of this chapter, we described the need for interventions for children with challenging behavior, identified an effective tiered model of behavior support practices (i.e., The *Pyramid Model*), described more specifically the use of IPBS for addressing the needs of children with severe and persistent challenging behavior, and described how these interventions can be implemented in a range of early childhood settings as well as in homes. While these practices are gaining empirical support, there is a great deal of data suggesting that these practices often are not being implemented or not being implemented as designed in early childhood settings (e.g., Conroy, Dunlap, Clarke, & Alter, 2005; Wood et al., 2009). Many early childhood practitioners are not prepared to address the needs of children with challenging behavior and identify it as one of their most significant training needs (e.g., Hemmeter, Santos, & Ostrosky, 2008; Snell, Berlin, Voorhees, Stanton-Chapman, & Hadden, 2011). Further, there is evidence that early childhood practitioners are more likely to implement effective practices (Driscoll, Wang, Mashburn, & Pianta, 2011) and less likely to report expelling a child when they have access to behavior support or consultation (Gilliam, 2005). To address the range of social-emotional and behavioral needs exhibited by young children, we need to identify the supports necessary for teachers and families to implement effective practices with fidelity.

Fixsen, Blase, Duda, Naoom, and Van Dyke (2010) suggest that it is the combination of effective intervention practices and programs *and* effective implementation strategies that results in positive outcomes for children and families. For practitioners and families to use behavior support practices with fidelity, effective implementation supports (including professional development) are needed. There is a substantial body of literature on school-wide approaches to behavior support in elementary, middle, and secondary schools, and there is a growing literature base on program-wide approaches to behavior support in early childhood settings (Carter & Van Norman, 2010; Fox & Hemmeter, 2009; Frey, Boyce, & Banks Tarullo, 2009; Hemmeter, Fox, & Snyder, 2013; Stormont, Lewis, & Beckner, 2005). Program-wide implementation of tiered models of behavior support in early childhood settings has been informed by the work of school-wide PBIS and includes variations of many of the same elements (Fox & Hemmeter, 2009; Hemmeter et al., 2007; Steed, Pomerleau, Muscott, & Rohde, 2013):

(a) Establishing a leadership team
(b) Ensuring the buy-in of all staff
(c) Strategies for promoting family engagement and support
(d) Ongoing training and coaching for classroom staff
(e) The use of universal screening and progress monitoring to ensure children's social, emotional, and behavioral needs are addressed
(f) A behavior support planning process for children whose behavior is persistent
(g) An ongoing process for monitoring implementation and outcomes

While it is beyond the scope of this chapter to talk about all aspects of program-wide implementation, this section will focus on supporting practitioners and families to implement the promotion, prevention, and intervention practices described earlier in the chapter. In the following

section, we will discuss (a) an effective approach for coaching professionals and families to implement these practices, (b) models for providing consultation to families and practitioners around the development and implementation of individualized behavior support plans, and (c) implications and recommendations for both practice and research.

Coaching Teachers to Implement Prevention and Promotion Practices

Much of the work around coaching and consultation related to behavior support has focused on coaching teachers to implement prevention and promotion practices, while relatively little research has been done on coaching practitioners around developing and implementing behavior support plans. Effective models for coaching and supporting early childhood practitioners have emphasized the use of coaching with performance feedback as a successful intervention to change teacher behavior (Snyder et al., 2012). Performance feedback involves using data collected during observations of a teacher to provide specific feedback on the teacher's use of a set of practices.

The use of coaching with performance feedback on teachers' use of social-emotional teaching practices and behavior support practices in early childhood classrooms has been examined in several published studies. Researchers have examined the effects of coaching with performance feedback on a variety of discrete practices associated with preventing and addressing challenging behavior including praise, preparing children for classroom transitions, teaching behavior expectations, and pre-corrections (Barton, Pribble, & Chen, 2013; Carter & Van Norman, 2010; Fullerton, Conroy, & Correa, 2009; Hemmeter, Snyder, Kinder, & Artman, 2011; Stormont, Smith, & Lewis, 2007). In addition, studies have examined the use of coaching with performance feedback on teachers' use of practices across multiple tiers (e.g., universal practices, targeted practices) (Artman-Meeker & Hemmeter, 2013; Artman-Meeker, Hemmeter, & Snyder, 2014; Fox, Hemmeter, Snyder, Binder, & Clarke, 2011; Hemmeter, Snyder, Fox et al., 2011; Sutherland, Conroy, Vo, & Ladwig, 2014). Across these studies, there is evidence that coaching with performance feedback is effective in increasing teachers' use of promotion and prevention practices. In addition, there is emerging evidence that the use of these practices results in teacher-reported changes in children's social skills and challenging behavior (Hemmeter, Snyder, Fox et al., 2011). Finally, these studies provide evidence that performance feedback can be delivered both live and via email (Artman-Meeker et al., 2014; Barton et al., 2013) and results in improvements in implementation.

The studies described above all used strategies associated with a model of coaching that is referred to as *Practice-Based Coaching* (PBC) (Snyder, Hemmeter, & Fox, 2015). PBC involves cycles of three major components: (1) needs assessment and action planning, (2) focused observation, and (3) reflection and feedback. The feedback includes both supportive feedback (e.g., "During the observation today, you used the visual schedule with Luke and he completed all steps of the routine!") and constructive feedback (e.g., "Today when Luke was having a hard time, the transition from centers to small group would have been a good opportunity to support him using the visual schedule"). The PBC cycle is implemented in the context of a partnership between a coach and a coachee. Each of the components can be implemented in person or through technology. For example, action planning could be conducted when the coach is in the coachee's classroom or over Skype. Observations could be conducted live or using video recordings of the teachers' practice. The key to the success of this model is that all components are implemented *and* implemented with fidelity. Most of the studies described above measured and ensured that the coaching was conducted with fidelity; however, there was considerable variability the measurement procedures.

PBC is an effective approach for changing teacher practice, but it is also a resource-intensive approach. In the studies described above, teachers received as much as 16 weeks of coaching (e.g., Hemmeter, Snyder, Fox et al., 2011).

This dose of coaching is not likely to be feasible for many early childhood settings. There are a number of things that might affect the dose of coaching that will be needed. First, the dose will depend on what is being taught. Studies that focused on coaching teachers to use discrete strategies (e.g., Barton et al., 2013; Hemmeter, Snyder, Kinder & Artman, 2011) required fewer coaching sessions per skill as compared to the dose reported by Hemmeter, Snyder, Fox et al. (2011), in which teachers were coached to implement a complex array of practices across tiers. Multicomponent interventions require more coaching than interventions that are a discrete skill. Dosage might also vary by the skills of the teacher. In the Fox et al. (2011) study, there was initial evidence that teachers with higher baseline scores required less coaching than teachers that had lower baseline scores. Dosage might also vary based on whether the person being coached perceives a need for changing their practice and whether they "buy in" to the model they are being coached to implement.

Program-wide implementation of tiered models of behavior support also might minimize the dose of coaching that is needed by individual teachers (Fox & Hemmeter, 2009). When all teachers in a building are working toward the same outcome, teachers often support each other in the implementation of the practices. Program-wide implementation might also mediate how much coaching is needed in that there might be fewer competing demands. That is, in programs that have committed to program-wide implementation of tiered models of behavior support, there is presumably administrative support that ensures teachers have the time and resources to devote to implementing the model and participating in professional development around the model. Although there are implementation supports that might mediate how much coaching is needed, the data on interventions for changing teacher practice consistently demonstrate the need for a systematic approach that is ongoing and individualized. There is little evidence of the effectiveness of coaching when it is not individualized, does not include performance feedback, and is not implemented over time.

Guiding the IPBS Process

Much of the work described in the previous section focused on coaching to support implementation of prevention and promotion practices. To implement tiered models of behavior support, such as the *Pyramid Model*, practitioners and families need support around guiding the IPBS planning process. Although the coaching model described above is useful for supporting teachers to implement practices that might be included on an individualized behavior support plan (e.g., individualized transition warnings, individualized pre-corrections, praise focused on replacement skills), it does not address how to support practitioners to collaborate with a team in the development of an assessment-based behavior support plan through the IPBS process. There are, however, models of coaching and consultation that have been used to support the IPBS planning process. These models have varying degrees of evidence on their effectiveness but offer some guidance around coaching and consultation for supporting the implementation of individualized behavior supports. The behavioral consultation approaches that have been used with young children with challenging behavior can be categorized as follows: (a) conjoint behavioral consultation (CBC) (Sheridan, Clarke, Knoche, & Edwards, 2006; Sheridan, Eagle, Cowan, & Mickelson, 2001), (b) mental health consultation (Gilliam, 2007; Perry, Dunne, McFadden, & Campbell, 2008; Reinke et al., 2014), and (c) PBS consultation (Carter & Van Norman, 2010; Duda et al., 2004; Dunlap & Fox, 1999; Feil et al., 2009). In each of these models, the consultant or coach plays a specific role in supporting the development, implementation, and evaluation of the behavior support plan. The goal of this section is not to do a critical review of consultation models but to provide some general descriptions of models and how they might guide programs in supporting practitioners and families in the IPBS process.

CBC is an indirect service delivery model in which a consultant works together with a child's family and teacher(s) to address the child's particular academic, social, or behavioral needs

(Sheridan et al., 2001; Sheridan, Clarke et al., 2006). In CBC, the consultant guides the family and teacher through a cyclical, four-stage process that includes problem identification, problem analysis, plan development, and plan evaluation (Sheridan et al., 2001; Sheridan, Clarke et al., 2006). The consultant uses a structured interview format to guide the participants through the CBC process (Sheridan, Clarke et al., 2006). In the CBC model, the consultant, family, and teacher all contribute to developing and evaluating the plan, with the family and teacher additionally responsible for implementing the plan (Sheridan et al., 2001). The family and teacher receive feedback on implementation of the plan from the consultant. Typically, the plan revolves around decreasing challenging behavior and increasing social skills (e.g., Colton & Sheridan, 1998; Sheridan et al., 2012) and is based on understanding the function of the child's behavior. The effects of CBC have been evaluated in several studies (Colton & Sheridan, 1998; Sheridan et al., 2012; Sheridan, Clarke et al., 2006; Sheridan, Eagle, & Doll, 2006). There is evidence of intervention fidelity as well as decreases in children's challenging behavior and increases in children's social skills associated with the intervention.

A number of studies have looked at an approach they refer to as "mental health consultation." Mental health consultation has been combined with the Incredible Years Teacher Classroom Management intervention to help teachers implement universal preventive practices, such as using praise, as well as behavior support plans (Reinke et al., 2014). In this model, the teachers receive support from a coach to develop and implement behavior support plans for children with challenging behaviors (Reinke et al., 2014). An integral part of this intervention is that the teachers are supported in learning key concepts across multiple trainings and then subsequently supported in using them during ongoing one-on-one sessions with coaches. The authors report the use of performance feedback as part of the coaching. One study used a model of mental health consultation referred to as the "Early Childhood Consultation Partnership." It was used to provide consultation services to teachers to implement general classroom preventative practices and to provide child-specific consultation (Gilliam, 2007). In this model, the consultant, teachers, and family members worked together to develop a plan for the individual child. The focus of this plan was on classroom strategies for addressing challenging behavior and resources and referrals for the child and family. In these studies, it is not clear how the teacher was involved in the development of individualized behavior support strategies. Finally, Perry et al. (2008) described a model of mental health consultation used specifically to help teachers implement behavior support plans. Consultants observed children, developed a plan, and then worked with teachers and families to provide consultation on how to implement the plan. The observations were designed to note possible trends that might be influencing the child's behavior. The plans included strategies for teaching prosocial behaviors and reducing challenging behavior. In-depth consultation was provided so teachers and families could implement the strategies. The families and caregivers were not, however, involved in the development of the plan.

There are a number of studies that explicitly describe the process of behavior support as IPBS and include the use of a consultant to guide the practitioner or family of a young child in the behavior support planning and implementation process (Duda et al., 2004; Dunlap & Fox, 1999; Feil et al., 2009). In the studies, outside consultants worked with school/center personnel and the child's family to address the child's behavioral needs. The process includes developing a team, conducting a functional assessment, developing hypotheses about the function of the challenging behavior, and developing intervention procedures. The family and practitioner are included in all steps of the process. Behavior support plans include implementation of universal prevention practices (e.g., in a classroom, reducing the length of large group), as well as individualized prevention strategies, the teaching of replacement skills, and strategies for responding to challenging behavior (Duda et al., 2004; Dunlap & Fox, 1999). The outside consultant provided coaching with performance feedback as the teacher and/or family implemented the

child's behavior support plan (Duda et al., 2004; Dunlap & Fox, 1999). These studies provide evidence that practitioners and families can implement behavior support plans with fidelity and affect changes in children's behavior.

These models have implications for supporting practitioners and families in the development and implementation of individualized behavior support plans for children with ongoing challenging behavior. These implications relate to (a) identifying children in need of individualized supports, (b) effective teaming, (c) expert guidance, (d) high-fidelity implementation, and (e) identifying children and families who need further support.

First, a key challenge related to IPBS is determining which children are in need of individualized supports. Early educators often want individualized behavior supports for every child with challenging behavior. However, the research on tiered models suggests that the vast majority of young children's challenging behavior can be resolved through effective promotion and prevention strategies (Brown & Anderson, 2015). Accurate and precise data collection will be needed to determine which children need individualized behavior support planning. Data should be collected on when and under what conditions the child engages in challenging behavior *and* what is being done in those contexts to support the child. When strategies such as a precorrection, a visual schedule, positive feedback, or individualized instruction around the routine are effective in changing the behavior, then a more intensive, individualized behavior support plan might not be necessary. Individualizing instruction, using visuals, and providing prompts are effective promotion and prevention strategies. It is much easier to apply promotion and prevention strategies than it is to develop individualized behavior support plans. If, however, the behavior persists even in the context of individualized promotion and prevention strategies or if the behavior is harmful or overly disruptive, an individual plan might be needed.

Once a child is identified as needing IPBS, effective teaming is necessary for the process to result in positive outcomes for the child. The composition of the team was described earlier. The literature on behavior consultation suggests that team members who are expected to implement the plan should be involved in the development of the plan. That is, when parents will be implementing the plan at home or teachers will be implementing it in the classroom, they should be involved in the development of the plan both to ensure that the plan is developed based on a thorough understanding of the child's behavior in those contexts and to increase the likelihood that they are committed to and invested in the process. Sheridan and her colleagues' (2001, 2006, 2012) research suggests that the active involvement of both parents and teachers improves the parent–teacher relationship, which mediates the outcomes for children.

Because IPBS is a complex process, it is necessary to have someone with behavior support expertise guide the process. Each of the models described above included a person with behavior expertise who facilitated the process, collected data for use in developing a plan, provided coaching and training to those implementing the plan, and/or monitored implementation and outcomes. This person might not have a deep understanding of the child and his or her behavior in context but can guide the team members who know the child well in developing a plan that will work. Although this person is important to the process, many early childhood professionals struggle to identify these types of consultants either because they do not have behavior specialists on staff or the behavior specialists who are available lack experience with young children or have limited understanding about the implementation issues in classrooms for young children. Despite these difficulties, it is essential to have expert guidance to ensure that all necessary components of developing and implementing a behavior support plan are in place (i.e., functional assessment, a behavior plan that includes preventive strategies, procedures for teaching replacement skills, and strategies for responding to challenging behavior).

A key part of the behavior support planning process is ensuring the high-fidelity implementation of the plan. Because the plan is based on an understanding of the child's behavior in context,

the child's behavior is not likely to change if the plan is not implemented as designed. As described above, successful implementation almost always depends on ongoing coaching and feedback for those implementing the plan. In the behavior consultation models described above, the coach/consultant was often involved in coaching the teacher or parents around the behavior support plan or strategies. However, because implementation fidelity was measured in only some of the studies, the amount of support teachers and families need to implement interventions effectively is unclear. Much of the work on coaching, including our own, suggests that IPBS is a complex process that requires ongoing support both around implementation and changes in the plan that might be needed over time.

An important role of the consultant is to identify children and families who might be in need of supports that go beyond individual behavior support planning. IPBS is a process for developing plans to support children in their everyday environments (e.g., schools, home, community), but it does not address directly more significant mental health needs of children and families. It is likely that some young children and their families will need additional mental health supports, and it is important that the consultant knows when and where to refer children and families for those services. However, it is almost always the case that even when children and families access other mental health supports, the child will need support to be successful in his or her daily life while the family accesses additional supports.

Implications for Research and Practice

In this chapter, we have described collaborative models in which the behavior consultant actively teams with and supports the teacher and parent in their implementation of a behavior plan. These models suggest that the critical components of developing and implementing IPBS are the active involvement of parents and teachers in developing the plan, support for implementation, ongoing data collection related to both implementation and outcomes, and the identification of resources for families who might need more intensive supports. For a field that is traditionally underresourced, early childhood programs will be challenged to implement this model of consultation. However, the research on school-wide PBS and translation of that model to early childhood programs provides guidance on how to enhance the internal capacity of programs to deliver tiered models of behavior support.

The research on coaching and consultation described above provides initial evidence of the effectiveness of coaching and consultation on implementation as well as outcomes. However, this research is limited by a number of methodological issues. First, much of the research on consultation fails to adequately measure fidelity. To really understand the effects of coaching and consultation on both implementation and outcomes, fidelity data on both the consultation process and the parent or teacher implementation of the behavior plan as designed is needed. Second, in much of the coaching and consultation research, the description of the coaching or consultation is not described with enough detail to be replicable or to understand the extent to which components (e.g., collaboration with families) are implemented. This limits the extent to which this information is useful for practitioners, and it limits the extent to which different models of coaching and consultation can be compared. Finally, coaching and consultation literature often does not directly measure changes in children's behavior. More research is needed on the effects of coaching and consultation on a range of child outcomes.

Of critical concern is the need for children to receive early intervention to address challenging behavior. Data suggest that children in poverty and children with disabilities are more likely to develop challenging behavior. We have described the *Pyramid Model*, which provides programs with a framework for considering the full range of supports that young children might need. We also have described the use of IPBS as an effective intervention for challenging behavior. A critical concern is the capacity of programs and practitioners to implement these approaches and

practices with fidelity. The promise for building the capacity of practitioners and programs is through the provision of coaching and collaborative consultation as described in this chapter. Future work must address the fiscal, policy, and personnel development challenges to ensure these implementation supports can be provided.

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Critical Issues and Promising Practices for Teaching Play to Young Children with Disabilities

15

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Play is a critical milestone that contributes to the learning and development of young children in multiple ways and is essential to their well-being (Ginsburg, The Committee on Communications, & The Committee on Psychosocial Aspects of Child & Family Health, 2007). Play with or near peers is a primary form of engagement for young children and a major developmental indicator (Brown, Odom, & McConnell, 2008; Lifter, Mason, & Barton, 2011). Play promotes independent participation across settings (e.g., homes, classrooms, and communities) and allows children to become active members of their social contexts (Odom et al., 2004). Play is related to better social and communication skills (Lifter, Mason et al., 2011; Mills, Beecher, Dale, Cole, & Jenkins, 2014), promotes improved physical and mental health (Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009), and provides a critical context for developing and fostering relationships with caregivers (Cohn, 1990; Henry, 1990; Smith, 1995) and peers (Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Ladd, 1990; Raver & Zigler, 1997). In fact, the United Nations High Commission for Human Rights asserted that play is the right of every child because it "is essential to the cognitive, physical, social, and emotional well-being of children and youth" (Ginsburg et al., 2007, p. 182). The American Academy of Pediatrics (2007) supports child-led play as it helps children learn to use complex social behaviors (e.g., sharing, problem solving, and resolving conflicts) and self-advocate for their needs. In sum, play provides children with multiple opportunities to learn and engage with the environment, including promoting meaningful interactions across people and contexts (Barton, 2015; Lifter, Mason et al., 2011; McConnell, 2002).

In recent years, child development experts, educators, parents, and researchers have expressed increasing concern about the decreased time that children spend engaged in unstructured or free play. Thus, numerous recent efforts have focused on promoting the importance of play in early childhood. Most children learn play skills through interactions with nurturing, responsive adults and peers in high-quality environments. In fact, for many children, simply providing time for unstructured play is sufficient for ensuring children play and acquire the benefits of play. Early childhood settings should ensure that all children have multiple opportunities and the needed supports for engaging in sustained play of increasing complexity (National Association for the Education of Young Children, 2009). Some

This chapter is dedicated to two individuals who shaped how I watch children play, how I research play, and how I think about play—Mark Wolery and Karin Lifter. I am forever grateful for their guidance and support.

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children with or at risk for disabilities are likely to have delays in play and will require more intentional, systematic instruction to learn appropriate play skills (Thiemann-Bourque, Brady, & Fleming, 2012).

Multiple empirical studies have shown that children with disabilities engage in less complex and fewer play behaviors than their typically developing peers when given the same materials in the same settings (Barton, 2015; Kasari, Chang, & Patterson, 2013; Williams, Reddy, & Costall, 2001); however, there is some controversy regarding the exact etiology and type of play deficits, particularly for children with autism spectrum disorders (ASD; Kasari et al., 2013; Lifter, Mason et al., 2011). Regardless, play deficits are likely to impact development and learning for young children, because playful interactions with caregivers, peers, and teachers are a primary context for learning new skills, particularly social skills, (Barton, 2015; Dunst, Hamby, Trivette, Raab, & Bruder, 2000), are an ideal context for practicing and generalizing skills (Strain, Schwartz, & Bovey, 2008), and provide important information about the child's development and how the child is interpreting their world (Lifter, Mason et al., 2011). For example, children with disabilities are less likely to (a) demonstrate the play skills necessary to participate in natural settings and inclusive classrooms, (b) engage in complex play behaviors that create contextually relevant opportunities for teaching or practicing skills, (c) use play behaviors that occasion social or communication interactions with caregivers, peers, or teachers across settings, and (d) represent their experiences through play or use symbols in their play actions. However, play is more than just a context for embedding new skills. Play is systematically related to other developmental domains (Kasari et al., 2013) and, as such, should be regarded as its own distinct domain and a primary focus of instruction when delayed (Lifter, Foster-Sanda, Arzamarski, Briesch, & McClure, 2011; Lifter, Mason et al., 2011). The purpose of this chapter is to describe evidence-based practices for increasing play skills in young children with disabilities. The chapter begins with a description of play, a rationale for teaching play, and an overview of evidence-based practices for teaching play. The chapter ends with implications for practice and a proposed research agenda for identifying effective and efficient practices to increase play skills in young children with disabilities.

What Is Play?

There are two overarching types of play taxonomies: social play (Parten, 1932) and cognitive play (Barton, 2013; Piaget, 1952; Sherratt & Peter, 2002; Smilansky, 1968). These play taxonomies propose a sequence for the emergence of specific types of play behaviors. Social play and cognitive play follow similar, increasingly complex developmental sequences across taxonomies; Table 15.1 describes these play types and subtypes. However, the specific behaviors are distinct and might require different behavioral repertoires.

Social Play

The most prominent social play taxonomy was developed by Parten in 1932 and remains relevant and useful today. In her taxonomy, she defined play relative to the child's interactions with peers, with or without objects across the following categories: (a) onlooker, (b) solitary, (c) parallel, (d) associative, and (e) cooperative. In onlooker play, the child spends most of her time observing other children playing, sometimes asking questions, commenting, or responding but not overtly engaging in the play activity (Parten, 1932). In solitary play, the child can play alone or proximal to peers. However, the child plays with different toys or with different actions from proximal peers. In parallel play, the child plays proximal to peers, with the same toy or a similar toy, but independently and with no verbal or physical interactions. In associative play, the child interacts with peers (e.g., sharing or verbalizations) and plays with similar, if not identical, objects, but there is no organization of the activity. In cooperative play, a two or more children's play is

Table 15.1 Definitions of social and cognitive play types

Age at onset	Social play Defining the child's play in relation to whom he/she is playing with or near		Cognitive play Defining the child's play in relation to the objects he/she is using	
Infants	Unoccupied	Infants watch people and things with momentary interest rather than play with them	Sensorimotor	Infants explore the world by touching, biting, tasting, hitting, kicking, etc.
	Solitary	Child plays alone with different toys than those of peers near him/her		
Toddlers	Onlooker	Children watch each other play and talk to each other	Relational play	Children explore objects by stacking, building, grouping, etc.
			Functional play	Children use objects in the manner in which they are suppose to be used
	Parallel	Children play near each other with similar toys and talk to each other	Functional play with pretense	Children demonstrate nonliteral use of actual or miniature objects in the manner they are suppose to be used without the reality-based outcome
			Symbolic play	
			Object substitution	Children use objects as if they were something else
			Imagining absent objects	Children perform a motor action that suggests using an object in the objects absence
Preschoolers	Associative	Children play near each other, with the same materials, and talk about their play and the materials but mostly engage in their own play behaviors	Assigning absent attributes	Children assign roles, emotions, or attributes to the self, objects, or others
	Cooperative	Children play together with the same toys for the same purpose. The play activity is based on a goal or topic	Social pretend play	Children engage in various forms of functional play with pretense and symbolic play with peers

organized around a central theme and outcome (e.g., making a building using blocks with peers or playing tag as a group). She also documented an emergence of qualitatively different social play behaviors during early childhood, which provided evidence for a developmental sequence of social play.

Cognitive Play

Conversely, there are numerous play taxonomies that define play relative to the child's behaviors in relation to objects, toys, or materials (i.e., cognitive play). Many cognitive play taxonomies included the following types of categories: (a) sensorimotor, (b) relational, (c) functional, and (d) symbolic play. These categories are often presented sequentially and imply a developmental progression of play. There also is evidence for a developmental sequence of cognitive play for children with typical development (Belsky & Most, 1981). Sensorimotor or manipulative play is first observed in infancy as mouthing and simple exploration of objects (e.g., Lifter, Ellis, Cannon, & Anderson, 2005; Ungerer & Sigman, 1984; Van Berckelaer-Onnes, 2003). This early and simple type of play is characterized by restricted variety in actions performed on objects (e.g., shaking, moving objects from one location to another, or banging objects against other objects) (Lifter et al., 2005) and usually serves an exploratory function (e.g., mouthing puzzle pieces, banging two blocks together, or pushing buttons on a toy to make a sound; Williams, 2003). Relational play includes the nonfunctional combinations of two or more objects such as nesting cups, stacking blocks, or moving objects

in and out of containers (Lifter et al., 2005; Ungerer & Sigman, 1984) and typically emerges as children develop better hand control and hand-eye coordination. Functional play is defined as using objects as they were intended (e.g., coloring with crayons, putting a puzzle together, or sipping from an empty cup). In some taxonomies, functional play behaviors can involve the use of pretense (i.e., sipping from a cup, using a spoon to feed a doll). Pretend or symbolic play typically includes the following subcategories of play: object substitution; assigning attributes to the self, objects, or others; or imagining an absent objects (e.g., Ungerer & Sigman, 1984; Van Berckelaer-Onnes, 2003; Williams et al., 2001). Across most taxonomies, these cognitive play categories encompass numerous behaviors requiring a range of skills and are not mutually exclusive.

Defining Pretend Play

Interestingly, although all cognitive play categories include pretend or symbolic play, there is no ubiquitous behavioral definition or pretend play or precise method for inferring pretend play in children (Barton, 2010). Furthermore, the behaviors, the agents of the behaviors, and the materials vary across definitions of pretend play. Most taxonomies define pretend play as *nonliteral* play behaviors (e.g., the child pretends to drink from a cup, feeds a baby a bottle, or plays doctor with her stuffed animals; Barton, 2010; Garfinkle, 2004). For instance, Williams et al. (2001) included *elaborated functional play* as different from *pretend play*, which (a) reflected the functional use of objects, (b) associated two or more objects together, (c) accompanied by a gesture or vocalization, or (d) directed toward a doll. Taylor and Iacono (2003, p. 84) defined pretend play as "not carrying out an activity to their usual outcome" and "non-literal." DiCarlo and Reid (2004, p. 199) defined pretend play as an action, which "imitated a real-life situation involving objects that corresponded to the toys used in the action." Rutherford and Rogers (2003) recognized the ambiguity in the literature regarding the definitions of functional play versus pretend play. In an effort to avoid excluding all functional play behaviors which involved pretense, they defined pretend play behaviors as any functional play behavior which "might have demonstrated pretend play or was likely to involve pretend play" (p. 294). Thus, functional play with pretense is recognized in the literature as a form of play different from symbolic and functional play, yet is not consistently classified.

Pretend Play Taxonomy

Barton and Wolery (2008, 2010) developed a play taxonomy specifically focused on pretend play to address the inconsistencies in defining and measuring pretend play. This taxonomy (a) deduced four categories of pretend play from the pretend play intervention literature, (b) separated pretend play from other forms of play, and (c) was focused on play with objects and self, not others. Their taxonomy included two major categories of play: functional play with pretense and symbolic play. Functional play with pretense can include the use of miniature or representative objects without the reality-based outcome. This includes placing a doll into a small bed, putting an empty cup up to a doll's mouth, or putting a spoon up to the child's own mouth (Charman & Baron-Cohen, 1997; Lieber & Beckman, 1991). Symbolic play includes three subcategories: object substitution, assigning absent attributes, and imagining absent objects. Object substitution includes using one object as if it were another (Charman & Baron-Cohen, 1997; Jarrold, Boucher, & Smith, 1996; Lifter et al., 2005). This includes using a block as a car, using a rod as a spoon to feed a doll, or using a block as a cup and taking a sip. Imagining absent objects are motor movements resembling activities performed with objects or performed as if an object was present (Sherratt, 2002; Young, Krantz, & McClannahan, 1994). This can include bringing hands to lips as if eating, moving hands as if playing the violin, or moving fingers up and down as if using scissors (Young et al., 1994). Assigning absent sattributes can be focused on the self, others, or inanimate objects. For example, the child might pretend to be a mother with a verbal confirmation or mother-related behavior, the child might give another child the role of mother with a verbal

confirmation (e.g., "Can you be the mom and I will be the dad"), or the child might indicate the doll is the mother with a verbal confirmation or mother-related behavior. Attributes also can include emotions or feelings (e.g., the doll is sad) or using a doll as an agent of action (e.g., having the doll drive a car or feed itself; Mundy, Sigman, Ungerer, & Sherman, 1987; Sigman & Ungerer, 1984; Ungerer & Sigman, 1981).

Social Pretend Play

Pretend play also can involve social interactions with others. Social pretend play is defined by sustained interactions with others around a nonliteral theme or the use of common toys in a nonliteral manner (Lieber, 1993) and is characterized by lengthy interactions, cooperation, reciprocal communication, enjoyment, and positive affect (Connolly, Doyle, & Reznick, 1988). Social pretend play requires children to have (a) the capacity to engage in complex pretend play independently and (b) the social skills to support ongoing interactions with peers (Pierce-Jordan & Lifter, 2005). Social pretend play sometimes is referred to as sociodramatic play (e.g., Goldstein & Cisar, 1992; Thorp, Stahmer, & Schreibman, 1995). In sociodramatic play, social interactions are based on roles within a specific theme (Goldstein & Cisar, 1992). However, pretend play does not require another individual; it can be solitary. Social pretend play, in particular, occasions multiple opportunities for children to talk with their peers, solve social problems, share materials, and regulate emotions in response to others.

Benefits of Play

The benefits of play are well documented and empirically supported. First, research suggests that promoting creative expression through play fosters independence and problem solving in young children (Goetz, 1981; Goetz & Baer, 1973; Holman, Goetz, & Baer, 1977; Ryan & Winston, 1978). Teaching children to increase their creative expression during block building (Goetz, 1981; Goetz & Baer, 1973), unstructured play (Moran, Sawyers, & Moore, 1988), and easel painting (Goetz & Salmonson, 1972; Kratochwill, Rush, & Kratochwill, 1979; Ryan & Winston, 1978) can be beneficial for learning and development in other domains. Creativity in block play, in particular, has been shown to predict academic achievement. For example, Wolfgang, Stannard, and Jones (2001) found that block play complexity in preschool was related to math achievement in high school. Similarly, Hanline, Milton, and Phelps (2010) found a predictive relation between complexity of block play and later reading ability. Additional research has demonstrated relations between complex pretend play and reading (Zigler, Singer, & Bishop-Josef, 2004) and self-regulation (Hanline, Milton, & Phelps, 2009). The research is clear—early experiences that promote creative expression and increasing complexity of play provide a foundation for future development, learning, and social and academic success.

Second, play is an important context for teaching, practicing, and assessing core skills across domains and increases the likelihood of learning in inclusive settings (Buysse, Wesley, Keyes, & Bailey, 1996). Play is flexible, occurring across settings, materials, peers, and skills, and provides an ideal context for practicing and generalizing new skills (Lifter, Foster-Sanda et al., 2011; Lifter, Mason et al., 2011; Sandall & Schwartz, 2008). Play also has reinforcing properties for other skills (Morrison, Sainato, Benchaaban, & Endo, 2002). In fact, multiple evidence-based practices for teaching children with disabilities new skills use play as the context for instruction [e.g., enhanced milieu teaching (Kaiser & Roberts, 2011), peer-mediated strategies (Strain, McGee, & Kohler, 2001)]. One such practice, embedded instruction, is a systematic approach to providing instruction during contextually relevant, ongoing activities and routines to support child engagement and learning (Snyder, Hemmeter, Sandall, McLean, & McLaughlin, 2013). This means teachers plan for and embed a *sufficient* number of instructional trials across the day to ensure children acquire goals and objectives (Snyder et al., 2013; Wolery, 2012). Although play is an ideal context for embedding

instruction to promote acquisition of many skills, embedding instruction into play might not be effective for all children or all skills (Ledford et al., 2015). Teachers should consider the child's current play repertoire (Barton, 2015) and provide additional instructional trials, perhaps using more direct approaches, to ensure children receive a sufficient amount of instruction to master relevant skills in a reasonable amount of time (Wolery, 2012). For instance, children might need complex play skills to benefit from embedded instruction.

Third, play is predictive. In children with typical development, play behaviors are often believed to parallel language development because of the simultaneous advances in complexity (Lifter & Bloom, 1989; Lifter, Foster-Sanda et al., 2011; McCune, 1995; Piaget, 1962). Multiple intervention studies demonstrated simultaneous increases in play and language even when play was the primary target (Barton, 2015; Barton & Wolery, 2010; Craig-Unkefer & Kaiser, 2003). Pretend play also is a predictor of social and language skills, particularly for young children with ASD (Freeman, Gulsrud, & Kasari, 2015; Gulsrud, Hellemann, Freeman, & Kasari, 2014; Kasari, Gulsrud, Freeman, Paparella, & Hellemann, 2012; Toth, Munson, Meltzoff, & Dawson, 2006).

Fourth, play also provides normalized, contextually relevant experiences with peers, which might promote sustained friendships. The Individuals with Disabilities Education Act (IDEA) asserts that children with disabilities are educated with children without disabilities to the maximum extent appropriate (34 CFR §300.114). In fact, IDEA has a strong preference for the placement of young children with disabilities in settings with typically developing children (Musgrove, 2012). High-quality inclusive settings provide children with and without disabilities opportunities to establish friendships. Hollingsworth and Buysse (2009) noted teachers within inclusive preschool classrooms used more active strategies to successfully support friendships between children with and without disabilities (Buysse, Goldman, & Skinner, 2003; Hollingsworth & Buysse, 2009). Furthermore, children in inclusive classrooms often have more positive attitudes regarding children with disabilities (Diamond, Hestenes, Carpenter, & Innes, 1997), which might, in turn, impact their play with peers (Diamond & Tu, 2009) and, at the very least, set the occasion for social interactions with peers (McConnell, 2002). A recent study by Yu, Ostrosky, and Fowler (2014) supports these findings. They found that typically developing children's sociometric ratings of their classmates with disabilities were related to whether or not the child with typical development liked to play with the child with a disability. In other words, if a child with typical development liked to play with a child with a disability, he/she gave that child with a disability a high sociometric rating. This suggested that children with disabilities who were able to play with their peers were more likely to be liked by their peers, which might promote the development of friendships.

Fifth, humans are thought to be unique in their ability to engage in pretend play. Humans can alternate identities for objects, others, and self (Bruner, 1972). As described by Rutherford and Rogers (2003), pretend play promotes (a) the use of symbols for thought (e.g., moving a fist in a circle around the top of a bowl as if stirring a substance in the bowl; Piaget, 1962), (b) social interactions among children (Erikson, 1951), (c) experimentation with various social roles (Smilansky, 1968), and (d) differentiation between thought and reality (Vygotsky, 1933). Thus, pretend play likely promotes the use of complex language, social, and cognitive behaviors.

Sixth, play has practical benefits. Play provides a context for meaningful interactions with others across settings, which promotes a child's independent participation and engagement. Further, when children can independently engage in meaningful play activities at home, it might free up time for caregivers to engage in other important household routines. Also, play, or engagement in preferred activities that are not intended to teach new skills, might be a precursor to leisure skills. Play also is incompatible with challenging or maladaptive behaviors. That is, if we teach children to engage in sustained play

behaviors with or near their peers, they are less likely to engage in challenging or stereotypic behaviors (Machalicek et al., 2009; Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002).

In sum, play deficits can be particularly debilitating because play is a primary context for interactions with caregivers and peers, exploring the environment and learning and practicing new skills (Strain et al., 2008). Thus, play is a *critical* intervention goal and should be intentionally taught using evidence-based practices. The following sections describe the state of the intervention research for teaching play to young children with disabilities.

Play Intervention Research

The intervention research on young children with disabilities is replete with studies focused on increasing the social, communication, and academic behaviors of young children with disabilities. Fewer studies have focused primarily on directly teaching play skills. Although highly correlated with skills across other domains (e.g., communication, social, motor), the unique and idiosyncratic nature of play suggests that effective intervention approaches might need to be specifically adapted and tailored to effectively and efficiently increase the complexity and duration of a child's play repertoire.

Adult Modeling and Prompting

Several recent reviews of the play intervention research have concluded that adult modeling and prompting are related to increased play behaviors in young children with disabilities (Barton & Wolery, 2008) including children with ASD (Jung & Sainato, 2013; Kasari, Freeman, & Paparella, 2006; Lang et al., 2009; Stahmer, Ingersoll, & Carter, 2003). In particular, adult modeling and prompting within a naturalistic teaching approach have proven effective (Barton, 2015; Coe, Matson, Fee, Manikam, & Linarello, 1990; Kasari et al., 2006; Lifter et al., 2005). In naturalistic approaches, the adult follows the child's lead in play, often contingently imitating his/her play actions, and models and prompts a play behavior that is both developmentally appropriate and related to the child's attention and interest (Barton, 2015; Lifter et al., 2005).

Least to Most Prompting Hierarchy

Although some studies did not include precise descriptions of the prompting or modeling procedures (DiCarlo & Reid, 2004; Kim, Lombardino, Rothman, & Vinson, 1989), many described using a least to most prompting hierarchy with live modeling, verbal prompting, and hand-over-hand prompting (Barton & Wolery, 2008; DiCarlo & Reid, 2004; Jung & Sainato, 2013; Lifter et al., 2005). Least to most promoting procedures begin with the natural antecedent (i.e., typically the presentation of the toys) and the adult delivers increasingly intrusive prompts only if the child does not demonstrate the target play behaviors. Most studies described used a three-step prompting hierarchy with (a) presentation of the toys, (b) live modeling or verbal prompting, and (3) physical hand-over-hand prompting (Barton & Pavilanis, 2012; Lifter et al., 2005; Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993). Least to most prompting hierarchies might be more effective than direct, single prompt procedures or other intervention approaches, because they allow the adult to build off the child's play, which complements, rather than interrupts, the play interaction (Barton & Wolery, 2008). For example, Ulke-Kurkcuoglu (2015) found least to most prompting to be more efficient than video modeling for increasing pretend play skills in two of his three child participants, all of whom had ASD. Two participants reached mastery criterion faster within the least to most prompting condition than in video modeling. The third participant reached mastery criterion at the same time within both conditions. Although more comparison studies are needed least to most prompting is a promising practice for teaching play and pretend play in particular.

Errorless Prompting Procedures

Studies have successfully also used errorless prompting procedures to teach play. For example, Colozzi, Ward, and Crotty (2008) used simultaneous prompting (presentation of the toys paired with verbal and physical prompt to play) to teach object play to young children with disabilities. Liber, Frea, and Symon (2008) used progressive time delay procedures paired with task analysis to increase social play skills in three children with autism. Lang et al. (2010) used response interruption and redirection to reduce stereotypy and challenging behaviors in four children with ASD while simultaneously using a most to least prompt hierarchy (i.e., physical, verbal, then model prompts) to teach functional play. They compared the use of the intervention procedures across two conditions: (a) with a presession free-access period to engage in stereotypies (abolishing operation condition) and (b) without a presession free-access period to engage in stereotypies. Their data suggested children spent more time engaged in functional play behaviors and less time in stereotypy and challenging behaviors with a presession free-access period to engage in stereotypy; however, there was some overlap across conditions across children.

Combined Intervention Approaches

Studies also have used a combination of direct teaching and naturalistic instruction to teach play (Kasari et al., 2006; Wong, Kasari, Freeman, & Paparella, 2007). For example, Kasari et al. (2006) and Wong et al. (2007) used priming and a least to most prompt hierarchy with specific schedules of reinforcement to teach symbolic play and other related behaviors to young children with ASD. Similarly, Ingersoll and Schreibman (2006) used adult-prompted imitation training to teach young children with ASD to spontaneously imitate a variety of social communication behaviors as well as pretend play actions. Their training included contingent imitation, verbal mapping of the child's play behaviors, and modeling. Likewise, Frey and Kaiser (2011) used play expansions and modeling to increase the diversity and complexity of play behaviors in three toddlers with or at risk for disabilities. The interventionist used contingent imitation, praise, and verbal mapping as control variables during baseline and intervention conditions. She used play expansions and modeling during intervention only; thus, the relation between each procedural component and target outcomes is unclear. More research on the use of play expansions within a naturalistic teaching framework is warranted.

Pivotal Response Training

Pivotal response training (PRT) is a specific intervention approach that was developed by adapting highly structured, direct teaching (e.g., discrete trial training) for the use in more naturalistic formats (Koegel & Koegel, 2006). PRT involves the systematic use of adult prompting and reinforcement while following the child's lead in play and using his/her preferences. PRT focuses on improving pivotal skills (e.g., object play for children with ASD) that have a large impact on development and learning across domains. Motivation, responsivity to multiple stimuli, and initiation are key components (Koegel & Koegel, 2012). PRT has been used to teach play across a variety of settings and implementers. For example, Stahmer (1995) used PRT to teach children with ASD to spend more time engaged in symbolic play, which generalized across materials and maintained overtime. Pierce and Schreibman (1995, 1997) trained peers to use PRT to increase social play complexity and play initiations in children with ASD. Additional studies have replicated these results; PRT has been shown to increase the generalization of play skills across play partners and materials (Lydon, Healy, & Leader, 2011; Thorp et al., 1995).

Video Modeling

In recent years, numerous researchers have investigated the efficacy of video modeling on a range of behaviors. In fact, multiple independent reviews have concluded that video modeling is an evidence-based practice for children with disabilities and, in particular, for children with ASD (e.g., Bellini & Akullian, 2007; Reichow & Volkmar, 2010; Shukla-Mehta, Miller, & Callahan, 2010;

Wang & Spillane, 2009; Wong et al., 2014). Several of these video modeling studies have focused on teaching pretend play behaviors to young children with disabilities (MacDonald, Clark, Garrigan, & Vangala, 2005; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009).

With video modeling, first a video recording of the model demonstrating the behavior is created; the child observes the video recording of the model, and then the child is given the opportunity to imitate the modeled behavior. Video modeling is rooted in the principles of observational learning (Bandura, 1977). Bandura identified four conditions that must be present for a child to learn observationally; the child must (a) attend to the model, (b) retain the behavior demonstrated by the model until she/he is given the opportunity to reproduce it, (c) have the requisite skills and ability to imitate the behavior, and (d) be motivated enough to imitate the behavior. Video modeling can be more effective than live modeling because (a) the adult has more control over the model, (b) multiple exemplars can be created to promote generalization, (c) the videos can be repeatedly shown to a child and reused across children, (d) the video removes the social aspect of modeling which might be important for children with ASD, and (e) the videos can be edited to remove extraneous or distracting contextual variables.

Using Video Modeling to Teach Object Play

Video modeling is a promising intervention for increasing play skills. For example, MacDonald et al. (2005) found that video modeling was related to increased target play behaviors, which maintained overtime without adult prompting or reinforcement. In their study, two children with ASD increased their use of scripted sequences of play actions and related verbalizations with video modeling and no additional adult prompting. Both children maintained their use of scripts in probe sessions without video modeling. D'Ateno, Mangiapanello, and Taylor (2003) found that video modeling was related to increased play behaviors for a 3-year old girl with ASD. They used video modeling without adult prompts or reinforcement to teach sequences of verbal and motor play behaviors across three distinct toy sets. Palechka and MacDonald (2010) taught three children with ASD to increase scripted play behaviors using adult-created and computer-generated videos. Two of the children learned the scripted play behaviors in the adult-created video faster than the computer-generated videos; there was no difference in efficiency with the third participant. Although each of these studies demonstrated increases in target play behaviors that maintained without adult prompting, none of them measured generalized play to untrained toy sets or the use of novel play behaviors.

Using Video Modeling to Teach Social Play

Video modeling also has been used to teach children with disabilities to engage in play with other children. For example, MacDonald et al. (2005) used video modeling to teach two children with ASD to play with a typically developing peer across three different scripted toy sets. All children learned to use the scripted play and verbal behaviors across toy sets. Reagon, Higbee, and Endicott (2006) taught a 4-year old boy with ASD and his older sibling to use scripted play actions and verbalizations using video modeling. The sibling served as the model in the video clips. The child with ASD maintained play behaviors in probes without video modeling and generalized to their home. However, interpretations of Reagon et al. (2006) results are limited due to the lack of an experimental design.

There are several important caveats in the video modeling research. First, video modeling alone (much like live modeling) might not be effective for all children with disabilities. For some children and some play behaviors, additional adult prompting might be necessary to elicit target play skills than video modeling alone (Shukla-Mehta et al., 2010). For example, Hine and Wolery (2006) used point-of-view video modeling to teach play behaviors to two young children with ASD. One child increased her play skills only after verbal instruction and additional reinforcements were used in combination with the video models. Dauphin, Kinney, and Stromer

(2004) used video modeling along with matrix training and adult prompting to increase the play behaviors of a child with disabilities. Sancho, Sidener, Reeve, and Sidener (2010) compared video modeling alone with video modeling with prompting and reinforcement. One child increased play behaviors in both conditions; however, the other child increased play behaviors more efficiently when video modeling was presented with prompting and reinforcement. Likewise, Taylor, Levin, and Jasper (1999) used video modeling along with prompting and reinforcement to teach scripted play comments to two children with ASD. Systematic instruction might be a necessary supplement to video modeling for some children, including prompting and reinforcement across multiple opportunities to respond, given the complexity of play skills, particularly social play with peers.

Second, several important prerequisite skills should be considered prior to considering using video modeling to teach play. The child should have, for example, (a) delayed imitation skills, (b) the ability to attend to video models, (c) the ability to recall visual stimuli, (d) the motor skills required to perform certain play actions, (e) a play repertoire appropriate given the target play behaviors (i.e., play target should be just above the child's current play level; Lifter et al., 2005), and (f) the motivation to engage in modeled play behaviors. Very few of the studies reported these characteristics. These are critical to assess prior to using and designing a video modeling-based intervention. For example, Nikopoulos and Keenan (2003) taught seven children with ASD to engage in social interactions and play with peers. However, the video modeling intervention was successful for only four of the seven children. All three of the other children did not consistently attend to the video models, had limited play skills, and engaged in behaviors that interfered with their imitation skills. These characteristics were believed to preclude their success with the video modeling intervention. Although the participants in their study were 9 years of age and older, the findings are relevant for younger children with disabilities.

Third, the video format and play targets should be individually selected based on the child's current repertoire, preferences, and using toys and materials that are readily available in the child's natural environment(s). There are several different types of video modeling: basic video modeling, video self-modeling, and point-of-view video modeling. Basic or point-of-view video modeling has been used to teach play skills. The format and specific behaviors prompted should be selected to promote the child's attention to the video and motivation to perform the modeled behaviors. For example, Nikopoulos and Keenan (2004) taught three children with ASD to engage in social behaviors within a play context using video modeling. However, two of the three children increased target social skills only once the videos were modified and the modeled sequences were simplified to focus on target social behaviors. Likewise, preferences for video option (i.e., self or model), activities, and materials should be assessed and used to promote attention to the video and motivation to perform the target behaviors (Mechling & Moser, 2010).

Scripts

Scripts also have been used to teach young children with disabilities to engage in social and object play. For example, Goldstein, Wickstrom, Hoyson, Jamieson, and Odom (1988) and Goldstein and Cisar (1992) used script training to teach children with disabilities and their peers to engage in scripted, complex symbolic play activities. The peers and target children were taught the scripts, and the peers also were taught to prompt and interact with children with disabilities. All children learned the scripts and generalized play behaviors across other peers. Doctoroff (1997) trained three children with disabilities and their peers to engage in scripted, pretend play behaviors. However, children's level of pretend play increased only when peer prompting was added and increases did not maintain overtime. In all three of these script training studies, peers were taught to prompt the play behaviors of children with disabilities; however, adults continued to deliver prompts to the peers, which were not faded.

Scripts also have been used without peers to teach play to children with disabilities. For

example, Neville and Bachor (2002) used systematically modeling and prompting of scripted play behaviors to increase individual play skills in five children with disabilities. All five children increased play skills with the script training intervention; however, they implemented a withdrawal design, and play behaviors did not return to baseline levels with the withdrawal of the intervention, which limits interpretations of the results. Interestingly, their findings also suggest play is not readily reversible and might be better suited to designs that do not require behavioral reversals (e.g., multiple probes versus A–B–A–B).

Summary of Effective Practices to Teach Play

As described by Reichow in Chap. 7, there are important differences in the conceptualization of evidence-based practices. For some, evidence-based practice refers to a cyclical process of selecting an appropriate intervention and ensuring the chosen intervention is having the desired outcomes. For others, evidence-based practice is used more as an adjective to indicate that an intervention has amassed sufficient amounts of evidence to qualify as evidence based. Using the first conceptualization, there are multiple promising practices (e.g., least to most prompting, video modeling) from which to start when planning instruction focused on teaching play. Conversely, Horner et al. (2005) and Kratchowill et al. (2013) subscribe to the latter conceptualization. They suggested the 5–3–20 rule when identifying an evidence-based practice. This refers to five studies, across three research groups, with at least 20 demonstrations of an effect (e.g., across behaviors, participants). There are not five studies that meet contemporary design standards *and* demonstrate strong evidence documenting a functional relation between a specific intervention type (e.g., scripting, least to most prompting, PRT, video modeling) and the play behaviors of young children with disabilities. Further, given the idiosyncratic nature of play, the heterogeneity of children with disabilities, and known history of adaptations across the play research, it might be unlikely that an evidence-based practice specific to play and children with disabilities will emerge that adheres to the 5–3–20 rule. Thus, practitioners should plan intervention focused on play using an iterative process that incorporates research evidence, clinical expertise, and child and family preferences and values. The next section will delineate several practical implications for teaching play and topics for future research.

Practical Implications and Future Research

Designing Instruction

This chapter provided an overview of the benefits of play. Young children with or at risk for disabilities, who engage in play less often with objects or peers or demonstrate less variety and complexity in their play, should have instructional goals focused on play. Careful consideration should be made in regard to the instructional procedures used (e.g., least to most prompting, video modeling), specific prompts chosen (e.g., verbal, visual, in vivo modeling), and the types of reinforcement used. The specific prompts, however, should be selected and individualized based on the child's learning history. For example, DiCarlo and Reid (2004) started with a choice of two centers and then provided additional prompts if the child did not play. Barton and Wolery (2010) used visual prompts, choices, and presenting the toys on the child's lap based on the child's response to the intervention. Several of the video modeling studies added specific prompts or reinforcement based on child responses to the video modeling (e.g., Hine & Wolery, 2006; Nikopoulos & Keenan, 2003).

Prompt Selection

Future research should examine different child characteristics and their relation to specific prompt types. Although there are multiple comparative studies examining different instructional components, few of these studies focused on

teaching play targets. Recent research has examined child preferences for instruction and found that (a) preference is not always related to efficacy and (b) preferences can be modified using observation or changes to reinforcement contingencies (Hanley, Tiger, & Ingvarsson, 2009; Heal, Hanley, & Layer, 2009; Leaf et al., 2012). Future research should examine child preferences as it impacts play instruction. For example, does a preference for contexts (e.g., with or without peers) or materials impact instructional efficacy? Likewise, future research might assess child preferences for different prompt types, sequences, learning formats (e.g., individual or small groups), or contexts prior to intervention for teaching play. These comparative studies will be critical for advancing the field's knowledge about conditions under which children learn to play and learn within play contexts.

Generalization and Maintenance

Researchers also should consider the impact on generalization and maintenance of intervention. Although emerging research supports the predictive nature of play, these studies are correlational, and the long-term benefits of play are unknown. Further, few studies have measured generalization and maintenance of play to natural settings including home environments and free-play times or activities in classrooms. Barton (2015) measured generalization to a free-play setting across four children with disabilities, but the toys were very similar to the intervention toys, and maintenance was collected immediately after the end of the intervention. Additional research is needed examining maintenance across longer time span, perhaps measuring complexity of play overtime, and generalization across different toys, adults, and settings.

Fidelity

Contemporary design standards for both group and single-case research include an emphasis on procedural fidelity. Fidelity is particularly important given that practices are more likely to be effective if they are implemented as intended (Strain & Bovey, 2011; Vernez, Karam, Mariano, & DeMartini, 2006). Implementation science is the scientific study of the variables and conditions that impact the effectiveness and sustainability of evidence-based practices (Fixsen, Blasé, Duda, Naoom, & Van Dyke, 2010). Implementation science has provided the field with additional knowledge regarding how we conceptualize, measure, and consider fidelity (Fixsen et al., 2010). That is, procedural fidelity is a critical component related to the independent variable. The play intervention research is characterized by a lack of reporting procedural fidelity (Barton & Wolery, 2008; Jung & Sainato, 2013). Future researchers should ensure fidelity is adequately measured and reported. Further, if the study included coaching of teachers, the fidelity with which teachers are coached and the fidelity with which teachers implement the intervention will be critical to measure and report. Although fidelity is necessary, implementers might also need flexibility to implement procedures in different ways depending on contextual variables such as student need (Harn, Parisi, & Stoolmiller, 2013), which might be particularly important for play given its dynamic nature. Although high fidelity is desirable, more research is needed to determine the extent to which fidelity impacts outcomes. No studies to date have compared low to high-fidelity implementation of instruction to teach play. In doing so, adherence to the planned high- or low-fidelity procedures should be reported.

Reinforcement

Specific care should be taken in selecting reinforcements for interventions focused on play. In natural settings, children play independently irrespective of the social context *and* as a means of interacting with peers or adults. That is, children engage in play because play has its own reinforcing properties or because play provides a context for social interactions (e.g., a child might play near peers in the housekeeping area, taking turns feeding and dressing dolls and stuffed animals). Thus, a natural reinforcement for play might be giving the child time to play with specific preferred toys or responsive interactions from an adult or a peer

(e.g., the child takes a turn and then the adult takes a turn). In fact, for many children with typical development playing with objects in meaningful ways might be reinforcing enough to promote sustained or more complex play (e.g., a child makes a town with blocks and pushes cars and trains through and around it without any notice of his/her peers). Alternatively, having peers or adults play with them might be reinforcing enough to sustain or expand on their play. However, this might not be the case for children with disabilities. Social interactions during play might not be reinforcing for children with disabilities, particularly children with ASD. Further, children with disabilities might prefer to play with objects using repetitive or restrictive actions, which would not promote more complex play. Thus, additional reinforcers should be used (e.g., edibles, stickers, preferred objects, positive comments given with positive affect) to promote their play skills.

Although there are a few examples where reinforcement was not used at all in the play intervention research, these studies often used peers (who were likely providing social reinforcement in the form of playing with the target child) or had limited outcomes. For example, MacDonald et al. (2009) used video modeling alone, without reinforcement, to increase scripted and cooperative play behaviors in two children with ASD and two peers with typical development; however, increases in novel play were minimal, suggesting a lack of generalization to new play behaviors. Sancho et al. (2010) found video modeling with prompting and reinforcement was more efficient than video modeling without prompting and reinforcement for one of two children with ASD. Although the distinction between prompting and reinforcement were not compared, this study highlights the need for individualized instructional decisions when teaching play.

There also are successful examples of the individualization of reinforcement in the play intervention research. Barton and Wolery (2010) and Barton (2015) modified reinforcement contingencies based on child performance. Barton and Wolery (2010) used edibles with praise for one child with ASD, which were thinned completely within one tier (i.e., toy set). Praise was used in subsequent tiers for this child and all tiers for two other children. Barton (2015) used edibles with positive comments for one child with ASD, which were systematically thinned from a continuous schedule to an intermittent schedule of reinforcement and used throughout each tier. Positive comments related to play were used to reinforce target play behavior for the other three children in this study.

Using Praise for Play

Behavior-specific praise (e.g., "Good playing with your doll!") is effective for increasing pro-social and appropriate behaviors in young children. For example, Ulke-Kurkcuoglu (2015) used edibles paired with basic praise during both least to most prompting and video modeling sessions, and all children learned the play targets. However, praise in this manner should be used with caution during play interactions, because it might interrupt rather than extend the play interaction. For example, saying, "Good playing with the baby!" might cause the child to pause or discontinue a play scheme. Behavior-specific praise during play can be adapted to extend the interaction. For example, a positive comment such as "Your baby is hungry!" might extend the child's play and be a more natural response than "Good feeding the baby the bottle!" For some children, behavior-specific praise might be important to use during initial sessions and thinned to a more natural positive comment regarding their play overtime. Many of the play intervention studies described using praise or verbal reinforcement but did not provide precise information regarding the type or quality of praise used (e.g., DiCarlo & Reid, 2004; Lang et al., 2009; Neville & Bachor, 2002). Conversely, Ulke-Kurkcuoglu (2015) provided specific examples of their praise statements. This could be a critical component of play interventions and should be described and examined in future studies.

In sum, preferences assessments should be conducted prior to starting intervention to assess the child's preference for social interactions, behavior-specific praise, edibles, or other tangible items. Also, reinforcement (in any form—praise or tangibles) should be systematically thinned as efficiently as possible to promote

independent play under natural consequences. Given the social nature and the potential reinforcing qualities of play for some children, future research should examine the differential qualities of different types of reinforcement used within play interactions. For example, does specific praise function as positive reinforcement or does it interrupt the play interaction for some children under some conditions? Is behavior-specific praise more likely to increase object play complexity or social play skills?

Selection of Play Targets

One major limitation in the play intervention research is the inconsistency in which play is defined and measured (Barton & Wolery, 2008; Barton, 2010; Jung & Sainato, 2013; Lifter, Foster-Sanda et al., 2011; Lifter, Mason et al., 2011). This limits interpretations of the intervention research and makes syntheses difficult. Additionally, there is limited research on the normative rates of play for young children in natural settings. This makes the selection of play targets difficult and limits the use of play as a context for teaching other goals. Lifter et al. (1993), Lifter et al. (2005), Lifter, Foster-Sanda et al. (2011), Lifter, Mason et al. (2011) made a case for considering a developmental sequence when selecting intervention targets for play. They suggest assessing the developmental progress in play prior to starting intervention. Lifter, Mason et al. (2011) analyzed the derivation of play targets across a sample of play intervention studies and noted that some studies did not describe how play targets were selected. They concluded that (a) a variety of play instruments are available and (b) there are inconsistencies in the methods used to determine play targets.

Teaching children to play requires clear operationalized definitions. Although individualization and variation in play goals across children are expected, consistency in broad categories might be necessary for advancing the research on play interventions and linking practices to specific outcomes (Lifter, Foster-Sanda et al., 2011). Future research should consider linking play assessments (e.g., Developmental Play Assessment, Lifter, 2000) or play taxonomies (Barton, 2010) to play interventions. Likewise, children engage in a range of behaviors across domains *during* play. Children use motor skills, language skills, and social and emotional skills. Thus, it might be important to specify play targets *and* targets for play-related behaviors. For example, it might be important to measure changes in the child's affect (Kasari et al., 2013) or improvements in language (Lifter, Foster-Sanda et al., 2011; Lifter, Mason et al. 2011) as a result of a play intervention.

Baseline

The issue of baseline measurement is a critical topic to consider in play intervention research. The overarching goal of play should be that children are independently motivated to engage in increasingly complex and social play behaviors. Thus, teaching them to play should be fun, engaging, and a positive experience. Future research should use experimental research designs that allow for intermittent baseline data collection (e.g., multiple probe across days) rather than continuous, because intermittent data collection might decrease the likelihood of toy or interventionist satiation. Also, there is empirical evidence to suggest that play behaviors are not readily reversible (Goldstein et al., 1988; Neville & Bachor, 2002); thus, designs that do not require reversals should be favored. Multiple probe designs (Gast & Ledford, 2014) are a reasonable option for conducting single-case research designs focused on play.

Careful consideration also should be taken in designing baseline sessions and identifying control versus intervention variables. For example, some baseline conditions have consisted of the researcher simply giving the children the toy sets in a clinic or a natural setting and telling them to "go play" (e.g., Stahmer & Schreibman, 1992). There are several issues with these procedures. First, if conducted in a clinic setting, it might not be an accurate measure of the child's typical play given both the settings and materials are unfamil-

iar to the child. Second, if conducted in a classroom setting, the child might move to another area of the classroom. Third, the absence of the interventionist during baseline and his/her presence during intervention might limit interpretations of the results. If the interventionist is the child's teacher, baseline might consist of the teacher playing with the child as he/she normally would. The teacher could be instructed to avoid promoting new play behaviors, and procedural fidelity should be measured (Barton, 2015; Goldstein & Cisar, 1992). The teacher could begin using the instructional procedures during intervention conditions. However, questions remain regarding situations when the interventionist does not have a rapport with the child; should they interact with the child at all to build a rapport? How should they interact with the child?

Recent research suggests, *not playing* with the child during baseline sessions might create an aversive situation for the child. For example, Barton et al. (2016) conducted a brief B–A–B design across two boys with Down syndrome to examine the effects of different baseline contexts. In the B condition, the interventionist (who was a researcher, was not the child's teacher, and did not have a rapport with the child) used contingent imitation and commented on the child's play, and positive affect, but did not prompt any play behaviors. Both children engaged in higher than expected rates of play, although mostly repetitive play actions. During the A condition, the interventionist did not use contingent imitation or commenting and only smiled when the child initiated an interaction. The A condition was conceptualized as more of a "true baseline." Contingent imitation and descriptive comments were often included as components of play interventions; thus, the A condition was more different than previous interventions used to teach play. However, during the A condition, both children reduced play levels to zero or near zero. One child put his head down and did not interact with the toys at all by the third session in A. The other child began refusing to come and sit with the interventionist and hid when she walked in the classroom during A. With the return to B, one child returned to previous play levels and engaged in the similar repetitive play with the toys; however, when the interventionist began using prompting (the C condition), the child did not respond to prompts and, despite multiple adaptations to the procedures, never increased play. The other child, however, did return to previous levels but continued to attempt to avoid playing with the interventionist. This suggested the A condition created an aversive context for the children.

Future studies should consider using "enhanced baselines." For example, commenting or imitation (without promoting) could be considered control variables and used during baseline to build a play rapport with the child. For example, Lang et al. (2010) provided free access to toys, and the interventionist (who did not have a rapport with the child) made positive verbal statements to the child every 10 s without demands or prompts during baseline. Lifter, Ellis, Cannon, and Anderson (2005) provided free access to the toys, and the interventionist (who was child's teacher) commented on the child's actions but did not praise any play. Barton and Wolery (2010) instructed the interventionist (also the child's teacher) to play with the child as they normally did without prompting any play; teachers were not trained or coached on intervention procedures until after the initial baseline condition. In sum, baselines should be designed to provide an accurate and reliable measure of the child's play prior intervention while *maintaining* the child's motivation to play with the toys and the adult or peers.

Conclusion

Play contributes to the cognitive, physical, social, and emotional well-being of children. Play also offers an ideal opportunity for parents, siblings, peers, and teachers to engage with children with disabilities in natural, meaningful, mutually beneficial ways. The research is clear—early experiences that promote increasing complexity of play provide a foundation for future learning, participation, and success. Children with disabilities, however, play less often and use fewer varied play behaviors than children with typical development. This means, even when provided with developmentally appropriate materials and

unstructured time to engage in play, children with disabilities are more likely to use the objects or materials inappropriately, engage in repetitive behaviors, and use fewer complex behaviors. This is true across a variety of play contexts. Thus, there is value in elevating play to its own developmental domain and maintaining time for play as a primary focus of curricula for young children. As outlined in this chapter, there are several promising practices related to improved play skills for young children with disabilities and extensive opportunities for future research.

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Part III

Maximizing Current and Future Child Outcomes with Evidence-Based Practice

Personnel Development Practices in Early Childhood Intervention

16

Mary Beth Bruder

Introduction

This country is currently experiencing an unprecedented expansion of government-sponsored early learning programs for infants, toddlers, and preschool-age children (Allen & Kelly, 2015b; Kagan & Kauerz, 2012b; National Governor's Association, 2010; Shonkoff, 2010; U.S. Department of Education, 2015; World Health Organization, 2012). Research identifying the conditions necessary to support optimal brain development during the early years of life (see Sameroff, 2010; Shonkoff, 2010; Yoshikawa et al., 2013) has created an urgency to begin or expand federal early childhood (EC) initiatives such as Head Start, home visiting programs, Early Learning Challenge grants, and Preschool Expansion grants (Gomez, Kagan, & Fox, 2015). In addition, early childhood intervention (ECI) programs for children with disabilities continue to grow at a rapid rate as more children are identified as eligible for services under the Individuals with Disabilities Education Improvement Act (IDEA): Part C for infants and toddlers or Part B (619) for preschoolers (Brown & Woods, 2011). Over the past years there have been documented increases in the numbers of children being identified with established or acquired risks to development such as autism spectrum disorder (ASD) (289.5 % increase in incidence over 12 years) or those living in poverty (25 % of children under 5) (Boyle et al., 2011; www.childstats.gov).

As EC programs continue to grow and serve larger numbers of diverse infants, young children, and families, attention has focused on the qualifications, knowledge, and skills of the workforce who staff these programs (Allen & Kelly, 2015a). For preschool-age children under IDEA (Part B 619), this includes special educators and related service personnel; infants and toddlers (Part C) have many of the same categories of service providers with a major distinction from Part B being the absence of a required special educator. For example, personnel categories for both programs include audiologists, deaf and hard of hearing specialists, EC educators, EC special educators (ECSE), family therapists, infant mental health specialists, nurses, occupational therapists, orientation and mobility specialist, paraprofessionals, physical therapists, psychologists, registered dietitians, social workers, speech and language pathologists, and vision specialists. States can also determine additional personnel categories that can provide services under IDEA, and these have included service coordinators, board-certified behavior analysts, infant mental

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health specialists, developmental specialists, ECI para-educator, and other categories unique to infants, toddlers, and preschoolers. While a team approach to service delivery under an Individualized Education Plan (IEP) for preschoolers, or Individualized Family Service Plan (IFSP), is implicit for both the preschool and infant-toddler program under IDEA, Part C explicitly states that the role of the early interventionist is to participate on a team to develop the IFSP and to train the family and others in the provision of early intervention services.

It has been reported that approximately 41,203 teachers and 46,138 para-educators are providing preschool special education services under IDEA (U.S. Department of Education Office of Special Education & Rehabilitative Services Office of Special Education Programs, 2014). While there are no personnel data collected about those providing services under Part C of IDEA, a sample state such as CT (population of birth to 3 year olds = 110,000) employed 1100 practitioners to serve approximately 5034 eligible infants and toddlers in 2013–2014 (www.birth23.org/aboutb23/AnnualData.html). While numbers of related service personnel under Part B of IDEA are available (U.S. Department of Education Office of Special Education & Rehabilitative Services Office of Special Education Programs, 2014), there is no breakdown of types of personnel by age served (e.g., preschoolers). One estimate on speech and language pathologists suggests that approximately 71,000 provide service to children under age 5 (Prelock & Deppe, 2015). In addition to the numbers of personnel serving children under the IDEA, the US Bureau of Labor Statistics reports that there were 438,000 preschool teaching jobs in 2012 and 1,312,700 child care jobs to provide care to children from birth to age 5. The qualifications for these teachers vary by state, though 30 states require at least a bachelor's degree for those teaching in a state funded program, 45 states require specialized training for teachers in pre-K, and 43 states require 15 h of in-service a year (Barnett, Carolan, Squires, Brown, & Horowitz, 2015). It is very likely that these early care and education teachers have taught at least one child who would qualify for IDEA services and many more who demonstrate one or more risk conditions. The distinction between those children who qualify under a state's eligibility criteria for IDEA and those children who do not varies, both within and across state EC programs.

This heterogeneous composition of children attending EC programs has emphasized the need for an increasingly versatile and competent workforce that can address a range of children's abilities and needs. Unfortunately, recent examinations of the status of the EC workforce have identified a number of issues that have impacted the quality and effectiveness of EC practices, services, and programs (cf. Allen & Kelly, 2015b; Boe, 2014; Bruder, 2010; Bruder, Mogro-Wilson, Stayton, & Dietrich, 2009; Gomez et al., 2015; Woods & Snyder, 2009; Zaslow, 2009). These include: shortages of personnel; inequities in wages and compensation for personnel across EC programs; shortages of preservice EC programs of study, coursework, and practicum opportunities; limited funding for EC continuing education; the absence of integrated and comprehensive personnel development systems that meet national personnel standards and adult learning guidelines; and limited experimental evidence about the effects of preservice preparation and/or in-service continuing education on EC improvements in program quality and child and family learning. While the issues seem daunting, they must be addressed as we continue to build integrated and effective comprehensive state and local systems of EC education for all infants, young children, and families. This charge has been most recently been reinforced by the Institute of Medicine (IOM) and National Research Council (NRC), (Allen & Kelly, 2015b).

The purpose of this chapter is to provide an overview of the evidence that is informing and guiding personnel preparation (preservice) and continuing education (in-service) practices for those providing early intervention (children aged 0–3) or preschool special education (children aged 3–5) to eligible infants and young children and their families under the IDEA. The term professional development (PD) will be used in addition to preservice and in-service, primarily when

used by authors' whose work is cited. The term early childhood intervention (ECI) will be used to refer to the system of specialized services and interventions provided to a child as delineated on his IFSP or IEP. These services and interventions are delivered in a variety of places, including inclusive early childhood community settings such child care and other toddler and preschool programs that meet the IDEA requirements of least restrictive settings or natural environment, as listed on a child's IFSP/IEP which is developed in collaboration with family members and delivered by personnel who meet state requirements to provide services under IDEA.

The focus of this chapter does not negate the acknowledgment of the multitude of other personnel that constitute the EC workforce and are also involved in planning, implementing, and evaluating prescribed curriculum adaptations or specific interventions within the general education curriculum for an eligible infant, toddler, or preschool child under IDEA. Indeed, the focus on personnel development in early childhood has embraced a cross-sector focus (see Allen & Kelly, 2015a); however, the scope of this chapter precludes a widespread examination of EC personnel development practices across the range of personnel categories, including those from related services under IDEA. It should also be acknowledged that the evidence that supports professional development methods and strategies for those providing ECI services under IDEA has been generated, in part, within the field of EC education (Zaslow, Tout, Halle, Whittaker, & Lavelle, 2010), special education (Sindelar, McCray, Brownell, & Lignugaris/Kraft, 2014), general education (Darling-Hammond & McLaughlin, 1995; Guskey, 2014), and adult education (Knowles, 1980). The exclusion of critical work from these fields is not intentional but reflective of the structure of this chapter.

The chapter will first provide a historical perspective of the foundations of ECI personnel practice: legislation, theoretical and conceptual frameworks, and pedagogy. The chapter will then present evidence used to guide ECI preservice and in-service practices that result in positive change with infants, young children, and families. A summary will be followed by recommendations to support the growth of evidence-based ECI personnel practices.

Most importantly, the chapter is written with the perspective that the ultimate goal of any personnel intervention is to improve students' learning by enhancing teachers' use of evidence-based approaches to instruction (Diamond & Powell, 2011, p. 76). This has been represented in the literature as both a conceptual framework and theory of change (see Desimone, 2011; Dunst, 2015; Snyder, Denney, Pasia, Rakap, & Crowe, 2011) as illustrated in Fig. 16.1.

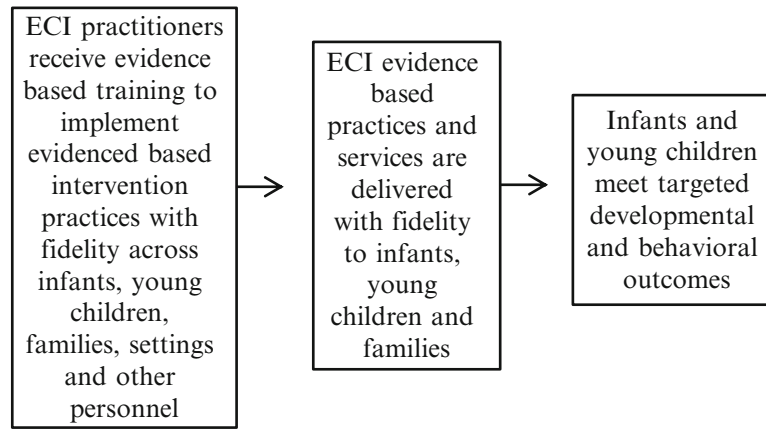

Fig. 16.1 Theory of change for early childhood personnel development

Historical Foundations of Personnel Development Practices

Legislation

An overview of the history of legislation related to early childhood special education is contained in Chap. 1 of (McLean et al., this volume). The current legislation for early childhood special education was passed in 2004 as the Individuals with Disabilities Education Improvement Act ((P.L. 108–446), which deferred to and adopted many of the provisions for general education students passed in 2001 as P.L. 107–110, the Amendments to the ESEA (referred to as the No Child Left Behind Act or NCLB). For example, the IDEA amendments required that special education services be based on scientifically based research findings as defined under NCLB: research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs. To guarantee this provision, IDEA required that special education teachers meet the NCLB standards for a highly qualified teacher. It also required that all other personnel are appropriately and adequately prepared and trained to have the content knowledge and skills to serve children with disabilities and meet qualifications consistent with any state-approved or state-recognized certification, licensing, registration, or other comparable requirements that apply to the area in which such personnel are providing either special education and related services (Part B) or early intervention (Part C) services.

The 2004 amendments of IDEA also added Part E to establish the National Center for Special Education Research (NCSER) within the Institute of Education Sciences (IES). The NCSER's mission was to sponsor research to expand knowledge and understanding of the needs of infants, toddlers, and children with disabilities in order to improve their developmental, educational, and transitional outcomes, sponsor research to improve and support the implementation of IDEA, and evaluate the implementation and effectiveness of IDEA (36th Annual Report to Congress on the Implementation of IDEA, 2014, p. 201). Studies under both the educational research program and the special educational research program under IES follow the same conceptual progression beginning with development studies that use an iterative participatory approach to develop interventions, to research that studies the efficacy of an intervention under ideal conditions, and to trials that examine the impact of scaled up efficacy studies implemented in authentic settings under routine conditions. While studies can be funded without progressing through this sequence, the progression unfolds over 13 years if the research focus was funded continuously. Other IES competitions include exploratory research, secondary data analysis, and measurement, as well as training and research programs for doctoral, postdoctoral, and early career professionals. IES also funds the National Center for Research on Early Childhood Education. During the fiscal year of 2013, 18 research grants were funded under NCSER, representing 5 % of those that were submitted. Five of these awards were in the area of ECI, and three explicitly include the training of teachers.

While IDEA has always contained provisions for both preservice and in-service learning for those in ECI through the award of discretionary grants to Institutions of Higher Education (IHE) and state systems of special education and early intervention, the development of statewide comprehensive systems of personnel development (CSPD) which had been required from the inception of IDEA in 1975 is no longer required in Part B. The current statute contains provisions under Part D for competitive grants to be awarded to IHEs for preservice training that addresses scientifically based knowledge and skills. In-service funds are available for states to increase and improve the knowledge and skills of special education and regular education teachers, principals, and para-educators to plan, develop, and implement effective and appropriate IEPs and in the use of effective instructional strategies, methods, and skills.

All IDEA training funds are awarded under the PD guidelines established under NCLB: PD is high quality, sustained, intensive and content focused to advance teacher understanding of effective scientifically based instructional

strategies; it is aligned with state academic and student performance standards; it provides follow-up training to teachers to ensure that knowledge and skills are applied in the classroom; and it is developed with extensive participation of teachers, principals, parents, and administrators of schools. Most important is the requirement that PD is continuously evaluated for impact on teacher effectiveness and student achievement.

Theories and Frameworks

Adult Learning

Guidance on adult learning and teacher PD was produced by the Commission on Behavioral and Social Sciences and Education of the National Research Council (NRC) after a 2-year study conducted by the Committee on Developments in the Science of Learning (Bransford, Brown, & Cocking, 1999). The findings of the study produced recommendations for effective adult learning activities, and a second book produced by the study applied the findings to education (see Bransford, Brown, Cocking, Donovan, & Pellegrino, 2000). In particular, the use of inquiry, experimentation, and research to guide learning was emphasized, along with job-embedded PD that was sustained, intensive, and supported by modeling, coaching, feedback, and problem-solving around student-specific needs.

This work on adult learning was preceded 40 years earlier by Malcolm Knowles (1962) and others who studied the learning processes of adults. Knowles defined an adult educator as one who has responsibility for helping adults to learn and, as such, has a mission to meet the needs and goals of the individual, the needs and goals of institutions, and the needs and goals of society (Knowles, 1980, p. 27). Knowles felt that these tasks should be guided by theory, which he defined as a comprehensive, coherent, and internally consistent system of ideas about a set of phenomena (Knowles, 1973, p. 6). Knowles' theory, andragogy, stressed self-directed learning and was based on thorough reviews of the literature and research on learning theory (Knowles, 1962). Other assumptions that formed the basis of Knowles' theoretical framework included the adults' need to know why they needed to learn something (motivation), the need to have learning be experientially referenced to prior learning, and the need to have immediacy of the learning to application and problem-solving (Knowles, 1984, p. 12). He also stressed the importance of the adult educator to the learning process and provided guidelines which are on Table 16.1.

Knowles' theory on self-directed learning was expanded and applied to research on teachers (Wood & Thompson, 1980). They recommended that PD focus on job-related tasks that were important, with opportunities for teachers to practice what they were learning. Additionally, they suggested the use of small group learning where teachers could learn from each other by sharing feedback in areas needing improvement (p. 337). Lastly, they suggested that PD should provide learning choices to accommodate different adult learning styles.

Joyce and Showers (Joyce & Showers, 1980) reviewed over 200 studies on PD and categorized them according to their impact on student learning.

Table 16.1 Functions of the adult educator

• Motivating the learner by creating an environment and conditions that will be conducive to facilitate learning
• Diagnosing the learner's needs within the scope of the given situation
• Planning a sequence of objectives and experiences with the learner to produce the desired learning and outcomes
• Selecting the most effective methods and techniques for producing the desired learning
• Providing the human and material resources necessary to produce the desired learning
• Evaluating the learning outcomes and helping the learner self-evaluate and measure their experiences to re-diagnose additional learning needs

Knowles, M. S. (1980). *The modern practice of adult education*: *From pedagogy to andragogy*. Englewood Cliffs: Prentice Hall/Cambridge p. 26–27

The result was a framework to guide teacher learning. The features of their framework included:

1. Description of the theory underlying the target skill
2. Model or demonstration of the skill
3. Practice of the skill in simulated and classroom settings
4. Feedback on performance of the skills
5. Coaching for application: hands-on, in-classroom assistance with the transfer of learning, skills and strategies to the classroom (Joyce & Showers, 1980, p. 380)

The authors concluded that student change occurred only after the last feature was achieved.

A series of investigations to identify practices that facilitate learning transfer resulted in the peer coaching model (Showers, 1984). Peer coaches supported each other through the change process, practiced and used new skills they learned, and collected data about the implementation process and the effects of a new teaching skill on students (Showers & Joyce, 1996, pp. 10–11). A unique component of this coaching model was the absence of verbal feedback within the coaching dyad. Research suggested that feedback was not related to the effectiveness of the model and was costly to teach and monitor teachers' implementation of appropriate feedback (Joyce & Showers, 1995). This coaching model also differed in other ways from others, as the one teaching with students was designated as the coach, and the one observing the teacher was the recipient of the coaching. Most importantly, effective coaching required teachers to implement all coaching components: regular meetings to plan instruction and learning activities, observations of each other while teaching students, and joint reflection on students' learning (Joyce & Showers, 2002). This latter component led to the conclusion that teaching was cognitive in nature and that the behaviors of teachers were driven by their thoughts about the effects of their teaching on student outcomes.

Tom Guskey (1982) also focused on the effects on student learning on teacher behaviors. His initial work focused on teachers' beliefs and attitudes and their relationship to student outcomes. He proposed that teachers' attitudes toward the value of a practice only changed after they saw positive student effects as a result of using the practice. These attitudes became beliefs, which led to increased self-efficacy and problem-solving, and resulted in teachers assuming more responsibility for improving student learning. Guskey (2000) documented this process through an evaluation framework for teacher PD that focused on training content, training context (climate and culture), and training quality. The framework was composed of five levels of evidence for effective PD: The trainees' reaction to new knowledge and skills would influence their learning of new knowledge and skills, resulting in their use of knowledge and skills, as supported by organizational resources, to achieve student learning (Guskey, 2000, 2002).

A reversal to this sequence has been recently proposed for PD planning and implementation (Guskey, 2014). As such, it forms a theory of change that begins with the identification of student learning outcomes. The outcomes then determine the teacher practices and organizational supports needed to achieve them. These lead to the articulation of the teacher knowledge and skills necessary to implement the practices and the optimal professional learning activities to teach the acquisition off the knowledge and skills.

Additional refinements in PD evaluation have been proposed by Wayne, Yoon, Zhu, Cronen, and Garet (2008) and Desimone (2009, 2011). Both attributed their framework to research findings on effective PD: effective PD is intense, sustained, job embedded, and focused on relevant subject matter (Garet, Porter, Desimone, Birman, & Yoon, 2001; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Both also focused on the identification and analysis of PD variables and possible mediators and moderators to subsequent student improvement. For example, Wayne et al. (2008) proposed a twofold framework that differentiates and analyzes the differences between the activities used to teach an instructional practice to a teacher (theory of teacher change) and the effectiveness of the instructional practice to improve student outcomes (theory of instruction).

Desimone (2009) built her framework around the following PD features:

1. Content consisting of what the students should learn
2. Active and participatory learning by the teacher
3. PD coherence to other professional development, teachers' knowledge and beliefs, and school policy
4. PD implemented for at least 20 h of time dispersed over a semester
5. Collective participation by teachers from the same school and grade level

The interactions that occur among these PD features allow for the analysis of teacher and student outcomes. She proposed that as teachers experienced effective PD, they improved their knowledge and skills, and changed their beliefs and attitudes, which resulted in improved instruction and student learning (Desimone, 2011). Most importantly, she recommended using the outcomes of past studies to guide future inquiry into how to best effect student learning (Desimone, 2009, p. 192).

EC and ECI Applications

While many of these adult learning theories and frameworks have explicitly guided the implementation and evaluation of ECI-specific PD (see Bruder & Nikitas, 1992; Dunst, 2015; Snyder, Denney et al., 2011), there have also been PD frameworks developed specifically for EC (Gomez et al., 2015; Kagan & Kauerz, 2012a; Kagan, Kauerz, & Tarrant, 2008; Zaslow, 2009) and ECI (see Striffler & Fire, 1999; Trohanis, 1994; Winton, 1990; Winton & McCollum, 1997; Winton, McCollum, & Catlett, 2008). For example, Zaslow et al. (2010) conducted a review of the PD literature in EC for the US DoED and concluded with the identification of core features of EC PD. These included features similar to others identified in other education frameworks (e.g., Desimone, 2011), with the addition of the ongoing assessment of child progress to inform and monitor the effects of the PD.

The National Professional Development Center on Inclusion used an iterative process to define a framework for EC PD (Buysse, Winton, & Rous, 2009) They define PD as facilitated teaching and learning experiences that are transactional and designed to support the acquisition of professional knowledge, skills, and dispositions as well as the application of this knowledge and practice (p. 3). Key components of their framework include: (1) the characteristics and contexts of the learners and children and families they serve, (2) the content of PD which refers to what professionals should know and be able to do as defined by professional competency standards and credentials, and (3) the learning experiences or the methods used to support self-directed experiential learning that is relevant to practice. The framework also includes a number of other factors that were identified as contributing to effective PD. These include access and incentives for the workforce to participate in PD and having organizational structures, policies, and resources in place to support the PD. Lastly, evaluation is described as an integral component of the framework.

Most recently, the Institute of Medicine, National Research Council, proposed a professional learning framework for EC through their report on the early care and education workforce (Allen & Kelly, 2015b). Each of the 13 recommendations contained in the report is supported by a thorough analysis of need, as well as strategies to remedy the need. Among the multiple layers of this report are recommendations for quality ongoing learning for those in the EC workforce. These recommendations form a conceptual framework to guide PD in EC, and they are comprised of features similar to those found in previous adult learning frameworks with the addition of the use of PD portfolios that build on the entire range of learning activities and training mechanisms, cover the full scope of knowledge and competencies to be supported, and are linked to incentives and career advancement (Allen & Kelly, 2015a, p. 13).

There are adult learning and training frameworks focused on those who work with infants and young children with disabilities. As an example, Walker McCollum (1982) proposed a framework to guide the preparation of ECSE teachers. The framework had three core elements: (1) the content or objectives of what the trainees are expected to learn, do, and feel at the completion of the program, (2) the sequence of training activities from simple to complex and designed to teach the content, and (3) the evaluation of whether the activities resulted in trainees meeting the training objectives. She also stressed that there should be a match between the three elements.

Walker McCollum cited work on in-service conducted by Harris and his colleagues (Harris, Bessent, & McIntyre, 1969) which informed the implementation of her framework. She identified a hierarchy of training activities and linked these levels to different levels of trainee impact. The hierarchy for learning activities began with lectures, proceeding to demonstration, role-play, and guided practice. Trainee impact ranged from awareness to knowledge acquisition to skill development and, lastly, to attitude change. It was recommended the more complex the learning, the more the learner must practice the required behaviors across a variety of situations (Walker McCollum, 1982, p. 53). Lastly, Walker McCollum proposed that training must address the learner's motivation to learn new skills, the adoption of behaviors by the learner to meet these skills, and ways for the learner to self-evaluate the acquisition of these skills.

More recently, Dunst and Trivette (2009) proposed an adult learning framework for ECI after completing a meta-analysis and research syntheses of adult learning strategies. The research synthesis identified active learner involvement as being key to the mastery of new knowledge and skills, along with bidirectional instructor/learner interactions (see Trivette, Dunst, Hamby, & O'Herin, 2009). The resulting framework was termed the Participatory Adult Learning Strategy (PALS), and it was composed of four learning phases: (1) introduction of knowledge and skills, (2) application of knowledge and skills, (3) informed understanding of the learning process using knowledge and skills, and (4) repetition of the learning process. Instructor practices that were identified as being most effective in each phase are on Table 16.2.

Table 16.2 Trainer roles in the different phases of PALS

PALS phases	Trainer roles
Introduction	Preview learning topic
	Describe key elements
	Provide examples
	Include trainee input
	Illustrate application
	Demonstrate application
Application	Facilitate application
	Observe trainee application
	Provide in vivo feedback/ guidance
	Facilitate learner assessment of options
Informed understanding	Establish learning standards
	Engage learners in self-assessment
	Provide guidance to learners
	Provide behavioral suggestions
Repeat learning process	Joint planning
	Trainer guidance
	Trainer/trainee mentoring

This framework also included the incremental presentation of new information to learners in order to facilitate the integration of new learning into the learner's existing knowledge base. Other recommendations included the use of multiple opportunities to foster learning and observations to evaluate the learner's knowledge and skills as measured to a performance standard. In addition, Dunst and his colleagues emphasized the importance of adhering to each PALS feature to assure effectiveness, including the measurement of fidelity to the features of the teaching of intervention practices to the adults and the subsequent delivery of the intervention practice by the adults to the target children (Dunst, Trivette, & Raab, 2013).

Dunst enhanced the PALS framework through a metasynthesis of PD studies that documented changes in student and child learning as a result of PD (Dunst, Bruder, & Hamby, 2015). The

metasynthesis found changes in child and family outcomes occurred only when specific features of PD were used. These features are consistent with other PD frameworks in adult learning and have been recommended for the conceptualization, design, and implementation of high-quality PD in ECI (Dunst, 2015). These features include:

1. Explicit explanations and illustrations of the content or practice to be learned
2. Active and authentic job-embedded opportunities to learn the new practice
3. Performance feedback on the implementation of the practice
4. Opportunities for reflective understanding and self-monitoring of the practice implementation
5. Ongoing follow-up supports
6. Sufficient duration and intensity of training to provide multiple opportunities to become proficient in the use of a practice

The analysis of studies found that the more practices that were implemented, the more effective the training as measured by both trainee and student outcomes. Lastly, PD activities were described as implementation practices, and the instructional skills that professionals learned to use were referred to as intervention practices (Dunst, 2015, p. 211).

Implementation Capacity Building

ECI personnel are also responsible for the implementation of effective and evidence-based student/child/family practices into program and system applications to improve service delivery on a larger scale. One of the original frameworks proposed to accomplish this consisted of a three-level framework to scale up intervention research findings into effective service delivery models (see also Paine & Bellamy, 1982; Paine, Bellamy, & Wilcox, 1984). The framework resulted from a study of implementation features found across successfully scaled up EPB innovations into effective service delivery models in human services programs for children, youth, and adults with special needs. These features included assistance in program adoptions and adaptations and ongoing training and support to enable staff to meet performance standards linked to positive client outcomes. This latter feature was necessary to maintain the integrity and consistency of the intervention features of the model and prevent program drift across sites. Explicit performance criteria was delineated at each level of implementation to insure the reliability of evidence across sites, populations in need of the service, and individuals implementing the services (see Fig. 16.2). The success of this process was attributed to the adherence to operational definitions, measurable outcomes, and well-documented interventions that could be replicated with fidelity. The implementation process was illustrated with examples of effective service models that were scaled up across agencies, age groups, and service sectors. These included teacher PD (Carnine & Engelmann, 1984) ECI (Cochran & Shearer, 1984), and community and school interventions (e.g., Blase, Fixsen, & Phillips, 1984; Walker, Hops, & Greenwood, 1984).

The process of scaling up EBP into effective service delivery models has been refined, improved, and referred to as implementation science (IS) (see Fixsen, Blase, Horner, & Sugai, 2008; Fixsen, Blase, Metz, & Van Dyke, 2013; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Halle, Metz, & Martinez-Beck, 2013; Metz & Bartley, 2012; Tout, Metz, & Bartley, 2013). A recent research synthesis of 25 different community-based IS frameworks documented the expansion and application of this work over the years (Meyers, Durlak, & Wandersman, 2012). The synthesis focused on the identification of the specific procedures and strategies used to achieve an innovation's desired outcomes and the subsequent actions and strategies used to transfer the innovation practice(s) to new settings. Among the authors' findings was that effective implementation was a systemic process composed of a coordinated series of related elements. These findings led to a proposed four-phase framework that includes: (1) considerations about the host setting, (2) creating the structure for implementation, (3) supporting the structure, and (4) improving future applications. These phases are comprised of 14 sequential and detailed steps which move the process from an evidence-based

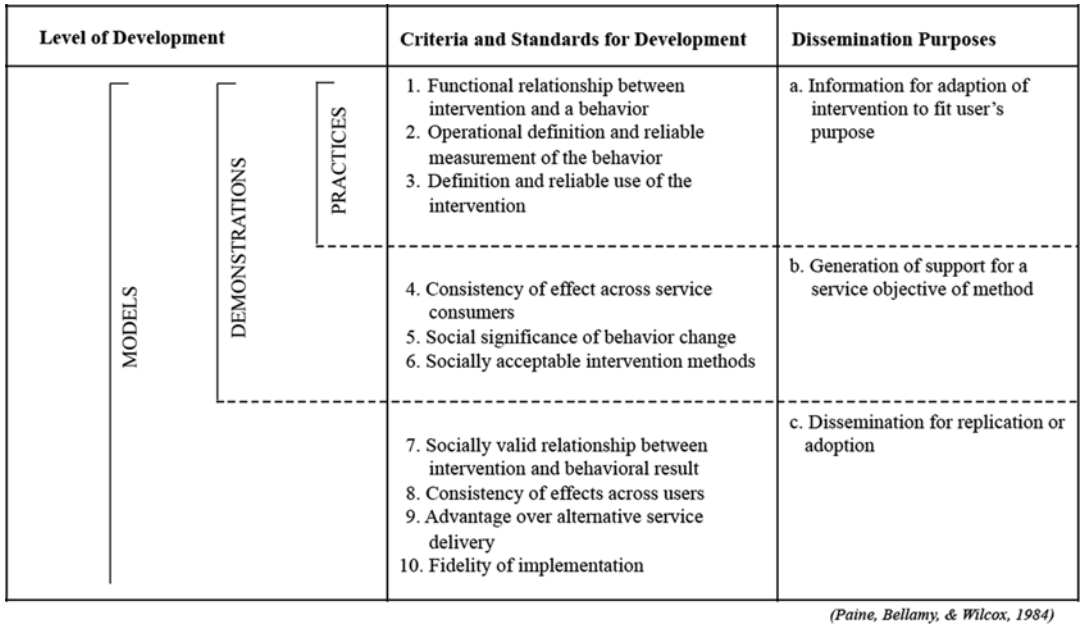

Fig. 16.2 Relationship between program development criteria and standards, dissemination purposes, and levels of development of innovative practices

practice to a community-based model. Staff recruitment, training, ongoing support, and maintenance are critical across all phases.

Most recently, Metz and colleagues (Metz, Naoom, Halle, & Bartley, 2015) proposed an integrated stage-based implementation science framework for specific to EC programs and systems. This framework is comprised of four distinct stages and three core implementation elements within each of these stages. The four stages begin with exploration followed by installation, followed by initial implementation, and finally full implementation of the full program or system. The three core elements embedded within each of the four stages are implementation teams, data-based decision making for progress monitoring and improvement, and sustainable infrastructures for capacity building.

Pedagogy

Pedagogy has been defined as the theory and practice of teaching: the function or work of a teacher. Pedagogy in ECI refers to the knowledge and skills a practitioner needs to know and do in order to facilitate learning in infants and young children with disabilities and their families. The theory and practices of ECI pedagogy have evolved over the past 50 years of service provision, research about the behavioral and learning needs of infants and young children and their families, and the growing evidence base to support both the content and the practices that make up the work of the EC interventionist.

The Federal US Department of Education (DoED) has also helped define the pedagogy of ECI personnel preparation through funding priorities under IDEA. For example, one of the first federally funded early intervention personnel preparation programs was described in the literature by Geik, Gilkerson, and Sponseller in 1982. The program was a graduate competency-based training program focused on five essential roles the authors identified for those that worked with infants: infant specialist, facilitator/consultant, parent educator, team collaborator, and program developer. Each role had assigned competencies, and these were implemented and measured through coursework and intensive practicum experiences.

This program and 39 other ECI preservice program descriptions were reviewed and analyzed for content and requirements (Bruder & McLean, 1988). Thirty of the programs included a training philosophy as their framework, and all 40 provided training to a variety of disciplines. The programs' coursework included the areas of assessment, families, intervention, infancy, and medical issues. Competencies also included teamwork, program administration, and program planning. Research was notably absent in both coursework and competencies. On average, a third of the total program hours were spent in practice, though no information was reported about the supervision of the students during practicum.

These findings contributed to other survey findings about the training needs of preschool or infant intervention (McCollum, 1987). As a result, recommendations for specialized pedagogy for those serving children with disabilities from birth to age five and their families were proposed (McCollum, McCartan, McLean, & Kaiser, 1989). The pedagogy included content and practices for both typical and atypical infant and child development; characteristics of all types of exceptionalities; curriculum and methods; physical, medical, and behavior management; interdisciplinary and interagency teaming; and program management.

ECI pedagogy was further refined by Bailey and his colleagues at the US DoED-funded Carolina Institute for Research on Infant Personnel Preparation. This group defined the core intervention competencies and responsibilities assigned to each discipline providing services under the IDEA through work groups of leaders representing each discipline (Bailey, Palsha, & Huntington, 1990) The ECSE group identified the following to describe their mission: To ensure that environments for infants and toddlers (with disabilities) facilitate children's development in social, motor, communication, self-help cognitive, and behavioral skills and enhance children's self-concept, sense of competence, and control on independence. They also identified 12 ECSE competencies that became the foundation of the CEC EC personnel specialty standards which continue to guide ECI pedagogy today.

National Standards

Personnel standards assist states in developing knowledge and skill requirements for teachers and other personnel. Nationally, professional organizations delineate discipline-specific practice standards to assure the competence of professionals who provide services under the discipline title (e.g., American Speech-Language-Hearing Association for speech and language pathologists providing speech therapy). These standards are used to accredit IHE programs of study (or state recognized alternative programs of preparation) to prepare and graduate students who are then eligible for state licensure or certification to practice under their discipline. To be accredited, IHE programs must match curricula and educational activities to the national standards and best practices in the discipline.

Most disciplines are licensed to serve clientele across the life span (e.g., nurse, occupational therapist, physical therapist, speech, and language pathologist) (cf. Catalino, Chiarello, Long, & Weaver, 2015; Muhlenhaupt, Pizur-Barnekow, Schefkind, Chandler, & Harvison, 2015; Prelock & Deppe, 2015), requiring a broad curricula and practicum requirements in IHE preparation programs. Education has recognized that age levels and content areas (e.g., in ECSE) require specific competencies, therefore encouraging IHEs to offer focused programs of study.

One resulting challenge in early childhood in particular has been the multiple standards developed by national organizations (Allen & Kelly, 2015b). A few examples include the EC Generalist Standards from the National Board for Professional Teaching Standards (NBPTS) that apply to teachers of children from ages 3 to 8 (National Board for Professional Teaching Standards, 2012), the Model Core Teaching Standards, Interstate Teacher Assessment and Support Consortium (InTASC) of the Council of Chief State School Officers (CCSSO) for K-12 teachers (Council of Chief State School Officers, 2011), the EC Professional Preparation Standards from the National Association for the Education of Young Children (NAEYC) for teachers from birth to age 8 (National Association for the Education of Young Children (NAEYC) (NAEYC), 2011), the Initial and Advanced

Preparation Standards from the Council for Exceptional Children (CEC), and the Initial and Advanced Specialty Standards from the Division of Early Childhood (DEC) of the CEC (Stayton, 2015). The CEC, DEC, and NAEYC standards are most relevant to teachers in ECI.

The governing body of CEC created a professional standards and practices committee to develop national standards for special education teachers in 1982. These standards were approved in 1992 and have been continually refined through research reviews and consensus from the field. The current standards were approved in 2012 and include seven initial standards under four areas of focus for entry-level professionals and seven advanced standards for continuing education or leadership program graduates (Council for Exceptional Children, 2014). The CEC initial practice standards and focus areas are listed in Table 16.3.

As one of the 17 subdivisions in CEC, the DEC developed specialty standards to guide the content of ECSE preservice personnel preparation programs and state certification requirements in 1993 (Stayton, 2015). The standards were organized into a set of 93 knowledge and skill statements that aligned with the CEC standards. These were revised and revalidated in 2001 and 2007 (see Lifter et al., 2011), realigned with the language and descriptions used by CEC, and aligned with the six standards and 22 elements used by NAEYC for early childhood teacher preparation programs in IHEs (Chandler et al., 2012; Stayton, 2015). National accreditation under the Council for the Accreditation of Educator Preparation (CAEP, formerly the National Council for Accreditation of Teacher Education) requires IHE preparation programs in ECSE to meet the CEC personnel standards as informed by the DEC specialty set of knowledge and skills statements. When a blended ECSE/EC program applies for accreditation from CAEP, it must meet the DEC and the NAEYC personnel standards. They are also listed in Table 16.3. It should also be noted that ECI has been long recognized for its interdisciplinary focus of intervention (Bricker & Widerstrom, 1996; Bruder & Bologna, 1993; Kilgo & Bruder, 1997; Stayton & Bruder, 1999), yet there are no personal practice standards to guide or accredit interdisciplinary preparation programs (Stayton, 2015).

State Certification/Licensure

Certifications, licenses, or credentials have been used by states to guarantee that teachers have met a standard that qualifies them to provide services to children based on their discipline focus. These are awarded by a state or jurisdiction to individuals

Table 16.3 Early childhood personnel standards and DEC recommended practice areas

CEC focus areas	CEC/DEC initial standards	NAEYC initial standards	DEC recommended practices
Learner and Learning	Learner development and individual learning differences	Building family and community relationships	Environment
	Learning environments		Family
Content knowledge and foundations	Curricular content knowledge	Using content knowledge to build meaningful curriculum	
Instructional pedagogy	Assessment	Observing, documenting, and assessing to support young children and families	Assessment
	Instructional planning and strategies	Using developmentally effective approaches	Interaction
		Promoting child development and learning	Instruction
Professionalism and collaborations	Professional learning and ethical practice	Becoming a professional	Leadership
	Collaboration		Teaming and collaboration
			Transitions

who have completed state-established, minimum requirements usually through approved programs of preparation and specialized examinations (e.g., Praxis) or portfolio review processes (e.g., edTPA). Though states use many names for this credentialing process, they are usually categorized as licensure, certification, endorsement, or a combination.

In 1980 only four states had a specific teacher license for children under the age of 5 (Trohanis, 1985). When the EC provisions of EHA were passed in 1986, specific pedagogy for ECSE teachers was defined to assure a competent and confident workforce. As a result, the DEC published recommendations for teacher competencies for state certification offices and IHE preparation programs (McCollum et al., 1989). The recommendations were specific and supported a professional certification structure that was comprised of an entry-level generalist, and an advanced level focused on either infant-toddler or preschool-age children. The authors stressed the need for a hierarchy of competence recognizing the unique child- and family-focused knowledge and skills required by ECI teachers.

Currently, all states require certification and licensure for those disciplines that provide ECI services under IDEA. Recent reviews of requirements across the 50 states found that in comparison to all other disciplines, the EC and ECSE credentials presented the most variability (C. Chen & Mickelson, 2015; Stayton et al., 2009). There were 23 different age levels addressed by EC and ECSE teacher certifications across states, and there was little congruence between states in regard the exact name of ESCE licensures/certifications. The ECSE titles ranged from infant-toddler family specialist credential, special education preschool certificate, preschool special needs, special education preschool/EC endorsement, and teacher of children with disabilities 0–5 to preliminary education specialist instruction credential with an EC special education specialty. Lastly, while the majority of licensures/certifications required an exam, only 41 % required specific curriculum/coursework, and 55 % required specific field/clinical work requirements (i.e., specified number of hours, populations, age ranges, experiences). Of most concern was the lack of congruence between state certification requirements and national personnel standards in ECSE (Stayton, Smith, Dietrich, & Bruder, 2012).

Recommended Practices

In 1992 the DEC developed a set of ECI-recommended practices that was based on literature on effective practices for young children with disabilities and their families, as well as the knowledge and experiences of researchers and other stakeholders (DEC, 1993; 2014; McLean, Snyder, Smith, & Sandall, 2002; O'Connor, Notari-Syverson, & Vadasy, 1996; Odom, McLean, Johnson, & LaMontagne, 1995; Sandall, Hemmeter, Smith, & McLean, 2005; Sandall, McLean, & Smith, 2000; Smith et al., 2002). The recommended practices began as an initiative to develop guidelines for service delivery in early intervention and ECSE. The first set of practices were published in 1993, and they were developed through an iterative process that included focus groups and surveys of those in the field. The purpose of the practices were to guide families, program personnel, and those in personnel preparation to implement evidence-based services and supports for infants and young children with disabilities and their families. The DEC-recommended practices have recently been revised into seven critical practice areas, under which 66 indicators are delineated (DEC, 2014). The practice areas are also listed in Table 16.3.

Evidence Based ECI Personnel Development Practices

Over the past 35 years, there has been much written and many recommendations offered about the preparation, support, and continuing education of the ECI workforce (Bricker & Widerstrom, 1996; Bruder, 2010; Buysse & Wesley, 1993; Catlett & Winton, 1997; McCollum & Stayton, 1985; Stayton & Bruder, 1999; Striffler & Fire, 1999; Thorp & McCollum, 1988; Trohanis, 1994; Winton, 1990; Winton, McCollum, & Catlett, 1997). The majority of the recommendations were not based on rigorous research, nor did they often result in experimental investigations to test

their validity. Recently, however, there has been a marked increase in both the quantity and quality of empirical studies being conducted on personnel practices in ECI (Snyder, Hemmeter, & McLaughlin, 2011). This seems to be a result of a number of factors including the relatively recent emphasis on EBP under the NCLB and IDEA (Bruder, 2010; Snyder, Denney et al., 2011), the infusion of research funding under the IES (Diamond, Justice, Siegler, & Snyder, 2013), the accountability requirements of publically funded EC and ECI programs (Kagan & Kauerz, 2012a), and the growing need for increased research and rigor to better meet the needs of the ECI workforce (Bruder, 2010; Dunst et al., 2013; Gomez et al., 2015; Horm, Hyson, & Winton, 2013; Kagan & Kauerz, 2012b; Sheridan, Edwards, Marvin, & Knoche, 2009; Snyder, Hemmeter, et al., 2011; Zaslow et al., 2010). Chapter 7, (Reichow, this volume), contains an overview of current thinking around the relation between ECI and EBP and is consistent with the conceptualization of EBP used in the remainder of this chapter.

Though many of the studies on personnel practices address EC at risk populations (Artman-Meeker, Hemmeter, & Snyder, 2014; Buysse, Castro, & Peisner-Feinberg, 2010; Buzhardt et al., 2011; Hemmeter, Snyder, Kinder, & Artman, 2011; Hsieh, Hemmeter, McCollum, & Ostrosky, 2009; Landry, Anthony, Swank, & Monseque-Bailey, 2009; McCollum, Hemmeter, & Hseih, 2013; Moreno, Green, & Koehn, 2015; Pianta et al., 2014; Pianta, Mashburn, Downer, Hamre, & Justice, 2008; Piasta et al., 2012; Powell, Steed, & Diamond, 2010), their findings inform the delivery and evaluation of preservice and in-service for those serving infants and young children with disabilities. Likewise, studies conducted in special education also inform the design and delivery of training to ECI practitioners (Brock & Carter, 2015; Harry & Lipskey, 2014; Ploessl & Rock, 2014; Rock et al., 2009, 2012; Scheeler, McKinnon, & Stout, 2012; Vernon-Dotson, Floyd, Dukes, & Darling, 2013; Westling, Salzberg, Collins, Morgan, & Knight, 2014). As a result, there has been an infusion of knowledge about personnel research and practice that directly applies to ECI and the development and scaling up of effective personnel EBP.

Survey Data

The US DoED, Office of Special Education Programs (OSEP), funded the Center to Inform Personnel Preparation Policy and Practice in Early Intervention and Preschool Education (CIPP) (http://uconnucedd.org/projects/per_prep/resources.html) to collect, synthesize, and analyze information related to the preparation and continuing education of professionals representing all disciplines providing both early intervention (EI) and ECSE services under IDEA. Surveys collected information on the status of a number of personnel issues. For example, one line of inquiry examined the supply and demand for ECI personnel (Bruder, 2010; Campbell, Chiarelo, Wilcox, & Milbourne, 2009). All state Part C and Part B (619) coordinators were interviewed and reported concerns about the limited number of professionals who had specialized training in ECI: Less than half of the state coordinators reported having a qualified work force in any discipline category. These data led to other examinations of the status of preservice, in-service, and practitioner perceptions.

Preservice

Surveys about program content and methods classes related to ECI were completed by 1131 IHE programs across 17 professional disciplines in all 50 states (Bruder, 2010). IHE programs reported as much variability within a discipline as there was across disciplines in regard to hours devoted to specific course content. Of more concern was that many aspects of EI/ECSE service delivery under IDEA were not addressed. The most critical finding was that the majority of personnel programs prepared students for a life span license or certification, and this was represented in their program content.

Other surveys of IHE coursework on disability-related pedagogy also reported limitations in content offered for ECI practitioners, including lack of coursework and practical experiences involving children with disabilities (Chang, Early, & Winton, 2005; Ray, Bowman, & Robbins, 2006) and a lack of pedagogical content related to ECI (e.g., family-centered practices, child-focused practices, natural environments, team processes, and service coordination) (Bailey,

Buysse, & Palsha, 1990; Dunst & Bruder, 2005)). Concerns have also been raised by data collected on the quality of blended programs (Dunne, 2002; Miller & Stayton, 1998), the availability of content about children with challenging behavior in 2-year EC programs (Hemmeter, Santos, & Ostrosky, 2008), and the availability of content about inclusion within early childhood 4-year programs (La Paro et al., 2014). Finally, to assess the future capacity of IHE preparation programs, CIPP conducted a survey with OSEP-funded doctoral programs specific to ECSE (see Woods & Snyder, 2009). Less than half of the 60 programs addressed ECSE, and 23 participated in the survey. Only six doctoral programs were interdisciplinary, having two or more disciplines enrolled, and none of the 23 programs mandated any emphasis in children from birth to age 3.

In-Service

State training and technical assistance systems for EI/ECSE providers across the country were examined through interviews and document reviews for the presence of components which contributed to a systematic, sustainable approach to professional development (Bruder et al., 2009). Defined components included:

1. Dedicated resources such as an agency budget line item
2. Staffing
3. A dedicated agency responsible for the provision of the training
4. Policies or procedures for determining professional development needs
5. Training content related to identified need or state standards
6. Quality assurance systems
7. A process for evaluating outcomes
8. Ongoing training that is provided over time
9. A formal structure for the delivery of content (training modules etc.)
10. Workplace applicability

Only 20 of the Part C systems and 23 of the Part B (619) components met the criteria as having a majority of components. Part C states with systems reported that training was most often delivered through workshops ($n=19$) or the Web ($n=16$), followed by presentations ($n=9$) and conferences ($n=8$). A majority of states provided CEUs for training ($n=15$) and five linked training to a credential and two to a certificate. Training content was most often identified through administrative and consultant input ($n=19$), and the most popular training areas were service delivery ($n=19$), policies and procedures ($n=18$), families ($n=11$), and disability-specific information ($n=10$). Training was evaluated by trainee feedback forms (18), and five states used compliance monitoring to further assess training. These findings were similar for Part B (619) programs.

Recent data collected by Cox, Hollingsworth, and Buysee (2015) had similar findings in regard to type of PD offered in states. They surveyed 831 PD providers from Iowa, Minnesota, Oregon, and Virginia using the *Landscape Survey*, created by the National Professional Development Center on Inclusion (NPDCI). Almost all who received PD were practitioners with less than a BA degree, though administrators and family members also participated. The majority of PD focused on children's development and learning, classroom practices, and family communication, with less than half of the PD addressing inclusion and learning for children with disabilities or children from culturally and linguistically diverse backgrounds. Over half of the PD was reported to be based upon NAEYC developmentally appropriate practice, state early learning standards, and state professional competencies, while a quarter reported the use of NAEYC personnel standards, and less than 5 % used DEC personnel standards. Half of the PD consisted of one-time events, with almost a third reporting multiple PD sessions over time, and a few providing PD the equivalent of one semester. PD providers who provided follow-up activities to training had more years of experience in EC and more advanced degrees. Significant predictors of the level of training intensity offered by PD providers were the employer, the provider, or the state where the provider worked.

Self-Efficacy

Part C and 619 service providers ($N = 1800$) reported on their feelings of self-efficacy and experience in preservice and in-service activities (Bruder, Dunst, & Mogro-Wilson, 2011; Bruder, Dunst, Mogro-Wilson, & Stayton, 2013). The preservice variables were type of degree (discipline), years of formal postsecondary education, licensure, and participants' judgment of how well their preservice training prepared them to work with young children and their families. The in-service variables were type of state training/technical assistance available to the participants, whether participants were required to have continuing education, and the amount of in-service training the participants received. Self-efficacy was measured in terms of the participants' perceived confidence and competence to statements about recommended practices in the following areas: early literacy, natural learning environments, instructional practices, IFSP/IEP, assessment and evaluation, and family-centered practice.

Half of the practitioners had been working in the field of early intervention or early childhood special education over 10 years and represented the disciplines of special education, early childhood education, early childhood special education, speech and language pathology, occupational therapy, and physical therapy. The sample reported low levels of competence and confidence working with children and families in all practice areas, though they judged themselves as more confident than competent in all areas.

Preservice preparedness and in-service intensity were related to all competence and confidence measures: the more the participants indicated that their preservice training prepared them to work with young children and their families, and the more in-service training the participants received, the higher their ratings of their competence and confidence beliefs. Participants with more years of experience reported higher procedural and intervention competence compared to participants with fewer years of experience. Less than a third of the sample reported that their preservice education program had prepared them very well to work with young children.

Teachers from this sample (early childhood special education, early childhood education, and special education) were partialed out for a more refined analysis of their competence and confidence in inclusive settings and natural environments. Neither the type of teaching degree nor having an advanced degree was found to be related to self-efficacy beliefs; the teachers' feelings of preparedness proved the best predictor of teacher self-efficacy beliefs (Dunst & Bruder, 2014).

There have been few studies that have examined the influence of personnel preparation and experience on ECI practitioner confidence and competence. Lamorey and Wilcox (2005) administered a 15-item early interventionist self-efficacy scale to evaluate interventionist training, practices, and child and program outcomes. There were significant positive correlations between EI practitioners' overall self-efficacy and years of intervention experience and personal self-efficacy and years of experience. Moore and Wilcox (2006) also found that years of experience in ECI related to higher efficacy belief appraisals.

Other data that contribute to the understanding of the self-efficacy of ECI practitioners was derived from follow-up evaluations of IHE program graduates about their perceived feeling of competence. Though not focused on self-efficacy as a construct, the data reveal graduates perceptions of their own abilities to implement the practices they learned. For example, Crais et al. (2004) surveyed 44 interdisciplinary graduates of two interdisciplinary preservice masters programs. The survey contained questions about the graduates' opportunities to implement interdisciplinary and family-centered practices in the areas of assessment, instruction, and collaborative consultation and their perceived competence in these areas. On all items, graduates rated themselves between somewhat and very competent. The survey also asked graduates to rate 15 interdisciplinary and family-centered practices according to the amount of training they received within their own discipline program compared to their interdisciplinary program. All graduates reported only receiving training in the practices in their interdisciplinary program.

Two other follow-up studies with graduates of ECSE/EC programs found less positive perceptions of competence on ECI practices. Murray and Mandell (2006) interviewed 19 graduates of their ECSE program who were working in ECSE programs across six states. The majority identified significant barriers to using the family-centered practices they had been taught. Recchia and Beck (2014) investigated the perceptions of 13 preservice teachers after their first year of teaching. The students had completed a master's degree program in an integrated early childhood program for children from birth to age 8 and were teaching in early childhood settings, seven including children with disabilities. The teachers felt less prepared in specific curricula that aligned with their particular teaching settings, though they felt prepared in broad-based skills they could apply across a variety of classrooms. The teachers also felt challenged in contexts where it was difficult to use the practices they had learned in their program.

Program Descriptions

Many program descriptions have evolved from projects funded by the Handicapped Childrens Early Education Program (HCEEP) demonstration, outreach, or research program which focused on either child intervention, parent intervention, or in-service education. With the exception of research institutes, these projects were not designed as research studies, though a requirement for each project was the collection and evaluation of impact evidence on children and, when appropriate, families and practitioners. Demonstration and outreach projects provided descriptions about the targeted intervention and detailed information about the training content and methodology used to enable the ECI staff to perform the intervention to improve child outcomes (see Dunlap, Robbins, Morelli, & Dollman, 1988; Rogers, Lewis, & Reis, 1987). Many of these project descriptions included detail about the training and fidelity measures they used to outreach and replication of effective program practices and achievement of outcomes could and did occur (Bruder, Anderson, Schutz, & Caldera, 1991; Cochran & Shearer, 1984). In-service projects funded under this program also demonstrated a systematic focus and documentation of both adult and child impact using multiple sources of evidence. Such projects were required to adhere to best practices in adult learning, which included a guiding philosophy, training objectives, relevant and job-embedded content, rigorous methodology, performance standards, and practicum applications, including follow-up and the collection of outcome data (Bruder & Nikitas, 1992).

Preservice

There are many descriptions of preservice preparation practices in ECI (cf. Gallagher, Steed, & Green, 2014; Kilgo & Bruder, 1997; Macy, Squires, & Barton, 2009; Miller & Stayton, 1998; Stayton & McCollum, 2002; Stayton & Miller, 1993; Winton, 1996), as well as descriptions of program features such as the case study method of instruction and online course applications (cf. Lifter et al., 2005; Snyder & McWilliam, 1999). Most preservice program descriptions include details about philosophy, coursework, practicum requirements, methodology, and, less common, student outcomes. Though implemented 20 years apart, two ECI preservice programs will be briefly described.

Bruder, Brinkerhoff, and Spence (1991) designed, implemented, and evaluated a 1-year graduate interdisciplinary certificate program for students representing different disciplines who were enrolled in different IHEs in CT or were at the postmaster's level. The nine credit institutes at the University of Connecticut included a 6-week summer session composed of didactic classes and supervised practicum applications with a follow-up year of practicum supervision (at their IHE or job site) and monthly research seminars. The coursework was divided into six modules that addressed families, medical issues, physical management, educational and instructional management, teaming, and service delivery. The most important measure of student outcome was the successful completion of 32 competency-based tasks representing ECI pedagogy and practice. Evidence of the program's

effectiveness was demonstrated with 32 students which included statistically significant pre-/posttest gains of students' knowledge acquisition and completion of performance measures for all competencies.

An interdisciplinary preservice program in ECI at the University of Oregon was described by Barton, Moore, and Squires (2012). The program was offered as an add-on of specialized courses and practice to speech and language pathology students (SLP) completing their graduate degree. Students took ECI classes in collaboration with the ECSE graduate program in areas such as foundations of ECI, assessment, family-guided practice, curriculum, developmentally appropriate practice, communication interventions, collaborative consultation, EBP, and parent support groups. The first four courses were taught by the ECI faculty; the latter courses were team taught by ECI faculty and SLP faculty. Students completed practicum in a variety of natural and inclusive settings; seven were university affiliated and two in the community. Principles of adult learning were used to teach and to supervise the students, and this included the use of frequent performance feedback to the students on their intervention with young children (in person or by electronic mail). The students also had to meet competencies and rate themselves and self-reflect on their practicum experiences. Other measures of effectiveness included course grades, caregiver satisfaction, parent and child outcomes, and job placement after graduation. All 26 graduates mastered both their program competencies and their SLP competencies, and 22 were employed in ECI settings upon program completion.

In-Service

There have been many program descriptions of various in-service components and continuing education opportunities for the ECI workforce (Blasco, Falco, & Munson, 2006; Dinnebeil, Buysse, Rush, & Eggbeer, 2008; Girolametto, Weitzman, & Greenberg, 2006; Ludlow, 2002; Malone, Stratka, & Logan, 2000; Ridgley, Snyder, McWilliam, & Davis, 2011; Snyder & Wolfe, 2008). In-service programs usually contain descriptions of the participants, content, methodology, and outcomes. While most are conducted face-to-face with trainees, online programs are appearing in the literature (Brown & Woods, 2012; D. Chen, Klein, & Minor, 2008). Additionally, there have been in-service descriptions with documented child or program outcome data reported with child care audiences (see Bruder, 1998; Campbell, Milbourne, Silverman, & Feller, 2005) and IHE faculty (Bruder, Lippman, & Bologna, 1994; Winton, 1996). As examples, two in-service studies having different content, methodologies, and evaluation will be described.

Boavida, Aguiar, and McWilliam (2014) developed and implemented a training program to teach 284 ECI practitioners in Portugal to use the Routines-Based Interview (RBI) (McWilliam, Casey, & Sims, 2009) to develop functional IFSP/IEP goals and objectives for infants and young children with disabilities. Training was planned using adult learning practices, and a pilot training program was administered to 18 ECI staff, to test and refine the training. The training consisted of five sessions totaling 22 h of small group meetings of 10–20 participants representing 14 early intervention teams. After the first five sessions, a 3-month application phase occurred during which time the participants were given weekly electronic prompts while they implemented the training content to develop a functional IFSP/IEP and submit it as evidence of their learning. An optional sixth training session then occurred to provide feedback to the participants on their reported experience developing the functional IFSP/IEP after the RBI interview. Of the 284 participants who began the training, 201 completed it, though only 80 provided both pre- and posttraining IFSP/IEPs after completing the training. The pre-training IFSP/IEP was compared to the participants in posttraining IFSP/IEP using rating scale to score the IFSP/IEP goals and objectives. After training, the IFSP/IEPs contained fewer goals and objectives, and those that were on the IFSP/IEP were scored higher on the rating scale for functionality. Both of these variables were statistically significant, with large effect sizes.

Campbell and Sawyer (2009) conducted a PD program with ECI providers on the implementation of participatory home visiting practices

which focused on embedding adaptations and interventions into family routines. Participatory practice emphasizes the use of natural materials and the collaborative role of the caregiver and the provider during the home visit, compared to traditional home visiting practices which focused on teaching the child (Campbell & Sawyer, 2007). The primary outcome measure for the study were home visit behaviors as scored on pre- and postvideos using a scale that consisted of categories of home visiting practices. The training consisted of small group face-to-face sessions of 3 h each, held 3 months apart. The training enrolled 147 providers, and though this training was mandatory for continued employment, 126 completed both sessions and 96 submitted viable video tapes of the home visits. The baseline videotapes showed that the majority of providers (66 %) used traditional practices. After the training, 43 % of the tapes demonstrated traditional practice, suggesting that a majority of providers (57 %) were using participatory practices. Additional analyses of the data documented three groups of providers based on the practices they used: those who were participatory and stayed participatory, those that were traditional and stayed traditional, and those that began as traditional and moved to participatory. Those that were rated as participatory and remained that way, and those who changed to participatory, had beliefs measured in the Q-sort that aligned with recommended practices in early intervention. Those who stayed traditional continued to hold beliefs about the importance of direct services to the child rather than participation-focused providers who believed in family involvement. The findings of the study suggested that these differences in provider practices were related more to providers' prior beliefs and perceptions than to the professional development they received.

Experimental Studies

Most of ECI personnel practice studies that meet EBP standards and demonstrate experimental control utilized single-case designs. Single-subject studies must be able document a defensible functional relationship between the independent and dependent variable as represented by a visual inspection of graphed data (Kratochwill et al., 2013). This includes the examination and analysis of multiple features of the data display, such as the consistency of behavior change within and across levels of baseline, intervention, and any other condition, the trend of the data within and across conditions, and variability of data in each condition. Other data features to inspect include the immediacy of any change between conditions, overlap of data points across and between conditions, the projected pattern of the data, and any anomalies within the data. Other statistical manipulations of the data may also be used (e.g., effect sizes) to support the visual inspection.

While EC studies also use single-subject designs, a majority implement randomized group comparison designs to demonstrate experimental control of the independent variable. The implementation of group designs must also meet research standards (Cook et al., 2015). These includes the random assignment of subjects to comparison groups, the equivalency of the groups on measures of interest prior to intervention, the minimal attrition of participants, and the use of statistical tests of power and effect size to measure the impact of the independent variable. Both types of designs require operational definitions of the independent and dependent variables, the use of internal control procedures such as fidelity measures to insure the treatment is being implemented as intended, and reliability measures to insure the validity of results. Both types also require replication of findings to ensure external validity of both the treatment and the outcomes. Examples of studies addressing differing populations and dependent variables follow. All have met standards for experimental designs.

Preservice

Experimental studies in preservice preparation are sparse, and single-subject methodology is used by the few that have been published. Barton et al. (2012) provided intervention to five student teachers who were at the conclusion of their preservice program. A multiple-baseline single-case research design across participants was used to examine the effects of coaching on the implementation of an intervention package to

increase children's dramatic play behaviors. The five target children had IEPs, were between 3 and 5 years of age, and were enrolled in a university-based preschool program. Two training conditions were compared in this design: didactic training and didactic training plus coaching. Observational data (event recording) were collected on the teacher's use of practices during a 5 min videotaped play routine which occurred two or three times per day.

The intervention package consisted of a number of practices that were evidence based including contingent imitation, a system of least prompts, and specific praise after the child used a target play behavior (Barton & Wolery, 2010). A 1 h didactic session on the intervention package was presented to the teachers after baseline concluded. It consisted of videos, a manual and role-playing. Data were collected on the teacher's use of practices after the didactic session. Coaching was then introduced as an intervention. Four coaches who were supervisors of the student teachers provided the intervention. The coaches were doctoral students and all had degrees in early childhood special education. They were provided a manual detailing the intervention and data forms to record the teacher's responses and suggestions for improvement. The coaches provided feedback to the teacher on her use of the intervention package before, during, and after sessions.

Visual analysis of the data showed that the coaching added to the effectiveness of the intervention. That is, four of the five teachers improved beyond baseline only after coaching was introduced, thus providing evidence for experimental control and the effectiveness of the coaching intervention. Interrater reliability, social validity, and fidelity measures also documented adherence to research standards.

An extension of this study (Barton et al., 2012) examined the effect of this training package on children's behavior. This study also used a multiple-baseline design across four teachers and replicated procedures from the first study with additions: all teachers received the 1 h didactic training prior to baseline; the coaches received more explicit training and direction as to the frequency with which they provided prompts and feedback to the teachers during the session; fidelity data on the coach training and implementation was collected; and observational data on child pretend play behaviors were collected across four children aged 3–5 with IEPs. Again, there was a functional effect demonstrated across the teachers as a result of coaching and with the target child's use of play behaviors.

Coogle, Rahn, and Ottley (2015) used a single-subject multiple-probe single-case design to examine the effectiveness of using bug-in-ear coaching on teachers' use of specific communication interventions. The addition of a bug in ear (BIE) allows coaching to occur simultaneously while interventions are being conducted in classrooms (Rock et al., 2009, 2012; Scheeler et al., 2012). Coogle et al. implemented BIE with three ECI student teachers who were completing their final semester of an undergraduate licensure program and participating in a student teaching internship. They were teaching in separate preschool public school inclusionary classrooms, each of which contained 16 children without disabilities and four with disabilities. The intervention consisted of a brief training via a narrated PowerPoint presentation that provided information related to four communication strategies with the students: wait time, sabotage, choice making, and in sight out of reach.

When in the classroom, the teachers received prompting and immediate feedback from a supervisor (through the BIE) on their use of the communication strategies during a 10 min play routine. The supervisor was remotely watching and listening to the teacher on Skype via an iPad that swiveled to follow the teacher. After baseline, the supervisor provided feedback through the BIE two times per day for 10 min each over four days, attempting to provide one directive prompt a minute as needed. The results showed the intervention was successful for all three teachers using visual inspection of graphed data that documented changes in level, trend, and variability. The patterns across the teachers were similar, except for variability of unprompted use of strategies, during the generalization and maintenance phases of the study.

In-Service

A number of single-subject studies have been conducted with ECI populations in inclusive EC or Head Start classrooms across a range of adult and student populations using a number of strategies to effect change across a number of specific adult and child outcomes (Casey & McWilliam, 2011; Friedman & Woods, 2015). The following are sample illustrations of experimental designs that provide data to support EBP strategies. Though they varied in methodology, reliability, and fidelity, data were collected as was data on the social validity of all of the interventions presented in these studies.

Hemmeter, Hardy, Schnitz, Adams, and Kinder (2015) conducted a study to examine a professional development intervention on three teachers' use of social-emotional practices as delineated in the Pyramid Model. The Pyramid Model for Promoting Social-Emotional Competence in Young Children (Fox, Dunlap, Hemmeter, Joseph, & Strain, 2003) is a comprehensive three-tiered model for promoting young children's social-emotional development and addressing children's challenging behavior. The setting for the study was three classrooms in three elementary schools staffed by a teacher and assistant teacher, and each of the three teachers was certified in ECSE, two had master's degrees, and the third was in a master's program. The dependent variables for the study were the teachers' use of specific pyramid practices as measured by pyramid checklists, a global measure of pyramid practices, and a global measure of classroom behavior. A multiple-probe design across practices and replicated across teachers was used to measure experimental control.

Intervention began with a meeting between the coach and the teachers to refine an action plan and timeline for the implementation for the first set of practices. Training was then provided over 30–60 min and included Power Point, video examples, and discussions on the practices. The coach also used implementation guides for the practices, the coach and the teacher developed steps to implement each practice and identified resources to help the teacher. After initial intervention, booster sessions were also implemented with teachers as needed. All observations were followed by coaching feedback three times per week. Most of the feedback occurred in meetings and a third were done by email. The feedback sessions followed a specific procedure which included discussions about any challenges the teacher was having with implementing the practice and the provision of needed resources to help the teacher with implementation challenges. Each teacher demonstrated acquisition of the specific practices after coaching was provided. Generalization probes showed mixed results. One teacher met criterion for generalization, one had inconsistent demonstration of practices across activities, and the third used practices but did not meet criteria levels. In regard to maintenance, one teacher demonstrated maintenance for all behaviors while the other two needed prompting to use practices. In regard to the presence of challenging behavior within the classroom, two teachers demonstrated a decrease in these challenging behaviors after intervention while one did not.

BIE technology has also been used as a method to deliver in-service PD. Ottley and Hanline (2014) provided intervention to four teachers who taught in three inclusive early childhood centers. A multiple-baseline single-case study documented the effects of coaching through the BIE. The BIE technology consisted of a Bluetooth wireless earpiece and two cell phones, the intervention was recorded by a camcorder, and a smart pen was used to scribe anecdotal notes. The focus of the intervention was on increasing the teachers' use of communication strategies, in particular ten specific strategies which were operationally defined. The teachers were not trained in ECSE, and one held a bachelor's degree, two had an associate's degree, and one had a CDA degree. The children who were the targets of the intervention all had disabilities which included autism and communication delays. Observations of the teachers occurred during indoor play routines.

After a stable baseline was demonstrated, each educator was given feedback on their use of communication strategies, and the researcher chose low-frequency practices as observed during

baseline as each teacher's intervention targets. The three practices were then randomly sequenced for intervention which began with a description and a rational for the use of the practice by the coach to the teacher. Examples of the practice were demonstrated, and the teacher used the practice until she did it correctly. The teacher then implemented the practice with the target child during a play routine while the supervisor used the BIE to provide immediate feedback to them. This was either a prompt to use the practice or positive verbal reinforcement after the practice was used. The intervention was delivered over 6–9 weeks, and the teachers participated in 27–37 of the 20-min coaching sessions. A functional relationship both within and across phases was demonstrated between the BIE coaching and the use of communication practices for each teacher. Maintenance data suggested a decrease in the use of communication strategies over time. Strategies with the largest effect were maintained by the educators at a higher rate than those with moderate to small effect sizes. Two of the four children demonstrated more communication as a result of the training.

Lastly, a multiple-baseline design across three home visitors and three caregiver child dyads was conducted by Krick Oborn and Johnson (2015). The study examined a multicomponent PD package to facilitate the delivery of family-guided routine-based intervention (FGRBI) to families and their children receiving Part C home visiting services (Woods, Kashinath, & Goldstein, 2004). The PD focus was on the effectiveness of coaching using electronic feedback to increase the home visitor's use of FGRBI as a strategy during home visits. The home visitors had a master's degrees and ECSE teaching licenses. The caregivers who participated included a step grandmother, a mother, and a father. All home visits were videotaped across baseline and intervention phases and coded for the percentage of intervals that the home visitors used any of seven specific FGRBI caregiver coaching strategies.

After baseline, the intervention phase began with a workshop that included two individualized 2-h sessions focused on FGRBI and caregiver coaching strategies. Adult learning strategies were used which consisted of PowerPoint, handouts, video examples, discussion modeling, and practice. If the home visitor did not demonstrate the criterion of more than 70 % use of home visiting strategies after 3 weeks, the coaching intervention began. During coaching each home visitor submitted their videotape of the weekly home visit, and they received an email with graphic and written performance feedback following the implementation of a five-step coaching protocol from their coach.

The workshop did not result in any of the home visitors reaching the preset 70 % criterion on home visiting behaviors, so all participated in individualized coaching. After 6 weeks of email feedback from the coaches after reviews of the home visiting tapes, all three home visitors demonstrated an increase on the use of target coaching strategies during home visits. Only one of the home visitors demonstrated the target behaviors during the maintenance probe, and none of the three acknowledged receipt of all 6 weeks of electronic feedback. Only one also provided reflective responses back to the coaches. There were minor changes in how home visitors used family routines during their home visits, and 25–55 % of the observed time didn't involve the child with the caregiver or with them.

Targeted Adult Learning for Child Intervention

While most of the literature focused on in-service and preservice personnel practice identify adult behavior as the dependent variable, studies that deliver intervention to children identify them as the dependent variable; yet these intervention studies also have an impact on the adults who deliver the intervention. As such, these studies contribute to the efficacy literature on ECI personnel practice, though this is not the primary outcome interest (see Barton, 2015).

As an illustration, Strain and Bovey's (2011) implementation of training strategies in their randomized control trial on the effects of a classroom-based model for young children with ASD warrants attention. This study used a clustered randomized design to examine the effects of a packaged intervention on 177 young children

who had ASD in 27 classrooms in comparison to 117 young children also with ASD across 23 classrooms. The intervention children participated in the learning experiences and alternative program for preschoolers and their parents (LEAP), which was originally developed in 1982. The teaching staff received intensive training to implement the model practices with fidelity. This consisted of a total time commitment of 23 days of on-site training, modeling, and feedback over 2 years. The LEAP model was composed of a number of program features including high intensity of learning opportunities, inclusive classrooms with a 1–5 adult/child ratio, positive behavioral guidance, sound instructional interventions, promotion of social and communication skills, use of peer mediated learning, and family involvement.

The training of the teaching staff included detailed protocols for each of the core features of the LEAP model, including fidelity measures with quality indicators to insure the integrity of the intervention delivery. Training methodology consisted of:

(a) Presentation of skill area to be learned in written/presentation format
(b) Discussion of skill area between trainee(s) and trainer(s)
(c) Demonstration of skill by LEAP trainer with simultaneous observation by trainee(s)
(d) In vivo practice by trainee(s) with observation and feedback provided by trainer
(e) Evaluation of trainee competency based on direct observation or permanent product
(f) Training of on-site supervisor to support direct-line replication staff
(g) Follow-up training and maintenance checks on a 6–8 week basis

The comparison classrooms were equivalent in regard to classroom structure, and the teaching staff received manuals and PowerPoint presentations about the core LEAP intervention features. Efficacy was measured through a battery of measures of general and domain-specific child development, as well as measures of quality for classroom features. After 2 years, the LEAP classrooms demonstrated a high level of implementation using the observational protocol. The comparison classrooms also made gains bringing their average to 38 % of program components over 2 years in comparison to the 87 % of implementation for the intervention classes. This was the only metric that allowed a pre/post comparison of teacher impact. Most importantly, children in the LEAP intervention group made statistically significant gains on all child measures compared to the children in the comparison groups. Teachers rated their experience with the LEAP replication process very highly.

Reviews of Evidence Based ECI Personnel Development Practices

Systematic Reviews

There have been an increasing number of reviews conducted on studies in both EC and ECI personnel preparation and continuing education. Common features of reviews include a thorough identification and categorization of studies that contain the feature of interest and an analysis of the features in each study. Systematic reviews begin with a process to identify the universe of studies that meet predefined criteria for inclusion. This is usually accomplished by searching a number of databases using terms describing the features of interest. Studies that are identified are then screened by titles and abstract to exclude irrelevant studies. Criteria can be revised to narrow or expand the search before each study is analyzed and categorized for final inclusion in the review. All of the following report their methodology and reliability measures within their article, and they are not included in depth below.

Two recent narrative reviews on EC PD were conducted under the auspices of the US DoED. Zaslow et al. (2010) conducted a review of effective features of early childhood PD. She organized the review into four areas: (1) improving the human and social capital of early childhood educators, (2) strengthening the institutions or organizations providing the PD, (3) improving children's outcomes in specific developmental domains, and (4) improving the overall quality of children's experiences in early childhood settings (Zaslow et al., 2010, p. 4). The literature review addressed children under 5 and included studies

on early educators who were defined as preschool teachers, prekindergarten teachers, kindergarten teachers, and child care staff. Her review included databases, curricula, and a variety of studies that were published in peer-reviewed journals, volumes, or government reports of evaluation. The inclusion criteria identified 37 studies in the literacy area, 7 in math, 14 in social skills, 10 on comprehensive curricula, and 11 on comprehensive approaches. She categorized and described these studies by type of design and impact. Her conclusion called for additional research on specific features of teacher PD such as the inclusion of audiences of those who work outside of preschool classroom, with infants or with children with cultural and linguistic backgrounds. She also recommended more rigor in studies to target PD approaches such as timing and setting. Lastly, she recommended more emphasis on the integration of learning across content areas for children.

A thorough review of research in early intervention and early childhood education funded by the IES was conducted by Diamond, Justice, Siegler, and Snyder in 2013 (Diamond et al., 2013). They reviewed research that focused on environment and instructional practices, instruction designed to impact academic and social outcomes, child skills and learning, and PD in early education. They categorize PD interventions as directed at helping teachers implement new curriculum, improve instructional practices, or improve instruction within a specific domain (Diamond et al., 2013, p. 32). The assumption being that effective PD practices result in improved academic and social outcomes for young children. The authors cite studies funded by IES that demonstrate teachers' behaviors can be influenced by training, that children's behavior can then be impacted by new teacher behavior, and technology can be an effective tool for PD. The authors conclude their review on IES-funded PD studies with a number of recommendations to increase studies to improve overall teaching practices.

Snyder et al. (2012) conducted a systematic review of the key features of the PD literature in EC using a framework from the National Professional Development Center on Inclusion [NPDCI] (National Professional Development Center on Inclusion, 2008) The review provided descriptions of the participant characteristics, content focus, and type of PD addressed in the reviewed studies, but it did not evaluate the effectiveness of any. An in-depth description of a subset of studies focused on instructional practices and was highlighted in the review. The research team used the NPDCI framework to develop working categories and definitions focused on the who, the what, and the how of PD. The development of the working categories and associated definitions for the how of PD was informed by the literature, research, and an iterative process. The result was operationalized definitions for nine working categories of types of facilitated teaching and learning experiences and 16 categories and definitions of forms of follow-up.

The review included 256 studies for which descriptive statistics were generated for each coding category, and comparative descriptive analysis was conducted for several subsets of studies including the characteristics of all studies included in the review and the subset of studies in which instructional practices were identified as a content focus for the PD ($n=63$). With respect to the who of PD, the reported settings for all studies were equally split among preschool/early childhood education, Head Start, and child care. PD participants were reported to interact with young children with disabilities or children at risk for disabilities or delays in 44 % in the larger group of studies and 77 % of the instructional practices studies. In regard to the what of PD, the most frequently reported content areas for the larger group of studies included social-emotional topics (27 %) and pre-academic (25 %) and instructional practices (25 %). With respect to the how of PD, only 68 % of the larger group of studies included a description of the PD strategies used to help learners in comparison to 98.8 % of studies focused on instructional practices. The most frequently occurring categories of PD were in-service training (34 % of all studies, 27 % of instructional practices studies) and staff development (28 % of all studies, 44 %% of instructional practices studies).

Some type of follow-up after PD was reported more frequently in the instructional practices studies (91 %) compared with the larger set of studies (84 %), with coaching or performance feedback as the most frequent form of follow-up (52 % of all studies, 65 % of instructional practices studies). Research staff was reported to be the most frequent providers of follow-up (49 % of all studies, 55 % of instructional practices studies), followed by consultants (28 % of all studies, 23 % of instructional practices studies). Single-subject experimental design was most frequently reported in the instructional practice studies versus the larger set of studies (55 % versus 26 %). Additionally, the instructional practice studies were more likely than the larger group of studies to report outcome measures for the practitioner (92 % versus 81 %), as well as the child (57 % versus 50 %).

Another systematic review of PD research in EC was conducted by Snell, Doswell-Forston, Stanton-Chapman, and Walker (2013). They analyzed 20 years of research on professional development delivered to those teaching preschoolers, primarily in classroom settings. They identified 891 potential articles that fit their criteria. After systematically reducing this pool, a total of 69 studies were identified as the final sample. The review focused on the characteristics of professional development presented in these studies: the study samples, the training topics and methods, and the research characteristics and outcomes of the studies.

Of the total sample, 57 studied included an average of 39 participants (range 1–500). The majority of these were female with an average age of 37 years and an average of 9 years of experience. The majority of classroom settings in which the professional development occurred was in Head Start. Forty-nine of the studies also reported on the child participants, and in 36 studies the children were typically developing. The majority of these studies focused on child interventions in the areas of communication and social skills (37 studies). Sixty-one of the studies reported using lecture-based classes or workshops to deliver the professional development, and 45 included applications of the content through demonstrations of practice. Only 15 studies reported any follow-up contact or support after the training was conducted. Most often (49 studies), the professional intervention was delivered by experimenters, consultants, or both. The studies were equally split between single-subject experimental designs, experimental treatment control group designs, experimental no treatment control group designs, and quasi-experimental designs. Direct observation measures were the most frequently used in 34 studies, followed by interviews, surveys, and self-rating scales. Less than half of the studies (31) reported social validity measures. Of the 30 studies that measured fidelity, only 18 of the measures were reported as acceptable. Nine studies measured generalization across settings or skills and only six reported positive effects. Maintenance of the adult behavior or skills was measured in four of the studies.

Casey and McWilliam (2011) conducted a systematic review of the use of feedback interventions used in early childhood classrooms (infant to grade 4). Seventeen studies were identified that met criteria, and all used single-subject methodology. The 86 adults in the studies were distributed across preservice students (17), paraprofessionals (29), and teachers (40) within a range of classrooms from Head Start, public schools, and child care. All classrooms had either children with disabilities or risk conditions. The feedback was delivered in all but two of the studies by a researcher, and in all studies it was delivered in private to the target teachers. All but one study used verbal feedback, one used graphing alone, eight used verbal and graphing, eight used written, two used written, and six used a combination. Feedback was provided prior to intervention in six studies and in combination with consequence (praise) in seven studies. Goal setting was used in two studies, one of which used antecedents and consequence in combination with goal setting.

The studies were analyzed for effectiveness using visual analysis, and five met criteria for having consistent positive effects using standards for single-case analysis. The authors expressed concerns over the insufficient baselines, lack of

information about outcomes, and the small evidence base for performance feedback in ECI. Nonetheless, a recent systematic review of the performance feedback literature with school-age students concluded performance feedback as studied in the single-case studies they reviewed could meet the guidelines established by the WWC for an EBP (Fallon, Collier-Meek, Maggin, Sanetti, & Johnson, 2015).

By far the most common terminology for performance feedback used in ECI has been coaching. Artman-Meeker et al. (2014) conducted a systematic review of the use of coaching in EC that included 49 studies. The specific variables reported for each of the studies included: teacher-child characteristics, settings, dependent variables, independent variables, initial training, coaching components and strategies, measurement of implementation and intervention fidelity, overall outcomes, social validity, preparation and supports provided to coaching, and study rigor using adapted WWC procedures and standards.; not all studies reported data in these categories.

Across all 49 the studies, the teachers ranged in age from 20 to 44, across education level from high school to master's degree, and had between 0 and 25 years' experience. Thirty-five studies reported on the children in the studies, and 26 studies reported their ages which ranged from birth to age 7, the majority being between 3 and 5. Twenty-two of the studies included children with, or at risk for, disability, and 18 of these 22 studies included children with identified disabilities; nine included children with autism, and two included children who were dual-language learners. The primary setting for the coaching was reported in 48 studies, and almost half of these were in an inclusive preschool class. Fifteen of the studies focused in the language and literacy domain, five on language only and five on literacy only, nine on instructional strategies, and eight in social-emotional development.

Twenty-one of the studies reported that the coaches had at least a bachelor's degree; 13 reported the coach had a master's degree. Only seven reported that the coaches had experiences as a coach or mentor. The role of the coach was reported in 44 of the studies. Most reported that coaches were primary research staff. Thirty-nine of the studies reported that the coaching happened in the teacher's classroom with the teacher. Four studies provided coaching at a distance, and in six studies a combination of face-to-face and distance was used. In 20 studies debriefing or feedback from the coach occurred immediately after an observation had occurred; in 13 studies, this occurred on the same day of the observation; and in 14 studies it occurred one or more days after the observation. Twenty-six of the studies reported the time spent in coaching, and in these studies, teachers participated in 3–32 coaching sessions and which varied from 2 min to 5 h per session, over 4.5 months, on average. Almost all of the studies expected coaches to provide feedback to teachers, yet only 10 of the 49 studies described any training or support to help the coaches learn how to provide feedback.

Twelve coaching practices were identified by the authors and used to categorize the coaching that occurred. The 12 strategies were then reduced to five features: a focus on partnerships, action planning, focused observation, reflection and feedback, and action in the work setting. Only two of the studies reported using all of the features, and 26 studies reported all features except for a focus on partnership. The most frequently used strategy across the 49 studies was performance feedback which included a range of practices.

Thirty-two of the studies used a group experimental design methodology, and a number of standards from WWC were used to assess the soundness of the studies: random assignment across conditions, equivalency of baselines across groups, sample comparability, and a description of sample attrition. Thirteen of the studies met all four of the adapted standards and 19 did not meet any. Seventeen studies utilized a single-subject research design, and these were also analyzed against WWC standards. Four of the 17 studies met the standards and also demonstrated strong evidence of a functional relationship.

Research Syntheses

Dunst and Trivette (2009) conducted a meta-analysis and research syntheses on the following

adult learning methods: (1) accelerated learning, (2) coaching, (3) guided design, and (4) just-in-time training. Results demonstrate that all four adult learning methods were associated with more positive learner outcomes as measured by the average effect sizes and 95 % CIs across all studies and outcomes combined. This study is described by Dunst in this volume.

Dunst et al. (2015) conducted a metasynthesis of 15 research reviews of in-service PD. The purpose of the metasynthesis was to determine the extent to which studies of in-service PD that included key characteristics and core features of in-service training were associated with changes and improvements in educator and student outcomes. A multiple-case design was used to analyze the research syntheses in the metasynthesis. This design is grounded in a conceptual framework for testing hypothesized relationships between independent and dependent variables in order to establish causal inferences. Each research synthesis was considered a separate case, and the focus of the analysis was the extent to which the relationships between in-service PD and teacher and student outcomes were similar in the research syntheses.

Research syntheses were located using search terms, and follow-up searches were conducted using controlled vocabulary, key word, and natural language searches as alternative terms were identified from retrieved publications and reports. The reference sections of retrieved journal articles, book chapters, books, dissertations, and other published and unpublished reports and papers were examined to identify additional reviews. Research syntheses were included if in-service PD was the main focus of a literature review, there was an explicit attempt to identify the characteristics of and conditions under which in-service training was effective, and sufficient information was included in the reports to code and conduct secondary analyses of the relationships between the key characteristics of in-service PD and research findings. More than 25,000 abstracts (including duplicate abstracts in different databases) were generated from searches. These were reviewed and reduced to 36 reviews that were then examined to determine if they met the inclusion criteria. Fifteen reviews formed the final group for analysis.

PD features were coded within five sets of characteristics which included (a) the focus of in-service training, (b) the in-service setting, (c) the in-service characteristics, (d) the research synthesis findings, and (e) the metasynthesis findings. Two of the investigators independently abstracted and coded information for the 15 in-service features as well as background information about the studies in the research syntheses (e.g., type of synthesis, research designs, number of studies). The 15 research syntheses included 550 studies of more than 50,000 early intervention, preschool, elementary, secondary education teachers, educators, and practitioners. Seven syntheses included only group design studies (e.g., experimental, quasi-experimental, and pre-experimental investigations or program evaluations), and six syntheses included a mixture of group design studies and either descriptive case studies or single-subject studies. The investigators of two research syntheses did not include information in their reports about the types of studies in their reviews. The participants included pre-K or K to grade 12 teachers ($N=8$ reviews); K to grade 5, 6, or 8 teachers ($N=3$ reviews); early childhood practitioners ($N=3$ reviews); or both pre-K to grade 12 teachers and other non-educators ($N=1$ review). Eleven research syntheses included studies of in-service PD to promote the use of different types of instructional or behavioral practices, two research syntheses included studies to promote teacher understanding and use of content knowledge or skills, and two research syntheses included studies of in-service training to promote teacher or practitioner use of different job-related practices or to support teacher confidence in their teaching practices. The content areas of in-service training included mathematics or science ($N=5$ reviews), teacher-child interactions ($N=1$ review), teacher praise ($N=1$ review), teacher confidence ($N=1$ review), or a mixture of different content knowledge and practice ($N=7$ reviews).

Eleven of the research syntheses included studies that provided in-service PD in both contextual and noncontextual settings, and four

Table 16.4 Types of trainer and learner activities included identified in effective in-service for teachers

	Trainer/coach roles		Active learning		Trainer supports	
Study	Introduction	Illustration	Authentic learning	Learner reflection	Coaching/ mentoring	Performance feedback
Blank and De las Alas (2009)	✓	✓	✓✓	✓	✓✓	NR
Blank et al. (2008)	✓✓	✓✓	✓	✓	✓	NR
Capps et al. (2012)	✓	✓✓	✓	✓	✓	✓
Cavanaugh (2013)	✓	✓	✓✓	NR	✓	✓✓
Dunst, Trivette, and Hamby (2010) and Dunst and Trivette (2012)	✓✓	✓	✓✓	✓	✓	✓
Fukkink and Lont (2007)	✓✓	✓✓	✓✓	✓	✓	✓
Ingersoll and Kralik (2004)	✓	NR	✓✓	✓	✓✓	NR
Ingersoll and Strong (2011)	✓	NR	✓✓	✓	✓✓	NR
Isner et al. (2011)	✓	NR	✓✓	✓	✓✓	✓
Joyce and Showers (1995) and Showers et al. (1987)	✓✓	✓✓	✓✓	✓	✓✓	✓
Kretlow and Bartholomew (2010)	✓	✓✓	✓✓	✓	✓✓	✓
Saylor and Johnson (2014)	✓	✓✓	✓✓	✓✓	NR	✓
Snow-Renner and Lauer (2005)	✓	✓	✓	✓	NR	✓
Yoon et al. (2007) and Guskey and Yoon (2009)	✓	✓✓	✓	NR	✓	NR
Zaslow et al. (2010)	✓✓	✓✓	✓✓	✓✓	✓✓	✓

Note: ✓✓ = Primary focus of the inservice professional development in the studies in the research syntheses, ✓ = Secondary or minor focus of the inservice professional development, and NR indicates that the research synthesists did not describe or include information in their reports to infer that the professional development included the inservice practice characteristic

syntheses provided in-service training entirely in teachers' classrooms or schools, child care or preschool settings, or other work environments. All of the research syntheses included descriptions of the focus of the in-service training, and some type of authentic teacher learning opportunities. Most of the research syntheses included the majority of key characteristics and features considered necessary for in-service PD to be effective as displayed in Table 16.4.

Acquisition or improvements in teacher instructional or behavior practices were the primary outcomes in 14 research syntheses. Nine research syntheses included student academic performance, knowledge acquisition, or skill development as the primary outcome measures, four included student or child behavioral outcome measures, and three included both types of child outcomes. Twelve research syntheses included both teacher instructional practices and student or child outcome measures. Five included both teacher content knowledge, instructional practice outcomes, and student or child outcome measures. Five included only teacher outcome measures, and one research synthesis included only student outcome measures.

Fourteen of the research syntheses included information about the duration or amount of in-service training provided. The number of hours of in-service training associated with positive effects ranged between 15 and 80+, and in a number of reviews, it was stated that multiple in-service sessions distributed over weeks or months of PD were a factor contributing to positive and significant effects. All of the research synthesis included information about the nature and extent of follow-up supports provided to teachers after the completion of the initial in-service PD. Ten investigators explicitly stated that ongoing follow-up supports were a factor that reinforced

in-service training, whereas three investigators made statements, or it could be surmised that follow-up supports contributed to positive outcomes. Investigators of all 15 research syntheses reported or described the characteristics of and conditions under which in-service PD was most effective. These included trainer introduction, demonstration, and explanation of the benefits of mastering content knowledge or practice, active and authentic teacher learning experiences, opportunities for teachers to reflect on their learning experiences, coach or mentor supports and feedback during the in-service training, extended follow-up supports to reinforce in-service learning, and in-service training and follow-up supports of sufficient duration and intensity. The patterns of results, taken together, provide strong evidence for the relationships between specific in-service PD characteristics and core features and teacher and student outcomes. Results that were the same or similar in the different types of research syntheses for different types of practices bolster contentions about the necessary, but not sufficient, conditions, for in-service training.

Summary

This chapter documented the need for increasing the quantity and quality of ECI practitioners who can meet the growing numbers of those infants, young children, and their families who qualify for services under IDEA. An overview of the evidence supporting preservice preparation and continuing education in-service for ECI personnel was presented, beginning with the foundation from which this evidence evolved. This foundation reflects the long and strong history of ECI, as illustrated through the preparation and ongoing training of high-quality and interdisciplinary personnel who can facilitate growth and development with infants, young children, and their families.

The history of ECI personnel development through preservice and in-service activities is supported by a number of interrelated elements that have continuously driven the field forward. Among these are the legislative and statutory mandates under IDEA for ECI service delivery and personnel development activities, the latter area to assure the competence of those providing ECI services. The field of ECI personnel practice is also supported by theoretical frameworks about adult learning as applied to the training and ongoing preparation of those ECI practitioners. Research has driven the evolution and validation of early theories about how people learn, and current evidence-based recommendations for personnel practice and policy are consistent with early work in this area. The challenge remains, though, on how to apply the components of these evidence-based frameworks into standard practice. We cannot ignore the research base on the unique learning needs of adults, and the skills needed by those who teach them. An additional caution to the field is warranted in regard to the use or recommendation of complex frameworks such as implementation science to guide the scaling up of EBP: For example, such framework requires a viable infrastructure to support the necessary sequence of activities associated with the effective demonstration of a system change.

The last foundational support for ECI personnel practice is pedagogy. The roots of ECI pedagogy continue to drive the content of IHE programs, state certification requirements, national standards, and recommended practice. The need to operationalize and align these core components of ECI pedagogy is an obvious next step in the research agenda for personnel practice. It is also a necessary direction for quality assurance of ECI personnel, including personnel from related services and other occupational categories.

The data that were presented in this chapter as evidence to guide personnel practice in ECI emanate from a variety of sources including surveys, nonexperimental demonstrations, experimental studies, and research reviews and syntheses. Survey data describe the lack of a systematic approach in both preservice and in-service programs in ECI as reflected by descriptions of IHE program offerings, state in-service and PD program offerings, and perceptions of those in ECI practice. This information provides needs assessment data for the field and, as such, can be viewed as a baseline for the future change.

In addition, descriptions of ECI interdisciplinary preservice personnel programs that were implemented 20 years apart remain consistent across a number of program features. Yet, inadequacies in preservice training continue to be identified through observations of baseline skills of teachers about to graduate and surveys on the self-perceptions of program graduates. This is another obvious research need in ECI.

The descriptions of in-service programs included in this chapter are typical of what is being offered through state and local ECI systems. The data from the two examples document interventions that were focused, coherent, part of a state, regional or local system, aligned with incentives or program expectations, and reflective of personnel practices that could can result in child and family change. As such, they provide insight into mechanisms that support or inhibit the acquisition of new knowledge and skills within the ECI workforce.

The evidence that was provided through experimental studies of preservice and in-service practices represented a sample of the available evidence. Though there are a number of experimental group studies that have demonstrated the effects of training and PD activities on teacher behavior, they have focused on teachers and children who are in preschools, Head Start programs, or child care. While the results of such studies inform ECI personnel practice, there have been few group designs either implemented or replicated with ECI practitioners who work with infants and young children who are receiving services under IDEA. The examples of research studies that documented experimental control over ECI personnel practices and personnel outcomes consisted of single-case studies and one example of a random group design focused on child impact. Less consistently demonstrated across studies was the impact of interventions on measures of child skills or on measures of generalization and maintenance of the trainee skills.

Finally, research reviews that were included in the chapter suggested a high level of variability across studies that met inclusion criteria for general research on personnel practices, as well as on targeted practices such as instruction, performance feedback, and coaching. The studies that used coaching were especially problematic because of the conflicting, changeable, and non-empirically based definitions used to describe this popular feature of personnel practice. Potential measurement confounds across studies were illuminated, as were issues related to the replication of such varying applications of the coaching construct. Across other reviews, variation across features such as strategies to teach to generalization and maintenance was also identified, as was the fact that most research studies relied on research staff to implement the interventions under study. However, research syntheses provided evidence for key features of personnel preservice and in-service interventions that have consistently resulted in adult learning and student impact and change.

Recommendations

The studies and reviews that were presented in this chapter are ripe with recommendations for future research on the preservice and in-service needs of ECI personnel. These recommendations were made in the context of the growing numbers and diversity of the ECI workforce and the complexity of competencies needed by them to meet the growing and diverse needs of ECI population. This complexity is compounded by a lack of infrastructure within state and local personnel development systems and the resulting reliance of such systems on ineffective training mechanisms (e.g., conferences, once offered workshops without follow-up) because of funding and logistical constraints. Such systems are also demonstrating challenges in identifying, training, and supporting qualified instructors and other personnel development specialists to deliver evidence-based education and training to ECI practitioners. Yet, it is clear that the federal and state focus on EC and resulting increases in EC programs will continue. What is less clear is how ECI systems will meet the current and future need for well-trained personnel, representing different disciplines, educational backgrounds, and learning styles, to deliver EBP to eligible infants and

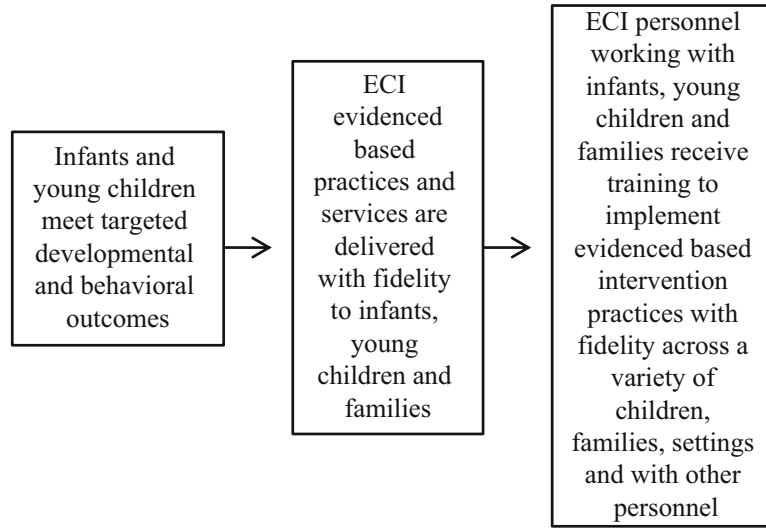

Fig. 16.3 Reverse model of change for personnel development

young children under IDEA, across a variety of EC settings, and, in collaboration with EC staff.

In 1960, the US Navy required a paradigm shift to accommodate the increasing complexity of their work in the era of growing and different (e.g., nuclear threats, collaboration with other armed forces demands). As a result the Navy coined the KISS principle to address the factors that governed their new world order. This principle proposed that most systems work best if they are kept simple rather than made complicated; therefore simplicity should be the key goal in systems design, and unnecessary complexity should be avoided. In the spirit of this principle, the following recommendations will attempt to simplify and clarify the direction needed for future ECI preservice and in-service practice.

Focus on the "Right" Variable for Sustainable Change

The job of personnel in ECI is to facilitate child and family change through the delivery of measurable interventions and outcomes. Therefore, the focus of all preservice and in-service activities should be on the child and family, and measures of effectiveness should reflect this. Guskey (2014) has recently recommended this shift for PD planning, and this has been reinforced for ECI by Dunst (2015). If all training activities focus on the achievement of child and family outcomes and change, preservice and in-service curriculum, activities, and outcome measures should then be guided by the theory of change reflected in Fig. 16.3.

Operationalize and Align All ECI Personnel Knowledge, Skills, and Recommended Practices

ECI has national personnel standards (Stayton, 2015) that are used to accredit IHE preparation programs in ECSE. Personnel standards from NAEYC are also used for those IHE programs with blended programs (e.g., EC and ECSPED). ECI-recommended practices are also available (DEC, 2014) to guide interdisciplinary preservice and in-service training. These standards and practices are not currently operationalized nor aligned with each other. This must be done as a first step to clarify the expectations and competencies for all who provide ECI services. These standards and practices are research based, grounded in inclusionary service delivery, and include competencies that can be implemented across service delivery sites and with other personnel (e.g., collaborative consultation). Once this first alignment is complete, personnel standards across related disciplines can be added to a personnel standards matrix to identify and differentiate similar and

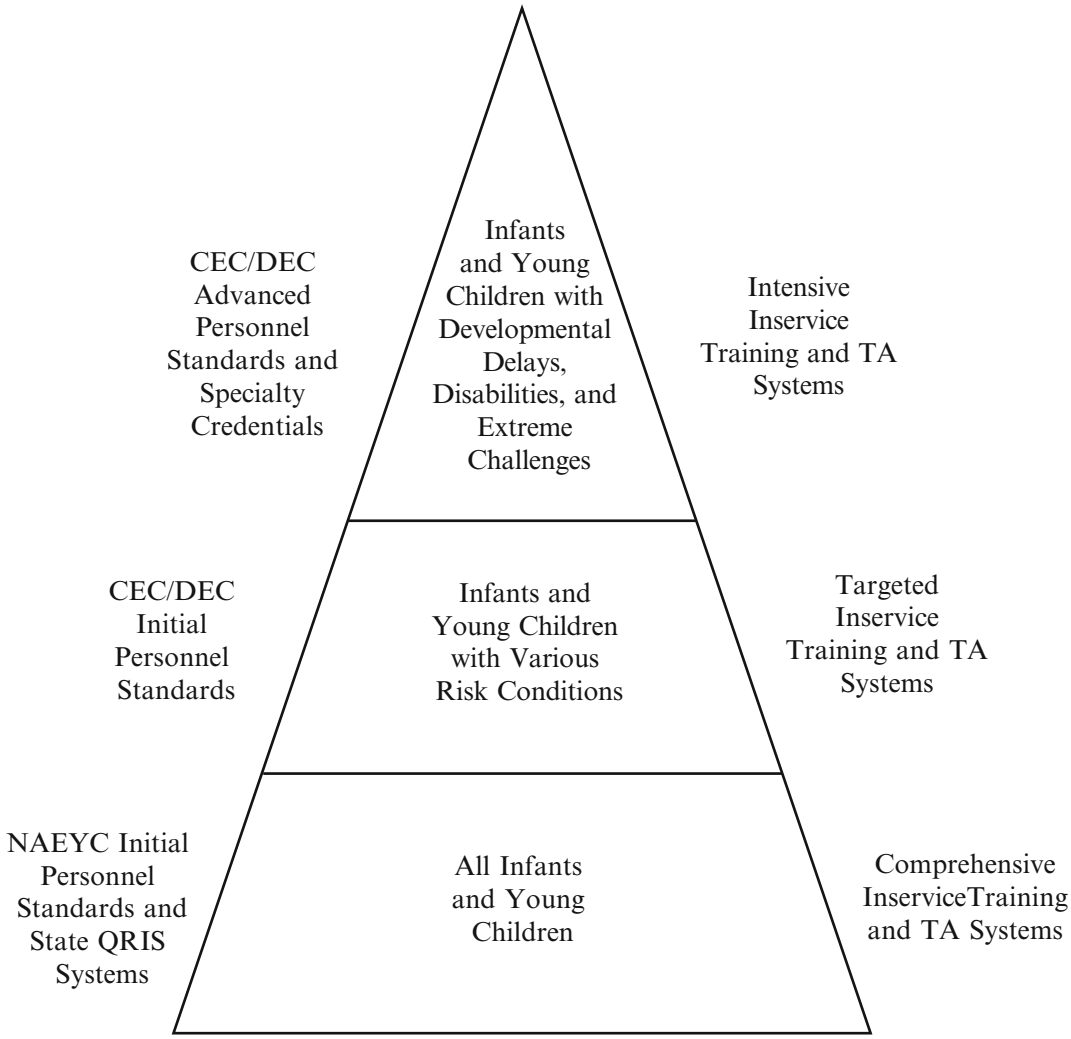

Fig. 16.4 Personnel hierarchy of knowledge and skill

differing practices aligned by discipline and child need. Figure 16.4 contains a scheme using the a pyramid graphic to illustrate as a first step, the CEC-DEC, NAEYC personnel standards, and DEC practices aligned with child need.

Create Infrastructure Support for a CSPD

The need for high-quality preservice and in-service training opportunities for those who serve infants and young children with disabilities and their families must be addressed through systems thinking. All systems are comprised of interrelated components, and each component must use EBP for administration, leadership, resource allocation, implementation, and evaluation. Personnel systems under IDEA evolved using such a system: the CSPD. The components and indicators of a proposed CSPD structure for ECI personnel as conceptualized by the Early Childhood Personnel Center, in collaboration with other national centers, are in Table 16.5. Such an infrastructure will support the identification, implementation, and evaluation of EBPs in the areas of personnel standards, recruitment and retention

Table 16.5 CSPD framework

Subcomponent 1: Leadership, coordination, and sustainability
Quality indicator PN1: A cross sector leadership team is in place that can set priorities and make policy, governance, and financial decisions related to the personnel system
Quality indicator PN2: There is a written multi-year plan in place to address all sub-components of the CSPD
Subcomponent 2: State personnel standards
Quality indicator PN3: State personnel standards across disciplines are aligned to national professional organization personnel standards
Quality indicator PN4: The criteria for state certification, licensure, credentialing and/or endorsement are aligned to state personnel standards and national professional organization personnel standards across disciplines
Subcomponent 3: Preservice personnel development
Quality indicator PN5: Institution of higher education (IHE) programs and curricula across disciplines are aligned with both national professional organization personnel standards and state personnel standards
Quality indicator PN6: Institution of higher education programs and curricula address early childhood development and discipline specific pedagogy
Subcomponent 4: Inservice personnel development
Quality indicator PN7: A statewide system for inservice personnel development and technical assistance is in place for personnel across disciplines
Quality indicator PN8: A statewide system for inservice personnel development and technical assistance is aligned and coordinated with higher education program and curricula across disciplines
Subcomponent 5: Recruitment and retention
Quality indicator PN9: Comprehensive recruitment and retention strategies are based on multiple data sources, and revised as necessary
Quality indicator PN10: Comprehensive recruitment and retention strategies are being implemented across disciplines
Subcomponent 6: Recruitment and retention
Quality indicator PN11: The evaluation plan for the CSPD includes processes and mechanisms to collect, store, and analyze data across all subcomponents
Quality indicator PN12: The evaluation plan is implemented, continuously monitored, and revised as necessary based on multiple data sources

strategies, preservice and in-service activities, evaluation, and leadership, coordination, and sustainability. A viable CSPD allows for the design and integration of research and practice across all EC personnel systems.

Acknowledge and Address the Complexity of Variables Inherent in ECI Personnel Research and Practice

ECI systems are complex, as are the children and families within such systems. The characteristics of personnel who are providing services contribute to the complexity under which research is implemented. Additionally, research designs have to be contextually referenced to the local, regional, and state culture and systems in which ECI operates. This requires the creation of theories of change (Figs. 16.1 and 16.3) that can be delineated into logic models to guide systematic examinations of independent variables, dependent variables, and mediators and moderators to the outcomes of interest, including system impact. Figure 16.5 contains such a logic model developed to accompany Table 16.5.

Create a Repository of Research Findings to Inform Current and Future Personnel Policy and Practice

Almost 20 years ago, Guralnick (1997) proposed an expansion of ECI EBP through the design and implementation of precise, rigorous, and targeted studies that would result in a rich repository of findings to inform policy and practice. Three sets of variables (program features, child and family characteristics, and outcomes) were delineated as integral to such research designs.

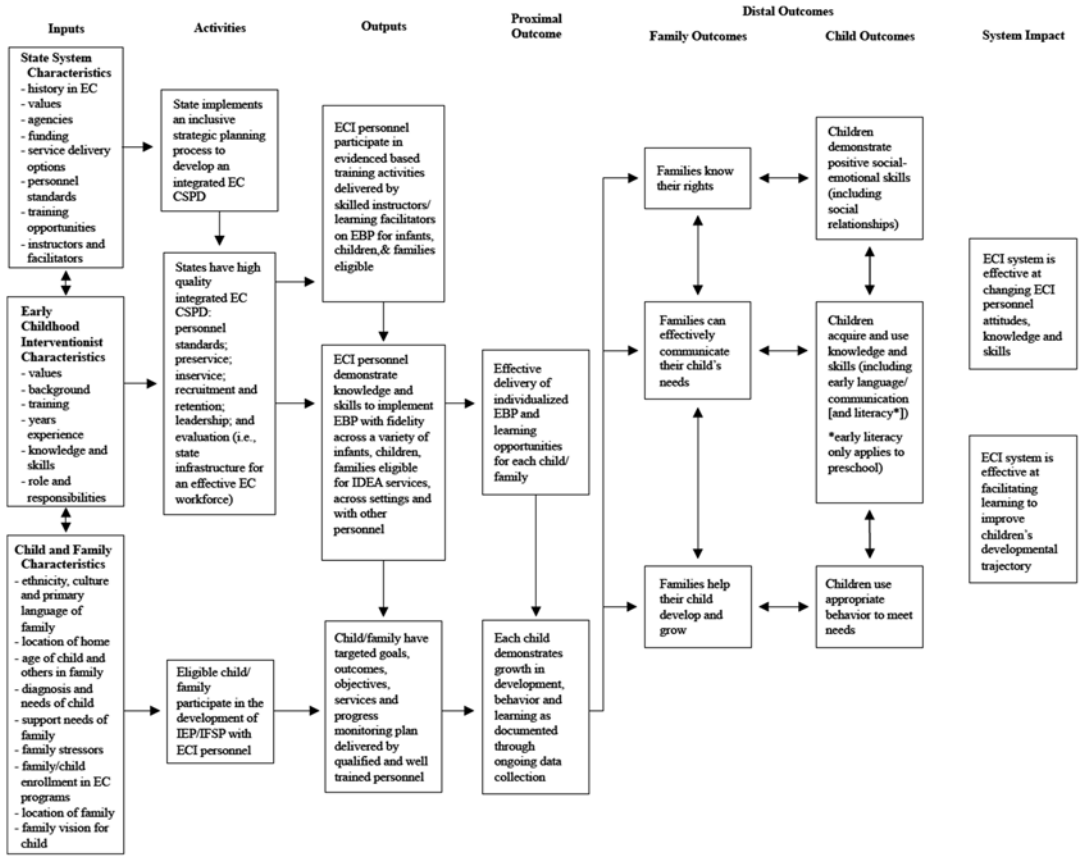

Fig. 16.5 Logic model for ECI personnel practice

Referred to as second-generation research, these designs could facilitate the examination of specificity within and across variables and the interactions among them, to identify evidence of effectiveness. Such designs could also include variations within program features and population characteristics such as systems and persons who provide preservice and in-service activities. Research designed in this way provides a mechanism to systematically build a shared repository of EBP across content areas, personnel practices, and target populations and outcomes. Figure 16.6 contains an illustration of second-generation design components using personnel development features that have been identified as effective across preservice and in-service personnel studies (Dunst et al., 2015).

Build and Sustain the ECI Workforce by Conducting Research on Individualized Learning Needs

Differences in adult learning styles have been demonstrated through measures of adult learning impact as a result of either preservice or in-service activities. Experimental studies also continue to demonstrate failures when trying to change adult behavior through the teaching of more than a targeted and small set of skills to practitioners, or when measuring the generalization and maintenance of those skills, or when moving an EBP from a controlled condition to a real-world situation on a larger scale. These failures will only increase if we do not conduct research on effective learning methods for the future ECI workforce: those who have grown up

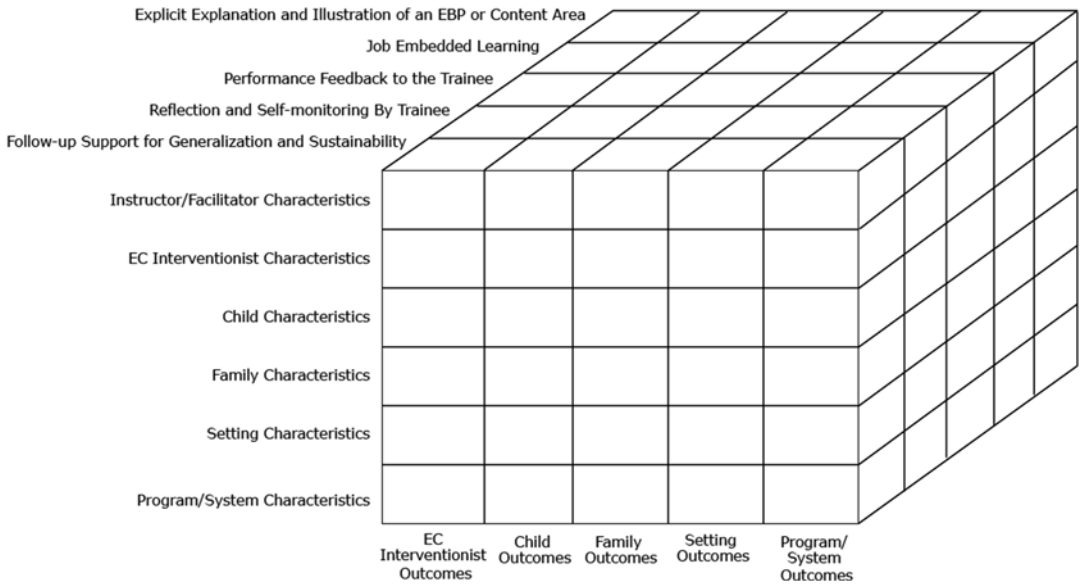

Fig. 16.6 Second-generation applications for personnel practice

learning very differently than any before them. For example, the current generation has been taught through media-directed instruction using tablets or phones, personal learning plans, immediate feedback loops on learning acquisition and progress through online personal teaching and record-keeping systems (e.g., PowerSchool), access to concrete video exemplars when needed (e.g., Kahn Academy), and instant messaging systems driven by pictures (e.g., Instagram and Snapchat). In fact, the College Board is recognizing the needs of current learners by teaming with Kahn Academy to redesign all college and graduate school preparation courses for 2016.

Individualized intervention, progress monitoring, and the acquisition of outcome-based standards have long been the cornerstone of service delivery to infants, children, and families under IDEA. We must begin to use similar methodology in the delivery of training to the personnel who deliver these services. The creation of individualized and effective learning systems for ECI personnel will require a commitment to participatory planning for both research studies and the translation of research findings into policy and practice. Responsive and personalized learning systems that are aligned with standards and competencies must be designed and studied to insure their effectiveness along with individuals' ability to self-direct, manage, and monitor their own learning over time as job requirements change (including the discovery of new EBP). This will require the exploration and use of learning mechanisms such as competency-based evaluation systems and registries, learning menus, and measurement systems. ECI must be prepared for the future learning of those who are, or will become, members of the workforce by identifying and applying innovative EBP in adult learning, so that we may focus the workforce on achieving child and family outcomes.

Embrace a Culture of Research Collaboration to Build and Sustain the ECI Workforce

This last recommendation is the most important and the most difficult to achieve. Very rarely has research on personnel practices been done collaboratively across multiple investigators who represent different philosophies or methodologies. Indeed, funding mechanisms create competition, and, as a result, methodologies are rarely shared, especially when external research funds are limited. This has created gaps between

research findings and applications to practice, practice gaps when interventions are not implemented with fidelity, and outcome gaps when EBP with infants, young children, and families cannot be replicated because of problems with the interpretation, application, and implementation of intervention features (e.g., coaching). These gaps will continue until they are collectively addressed by the ECI research community.

The ECI research community has a responsibility to implement research studies to identify effective interventions to use with infants, young children, and families, and effective interventions to facilitate the implementation of these interventions by the ECI workforce. Until this community agrees to collaborate on a collective and iterative research agenda on personnel practice, we will not be able to move beyond the current status of multiple and various interpretations and applications of features of personnel practice. This could be accomplished by agreeing to a common nomenclature, or agreeing to share methodologies to add value to the knowledge base. Most importantly, the ECI field has a responsibility to infants, young children, and families to implement EBP in all interventions, most importantly as described in this chapter, when teaching of ECI personnel.

Conclusion

"Perfection of means and confusion of goals seem, in my opinion, to characterize our age". This quote has been attributed to Albert Einstein and applies to many challenges we have today. One model for meeting such a challenge was demonstrated by the field of cardiology to address coronary heart disease. Death rates from this disease decreased by 38 % between 2003 and 2013 according to the CDC. This was due to the findings of one researcher who noted differing rates of heart disease mortality, by hospital, that could not be attributed to state, regional, or resource differences. He and a group of his colleagues then surveyed a random sample of 365 hospitals and discovered that those that used one or more of six specific practices to cut down on the time it took to get patients from the ER into an OR treatment room to open their arteries did better than those that did not use such practices. Additionally, the higher the number of the practices used, the faster the patients were being treated, and the better the cardiac outcomes. These findings were published in a peer-reviewed journal in 2006 and presented at major cardiology meetings. The field of cardiology embraced these six EBPs, and hospitals (by definition being complex systems) implemented them. Evaluations documented that many more lives were saved than were under previous treatment protocols (Kolata, 2015, June 19).

The field of ECI also has the need and the opportunity to facilitate a sea change in how evidence-based personnel practices are applied to teach practitioners to implement child and family interventions with fidelity to achieve targeted learning outcomes. Syntheses of reviews of personnel practice methods related to positive outcomes have identified six EBPs (Dunst et al., 2015), and these are on Table 16.4 and Fig. 16.6. I hope the field of ECI will demonstrate the same sense of urgency as cardiologists, and use these practices to frame all future research endeavors on personnel practice, so that we may realize better outcomes in ECI with the infants and young children we serve.

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Implementing Evidence-Based Practices in Early Childhood Classroom Settings

17

Brian A. Boyd, Suzanne Kucharczyk, and Connie Wong

There is no doubt that the age of accountability in educational policy and practice is upon us. The No Child Left Behind (NCLB) Act of 2001 issued in and codified the concepts of scientifically validated practices and high-quality teachers. The relationship between the two concepts was thought to be relatively straightforward and linear—higher-quality teachers who implement scientifically validated practices would lead to better student outcomes. Yet defining and measuring high-quality teaching has proven to be difficult (Brownell, Sindelar, Kiely, & Danielson, 2010), and so too has the process of supporting classroom-based practitioners in their selection and implementation of evidence-based practices (EBPs) (Buysee & Wesley, 2006). In fact the NCLB law, itself, has faced ongoing criticism related to what some consider its focus on a narrowed curriculum (Darling-Hammond, 2007), inadequate attention to issues of educational equity along racial or economic lines (Darling-Hammond, 2007), and concerns over the appropriateness of the testing and accountability standards for students with special needs, in particular those with more severe disabilities (Browder & Cooper-Duffy, 2003). The gulf between policy and "on-the-ground" practice is not new; still, there is an increasing recognition from both policymakers and practitioners that implementation of scientifically or evidence-based practices could improve educational outcomes. The issue that continues to plague both parties (and educational researchers) is how to support and sustain implementation of those practices in classroom settings.

The growing field of implementation science is increasingly recognized as a way to both support and investigate the implementation process in order to understand the organizational "drivers" and other necessary supports that must be in place to sustain EBP implementation in real-world settings (Aarons, Hurlburt, & Horwitz, 2011; Fixsen, Blase, Naoom, & Wallace, 2009). For the purposes of this chapter, it is important to

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understand that there are different implementation process models, yet most include the phases of pre-implementation, implementation, and sustainability (see Table 17.1) (Aarons et al., 2011; Han & Weiss, 2005). In each of these phases, there are various facilitators and barriers that affect EBP implementation, and those can occur at multiple levels of a system, ranging from the social political climate (e.g., is there funding to support EBP implementation?) to the individual provider level (e.g., does the person have the necessary training to implement the EBP?). This means that poor EBP implementation often is not simply a product of unwillingness or noncompliance on the part of practitioners, but is likely the result of their interaction with a multilevel and complex educational system that at any point can present "roadblocks" to EBP adoption and implementation. For example, it has been empirically demonstrated that organizational climate and culture matter in the adoption of EBPs (Glisson & James, 2002). Simply put, if the provider does not believe their organization, in this case a local school, is supportive of innovative practice and change, then that person is unlikely to adopt research-based practices.

Table 17.1 Barriers and facilitators to learning to implement EBPs

Barrier	Learner outcomes related to the implementation of EBP	Facilitators
Pre-implementation phase		
• Limited prior knowledge of quality indicators of instructional practices	Developing awareness of criteria for instructional practices to be based in evidence or not	• Identifying current understanding of quality indicators for instructional practices
• Professionals feeling threatened by criteria which may highlight negatively practices that they are currently using		• Linking current knowledge with new information on how to identify whether instructional practices are evidence based or not
• Professionals feeling lack of confidence in their ability to research and recognize evidence		• Identifying various ways professionals can access knowledge of EBPs (e.g., clearinghouse, reputable websites, academic journals)
• Overuse of didactic instruction keeps professionals disengaged and passive	Awareness of specific EBPs	• Active instruction interspersed with didactic information
• Application to professional's classrooms unclear		• Application to professional's specific classrooms and students made frequently and clearly
• Knowledge of evidence-based practice is the focus when skill development and attitudinal change toward practice is required		• Resources required for effective implementation identified with participants
• Professionals feeling not prepared to apply knowledge		• Ongoing instruction on evidence-based practice returns professionals to critical features they may have missed in their initial introduction to the practice
• Professionals feeling overwhelmed and lacking resources needed to apply knowledge		
Supported implementation phase		

Barrier	Learner outcomes related to the implementation of EBP	Facilitators
• Little opportunity is provided for professionals to practice implementation of evidence-based practice with direct feedback and modeling	Implementing the EBP	• Process in place for professionals to practice; model for other professionals; and receive direct and specific feedback on their implementation
• Professionals expected to be able to implement all aspects of evidence-based practice in unrealistic time frame		• Implementation is seen as a staged process with clear expectations of which stages are most critical and how professionals should achieve mastery of each
• School administrators not prepared to provide time resources for required coaching towards skill acquisition		• Professionals provided access to mentors and peers to contact when implementation becomes challenging
		• Professionals are provided with individualized support and guidance
		• School administrators provide professionals with time and resources to learn how to implement and implement effectively
• Professionals lack clarity about what fidelity looks like	*Achieving fidelity of implementation*	• Professionals provided with and learn to use fidelity guides which underscore critical features of the evidence-based practice and where adaptation is acceptable to maintain effectiveness
• Inadequate structures for recognizing and reinforcing skill acquisition		• Professionals and professional development providers (e.g., coach, supervisor, peer) take data on fidelity of implementation and analyze data on an ongoing basis to adjust implementation as needed
• Once fidelity is met supports are taken away		
Sustainability phase		
• Professionals lose motivation to maintain skills and fidelity when external supports are pulled away	*Sustaining fidelity of implementation*	• Professionals support each other in their implementation of the evidence-based practice
• New challenges (e.g., new students, resource issues) stymie progress and professionals revert to old ways		• Professionals are well prepared to adapt to new information/challenges because they are clear about the nonnegotiables of the evidence-based practice

Note: Adapted from Caffarella (2002), p. 212 Figure 10.1 *Examples of barriers and enhancers to transfer of learning*

Gregory Aarons (Aarons et al., 2011) and others (e.g., Klein & Sorra, 1996) also have discussed the need for an "innovation-values fit." That is, innovative practices most likely to be adopted by organizations are not only those that align with their mission, vision, and goals but also fit within the everyday practical demands of the environment (e.g., productivity requirements). This is consistent with the diffusion of innovation theory, which posits that the local context matters greatly in intervention adoption and implementation (Dingfelder & Mandell, 2011). Further, leadership matters—leadership style is associated with providers having positive attitudes toward EBP use (Aarons, 2006). If the building principal does not value (or reward)

innovation and EBPs, then why should the classroom teacher? Finally, at the provider level, we know that ongoing support and monitoring are important in order to implement and sustain change in practice. Monitoring fidelity of EBP implementation has even been associated with less provider turnover in mental health settings, suggesting it could have a protective effect (Aarons, Sommerfeld, Hecht, Silovsky, & Chaffin, 2009). Further, it has been found that implementation of EBPs, when compared to services as usual, is associated with lower levels of emotional exhaustion for mental health providers (Aarons, Fettes, Flores, & Sommerfeld, 2009). This begs the question—could the implementation of EBPs in classroom settings, when combined with constructive fidelity monitoring, mitigate the high amounts of teacher turnover and burnout found in the field of special education?

With this question in mind, we now shift to a discussion of what makes EBP implementation so difficult in classroom settings and, contrarily, what supports and sustains EBP adoption and use. Finally, we follow this with a discussion of how a classroom provider could navigate the process of selecting an appropriate EBP for an individual child.

What Makes Evidence-Based Practice Implementation Difficult?

In many states in the USA, both teacher's pay and morale are low, and in special education, in particular, we continue to deal with issues of teacher retention and burnout (Billingsley, 2003; Conroy, Alter, Boyd, & Bettini, 2014). These recurring, systemic issues can certainly impede efforts to disseminate and implement EBP. However in any discussion of why people do or do not change, it is important to introduce the concept of *readiness to change*. Peterson (2013) defines readiness to change as "the developmental process in which a person, organization, or system increases the capacity and willingness to engage in a particular activity" (p. 44). Thus, while organizations or larger systems also must demonstrate a willingness to change, here we focus on provider-level factors that may impact change. First, demographic variables such as level of education, experience, and one's professional discipline have been associated with provider's openness toward EBPs (Aarons, 2004, 2005; Aarons et al., 2011). In addition, cultural beliefs and attitudes as well as the amount of discrepancy between the current and new practice, or in this case EBP, can affect intervention uptake. As Peterson states, "people who are considering (or being asked to consider) a behavior change that challenges the assumptions of their culture or family of origin are unlikely to be ready to change unless they are able reconcile their sense of identity and cultural values with the new behavior" (p. 49). Thus, intervention developers need to more purposefully consider the culture of the individual as well as the organization as they attempt to move their practice into real-world settings. Finally, in Aarons' development of the *Evidence-Based Practice Attitude Scale* (EBPAS; Aarons, 2004), one of the four validated subscales measured the construct of "divergence." Divergence measures, in part, the extent to which providers believe their clinical or practical experience should inform their practice in comparison to the research evidence. It is more likely for providers to experience divergence when the EBP is mandated via top-down processes (e.g., school superintendent or board elects practice without input), without consideration for the actual practice context (Garland, Kruse, & Aarons, 2003) or perspectives of the providers in that context.

What Facilitates Evidence-Based Practice Implementation?

We know that certain forms of professional development are more conducive to EBP implementation and sustainment than others. Thus, who should be trained and how they should be trained and supported is where we now turn our discussion, with a focus on early childhood education (ECE) classroom settings.

Professional Development and Implementation of EBPs

While EBPs for young children with special needs continue to be developed, studied, and disseminated, our understanding of how best to support the implementation of these practices to fidelity is also emerging. Snyder, Hemmeter, and McLaughlin (2011) maintain "similar to second-generation research on early intervention effectiveness, to advance a scientific basis for ECI PD (Early Childhood Intervention Professional Development), it will be important to explicate what PD is and which features of (professional development) work for whom, under what circumstances, and what cost" (p. 358). The following section describes various ways in which professional development efforts support the work of early childhood special educators based on adult learning principles as well as theories and research into the application of professional development practices in early childhood settings.

Professional Development for Whom

When considering how best to ensure the effective implementation of EBPs in ECE settings, the needs of all stakeholders (e.g., teachers, paraprofessionals, related service providers, administrators, families) must be considered. These stakeholders have varied learning needs, experiences, motivations, and resources available to them which may impact their capacity to be ready to receive new knowledge, apply the knowledge, and receive feedback in order to apply to fidelity. Positive, sustained outcomes require that professional development recognizes and plans for these differences. While considering the needs of these stakeholders, those of paraprofessionals working in ECE settings take precedence.

Paraprofessionals

A focus on paraprofessionals is particularly critical when planning for professional development for the effective implementation of EBP. There continues to exist a reliance on the use of paraprofessionals in the current educational model for students with disabilities (Giangreco et al. 2003; Giangreco & Broer, 2005; Robinson, 2011). Unfortunately, many paraprofessionals lack the organizational supports (e.g., supervision, professional development) (Carter, O'Rourke, Sisco, & Pelsue, 2009) to maintain the skills necessary for effective implementation of EBP. Given the significant role paraprofessionals play in the educational programs of students with disabilities, there has been a focus on building their knowledge, skills, and capacity (Giangreco, Edelman, Broer, & Doyle, 2001). In a study of the knowledge, responsibilities, and training needs of 313 paraprofessionals in elementary and secondary settings, researchers found that on-the-job training was the dominant professional development process through which paraprofessionals gained knowledge about expectations for their work (Carter et al., 2009). Considerations must be made to ensure that paraprofessionals have access to quality professional development efforts by including paraprofessionals in the planning for learning activities, providing for release time and coverage for paraprofessionals as needed, identifying the specific contexts within which paraprofessionals work to best tailor implementation (e.g., instructional support, one-on-one assistance, group support), and providing teachers and administrators with information on their own support of paraprofessionals.

Educators

According to Carter et al. (2009), schools rely on informal, on-the-job, individualized approaches to training paraprofessionals. The quality and resulting outcomes of such practices are likely to be as good as their implementer—often the special education or general education teacher. Few special education or general educational teachers are prepared for this role based on knowledge of adult learning principles and practices. In developing professional development efforts for the implementation of EBPs in ECE settings, teachers and other key implementers should be prepared to

encourage paraprofessional reflection on their use of EBPs, provide modeling effectively, and provide coaching as their implementation of EBPs is generalized for various students in various settings.

In addition to supporting teachers in their critical, and overlooked, roles as professional developers, trainers, facilitators, and coaches, their own learning needs and circumstances should be considered. Teachers in early childhood settings, in general, have reached various levels of education depending on their state licensure requirements (Ackerman, 2004). The diversity of their teaching experiences, prior EBP expertise, and current teaching challenges require an individualized, applied approach to the development of their professional development plan.

Administrators, Therapists, and Others

Other team members to include are administrators, therapists (i.e., speech-language pathologist, occupational therapist, psychologist), and any other staff who will be implementing EBPs for young children with special needs. Team members should strive to maintain a transdisciplinary culture during their work by involving each other, sharing expertise, and collaborating throughout the process of assessment, educational planning, implementation, and evaluation (Bruder, 2000). In order to reflect a collaborative teaming culture while supporting the implementation of EBPs, care should be taken to provide opportunities for professionals to assess their team-level expertise and gaps in the knowledge and use of EBPs, plan for implementation across team members, and provide direct feedback to members across roles.

Families

Families of children with special needs are another group that must be included as learners in the process of understanding how to implement EBPs for their children. Parents have the greatest opportunities to generalize their children's skills into environments outside of the classroom. Ensuring that parents possess the skills to teach EBPs to the level expected from school team members expands the likelihood of positive, sustained outcomes for young children with disabilities. For example, parent-implemented interventions have been found to be effective EBPs for students with autism spectrum disorder (Wong et al., 2014).

Designing Professional Development Toward Effective Implementation of EBP

The NCLB Act (Section 9101 34, p. 1963) offered descriptors of effective professional development as "high quality, sustained, intensive, and classroom-focused in order to have a positive and _ lasting impact on classroom instruction and the teacher's performance in the classroom." The act also clearly highlights 1 day, short-term trainings without follow-up as specifically ineffective. These descriptors, in part, represent what is known about how adults learn and how professional development programs can support the learning of evidence-based practices. Adults learn best when the content of the learning is directly relevant to their needs and capitalizes on their experiences, when the process of learning takes place in authentic settings most like or within their own, when they have opportunities to direct their learning (Merriam, Caffarella, & Baumgartner, 2007), and when they are supported and coached through direct feedback and opportunities for self-reflection on their implementation (Cornett & Knight, 2009). The following section describes ways in which various approaches to professional development can be used to support the implementation of EBPs in classrooms.

Structures for Adult Learning

Several learning structures could be considered when weighing approaches to providing professionals with support in their implementation of EBPs. Three seemingly dichotomous modes for learning are self-directed vs. facilitated, individual

vs. group, and expert vs. peer. Self-directed learning is critical given that school professionals live in a time highly accelerated by expectations and access to new knowledge (Williams, 2001). It offers a structure for teachers to take initiative to direct and apply their learning immediately within their classroom setting (Merriam et al., 2007). Yet self-directed learning (e.g., self-paced online learning modules, independent projects, informal web searches for current EBP research) is challenging for already burdened professionals who may not have the necessary resources or adequate time to engage in these activities. Facilitated learning (e.g., training, coaching) provides learners with more structure and direction while maintaining individualization to meet the needs of specific learners. Focus on individual learning (e.g., teachers of specific student, new teacher) versus group learning (e.g., all special education teachers, all team members supporting a classroom, all new paraprofessionals) greatly depends on the content and desired outcomes. Similarly, the desired outcomes determine whether a school or district will rely on subject matter experts (e.g., curriculum developer gives training) or peers (e.g., experienced teachers providing feedback to other teachers) in the provision of professional development.

The combination of these learning structures in supporting the implementation of EBPs begins to define the professional development plan being developed. For example, a desired school outcome could be that all teachers in a school become more aware of EBPs so that they are clear as to practices which do not meet criteria and are able to be more critical in incorporating such practices into their work. This outcome could begin with a full staff training on EBPs and research skills, followed by a self-directed, self-paced process through which groups of professionals research EBPs, and concluded when these groups discuss their findings in a professional learning community setting. In another example, a different professional development plan would be developed by a school investing in ensuring that all special education teachers, paraprofessionals, and other relevant team members are able to implement specific EBPs to fidelity. In this case, the adult learners likely will require learning formats that are more intensive, ongoing, and directed. The following section describes various learning formats, their advantages, and disadvantages when applied to the support of professionals in ECE classrooms.

Learning Formats

Formats of professional development frequently used in schools include onsite and online training, peer and mentor coaching, professional learning communities as settings for action learning, and supervision and evaluation. Each of these holds advantages and disadvantages for professional learning. Again, maintaining alignment between the features of these formats, the desired learning outcomes, and learner characteristics is critical to ensure successful learning and implementation of EBPs in classrooms. To achieve alignment, well-developed professional development plans are based on a cyclical, iterative process of understanding the context; identifying and prioritizing learning needs; developing objectives for change; designing the instructional plans; creating cumulative and summative evaluations; working with school staff and administrators to secure time, space, and other needed resources; procuring feedback from stakeholders throughout the process; planning for knowledge transfer; and of course implementing the professional development plan (Caffarella & Daffron, 2013). Based on their review of literature of evidence-based programs in schools, Han and Weiss (2005) describe a three-stage sustainability process to the implementation of EBPs: *pre-implementation*, *supported implementation*, and *sustainability phase*. Table 17.1 describes the barriers and facilitators to learning at each of these phases as professionals learn to implement evidence-based practices. These should be considered in the planning and delivery of any of the following professional development formats.

Training. Training is a term used to describe many different professional activities including onetime or ongoing, off-site instruction, on-site instruction, web-based instruction, and so on for

Table 17.2 Aligning training outcomes with training activities

Training outcome	Training activities
New knowledge (e.g., *introduction to 27 evidence-based practice for students with ASD*)	. Didactic training with PowerPoint and handouts
	. Reading assignment
	. Self-paced web search assignment
Developing skills (e.g., *learning to implement specific steps of an evidence-based practice to fidelity*)	. Role play
	. Group tasks
	. Model>practice>apply in context
Shifting perspectives (e.g., *critical analysis of interventions currently being used in classroom to determine whether evidence based or not*))	. Group dialogue
	. Journaling
	. Online community of practice

large groups, small groups, and individuals. Again, the NCLB (2001) definition of high-quality professional development specifically excludes onetime training from those descriptors. Although stand-alone (i.e., "spray and pray") trainings may appear efficient for school districts, they rarely produce any proximal, let alone sustained behavior change. Professional development activities that include didactic training are more likely to be effective when designed for outcomes related to knowledge awareness and paired with other professional development formats which better address early childhood professionals' skill development and perspective/attitude change related to the implementation of evidence-based practices. For example, didactic training of new information, followed by modeling (Robinson, 2011), and continuous performance feedback (Casey & McWilliam, 2010) have been found to be an effective professional development package for skill development of teachers and paraprofessionals working in early childhood settings.

Online training and blended training (i.e., in person and online) provide another opportunity to expand training toward a greater likelihood of effectiveness. Merriam and Bierema (2014) point to the challenges and advantages of this format in stating "for online lifelong, learning to be most effective, learners should have technical skill and open attitudes toward online learning; be prepared for and interested in learning; and belong to online communities that encourage participation within a positive sociable community. Being prepared for lifelong online learning may be frustrating to many adult learners as the technology continues to advance, creating challenges for both learners and educators to keep pace" (p. 196). One example of an online professional development platform relevant to EBPs is the Autism Internet Modules (2014) where 27 EBPs for students with autism spectrum disorder (ASD) were developed by the National Professional Development Center (NPDC) on ASD. These online modules could be used to provide an introduction to professions in an EBP prior to practice and feedback with a coach. Alternatively, they could be used to support sustainability of implementation by providing professionals with access to information on the EBP, as needed, when external support is no longer readily available.

Online training or blended training can be effectively incorporated into professional development plans for professionals implementing evidence-based practices. Table 17.2 aligns these training activities with specific learner outcomes. These training activities should be followed with ongoing professional development using the other formats mentioned here to support generalization of knowledge to the effective classroom application of evidence-based practices.

Coaching. In a review of early childhood professional development literature, Snyder et al. (2012) found coaching to be the most frequently used follow-up method by researchers for training on interventions. While research on coaching in various settings continues to require development, some studies have found that coaching led to greater transfer of new teaching practices into the classroom and furthermore higher student achievement scores (Showers, 1982, 1983). For example, Truesdale (2003) found that coaching increased transfer of training content over 15 weeks without loss of teacher interest, as compared to a control group; in addition, coaching when added to staff development

has dramatically increased teacher implementation of new skills (Bush, 1984). The NPDC on ASD used a cyclical coaching process involving pre-observation, observation/modeling, and post-observation in its work with 76 school programs across 12 states implementing EBPs (Kucharczyk et al., 2012), which technical assistance providers identified as the most impactful shift in their work with teachers as compared to their work prior to NPDC. While coaching requires a greater resource (e.g., time, administrator support) input than other less intensive models of professional development, it can support sustained teacher implementation of EBPs (Kucharczyk et al., 2012). In the context of schools, as well as in other learning environments, coaching is seen as a critical process used to support not only the use of EBPs, but their fidelity of implementation (Basu, Salisbury, & Thorkildsen, 2010; Rush & Shelden, 2011; Wilson, Dykstra, Watson, Boyd, & Crais, 2012).

Since coaching is enacted in the relationship between the coach and the professional, the practice requires skills in addition to the primary skills of facilitator and communicator required to provide training. Hanft, Rush, and Shelden (2004) describe seven factors which affect the relationships between coaches and adult learners (e.g., professionals and family members): motivation, respectful learning environment, past and current experience, self-direction and active involvement, learning styles and coping strategies, critical and reflective thinking, and transition time to integrate new ideas. Similar to the NPDC and other coaching models, their cyclical process for coaching involves initiation, observation and action, reflection, and evaluation. Throughout the cyclical process the coach supports the professional in their reflection on their implementation of the EBP; provides resources, models, and guidance as needed; gives data-based feedback; and helps the professional to create an action plan that moves their skills toward fidelity of implementation of the evidence-based practice.

Professional learning communities. Professional learning communities (PLCs) are at a minimum consistent meeting times for groups of school professionals to gather for a common task. At their strongest they embody principles and serve as a structure for the enactment of shared mission, vision, and goals, collective inquiry, collaborative teaming, action orientation, continuous improvement, and an orientation toward results (DuFour, DuFour, & Eaker, 2008). When learning to implement EBPs, school team PLCs can be an effective structure for professionals to discuss successes and challenges to their implementation, develop solutions, and report on the implementation of these solutions. Providing an agenda for addressing the implementation of EBPs within PLCs will assist the school teams in maintaining a collaborative, solutions-based approach. For example, specific professionals might be assigned to bring in their fidelity and student data sheets to report and receive feedback on progress. If all relevant team members are not members of the PLC (e.g., paraprofessionals, therapists traveling between school), care should be taken to include them in the dialogue and action steps developed within the PLC. In conclusion, there are a number of professional development formats to support EBP implementation, but these must be carefully selected and individualized based on desired outcomes for students, professionals, and/or family members. Table 17.1 further identifies specific barriers professionals or coaches may encounter and how these might be addressed through facilitators at each of the three phases—pre-implementation, supported implementation, and sustainability.

How Does One Make an Informed Decision about EBP Selection?

Before discussing the selection process, it is important to note that practitioners take different paths in how they identify and ultimately use EBPs (Odom, Hume, Boyd, & Stabel, 2012). These different pathways have been discussed in terms of "eclecticism." For example, Gilliland, James, and Bowman (1994) noted that some professionals in their field describe an unsystematic eclecticism in which "eclecticism is a jack-of-all-trades-master-of-none approach" (p. 554). In this

form of eclecticism, practices may be adopted based on personal or professional knowledge, without an identified conceptual framework or set of guidelines. Gilliland et al. and other scholars also have identified a second form of eclecticism that they describe as "technical eclecticism" (Lazarus & Beutler, 1993; Lazarus, Beutler, & Norcross, 1992). Technical eclecticism involves the selection of empirically supported treatments from different theoretical perspectives for use with an individual client. Theoretical eclecticism is the final form in which two or more theoretical approaches are incorporated into a treatment model and the therapist follows the practices dictated by those theories. It is believed that the latter two forms of eclecticism are superior to the use of unsystematic eclecticism. These different forms of eclecticism, however, acknowledge that practitioners are likely to use multiple EBPs simultaneously, although one goal should be to support their use of technical or theoretical eclecticism in order to encourage a more informed decision making process, and to ensure that incompatible practices are not chosen for implementation. Still the process of implementing EBPs in classrooms should be systematic and begin with assessment. Prior to EBP selection, it is essential to review children's goals and learning characteristics, evaluate the existing program, identify skills and knowledge of staff, and assess resources.

Identify Potential EBPs That Align with Child Goals

The first step is to identify potential EBPs that align with the child's goals. As an example, several research reviews have been conducted to identify EBPs for children with ASD. Two notable reviews, conducted by the NPDC on ASD (NPDC; Wong et al., 2014) and the National Standards Project (NSP; National Autism Center, 2015), have specifically focused on behavioral interventions that can be used in educational settings for children with ASD. Using a systematic process for evaluating published, peer-reviewed journal articles that reported findings from either group or single case experimental design studies, both reviews identified a specific set of EBPs for children with ASD. Furthermore, both reviews also report outcomes produced by each EBP that span across multiple developmental domains and skill areas. Such reviews of the research literature can be used to identify a tentative list of EBPs that are potentially viable treatments to target individual child goals.

Subsequently, the child's target skill domains can be matched with EBPs that have been shown in research to successfully target the same type of skills (e.g., if the target goal is improved play skills, then one would select from a list of evidence-based play interventions). For each targeted goal, at least one EBP should be listed. However at this point in the process, the information from the research reviews on EBPs and outcomes should not be restrictive but rather serve as a general guideline in the initial selection of EBPs for the classroom. Other EBPs also can be included based on professional judgment. At this stage, it is often helpful to be more inclusive and have several EBPs selected for each goal because in the following steps, the list will be systematically reduced.

Narrow Potential EBPs Based on Child Characteristics

The next step is to consider individual child characteristics in relation to the list of EBPs selected for each goal. Continuing to use the example of children with ASD, we know that cognitive ability and early language skills are predictive of later outcomes for this group (Howlin, Goode, Hutton, & Rutter, 2004). This affects EBP selection because children with ASD who have higher mental ages often acquire and generalize new skills quicker and more easily with naturalistic intervention strategies, whereas children with lower mental ages often need more time and repeated practice and require the use of more intensive behavioral therapies (Wong, Kasari, Freeman, & Paparella, 2007). This example simply demonstrates that EBP selection will need to be tailored to the individual child because no single teaching practice will meet the needs of all children, even if they are working on the same target skill.

Other Factors to Consider

With the list of EBPs now narrowed based on the child's goals and characteristics, the final step in the selection process is to decide which practices have the best fit given factors external to the child, such as family preferences, team knowledge and interests as well as available resources. It can be difficult to assess team knowledge and interest in various EBPs, although self-assessment and direct observation could be used. Reszka and colleagues developed and psychometrically validated the *Classroom Practice Inventory* to have teachers of preschool-aged children with ASD self-rate their use of various EBPs (Reszka, Hume, Sperry, Boyd, & McBee, 2014), such tools could be useful in helping teams self-identify their strengths and challenges related to EBP selection and use. While understanding child goals and learning characteristics and team knowledge are essential to selecting and implementing EBPs in the classroom, the limiting factor may be resource allocation. Therefore, an assessment of the resources available to support EBP implementation also must be considered in the selection process, including time, training, materials, and staff expertise needed to implement and sustain the practice. Staff expertise is one of the drivers of EBP implementation and sustainment Aarons et al. (2011) identified. Essentially, it is more likely that an organization, such as a school or classroom, will select, implement, and sustain a practice when multiple staff working in that organization are trained in and consistently implement the practice. Therefore, building a critical mass of knowledgeable staff related to a few, select EBPs is often more productive than having many providers who are "jack-of-all-trades-master-of-none." Overall, a thorough EBP selection process will provide assessment information about the child; the classroom/program environment, including team member knowledge; and available resources. Finally, ongoing progress monitoring is essential to ensure the selected EBP is being successfully implemented and the desired outcomes are being achieved. Teachers' systematic and consistent use of progress monitoring has been associated with their ability to identify student needs, design more targeted instruction, and better student outcomes (Fuchs & Fuchs, 2001). Therefore, a critical step in the EBP implementation process is continuous assessment in order to ensure the selected intervention is actually meeting the goals and needs of the child.

Conclusion

One way to improve children's educational outcomes is for practitioners to implement and consistently use evidence-based practices. Yet there are a variety of system level and individual provider factors that affect adoption and use of these practices in ECE classrooms settings. Individualized and ongoing professional development opportunities can successfully contribute to EBP implementation and sustainment. With professional development, however, it is important to consider who needs to be trained (e.g., paraprofessionals, educators, or family members) and the most appropriate training format (e.g., online training, coaching) given the desired outcomes.

The field of implementation science is contributing greatly to our understanding of what affects EBP adoption and use in real-world settings, both at the organizational and provider level. While educational research and practice is beginning to use knowledge generated from implementation science, there are other fields that could be relevant to the study of EBP use in early childhood special education. One such field is Social and Decision Sciences, which is primarily concerned with the choices individuals make and how they make those choices. A better understanding of how administrators and providers actually decide whether or not to adopt a practice would be informative for intervention development and, ultimately, EBP implementation.

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18 Using Modifications and Accommodations to Enhance Learning of Young Children with Disabilities: Little Changes That Yield Big Impacts

Susan R. Sandall, Ilene S. Schwartz, and Ariane Gauvreau

Learning Environments

The quality of a learning environment is related to the outcomes achieved by children who spend time in that environment. Quality can be assessed on multiple features including safety; amount, type, and organization of activities and materials; social and emotional support; children's interactions with caregivers, teachers, and peers; and the type and amount of language opportunities (e.g., Brophy & Good, 1986; Hamre & Pianta, 2005; Hart & Risley, 1995; NCHD ECCRN, 2002; NRC, 2001; Pianta, 2000; Raver, 2004).

In early childhood education, the learning environment plays an important role in intervention and achievement of planned outcomes for all children including those with disabilities and other special needs. Teachers, parents, and caregivers arrange environments to provide young children with opportunities to explore new and interesting spaces, places, and materials, to interact with others, and to use language in a variety of ways. Carefully designed, interesting yet predictable environments set the stage for learning and development. For young children with disabilities, well-designed environments are necessary but may not be sufficient to provide the support that individual children may need in order to fully participate and learn. Changes or adjustments to the learning environment may be needed. These changes are called modifications and accommodations (Sandall & Schwartz, 2008). In this chapter, we will describe the modifications and accommodations that are used in early childhood settings to enhance the learning of young children. We will emphasize three main points: access and participation are key to learning, access and participation can be enhanced by making changes to the social and physical environment, and intentional planning and implementation are vital.

Definitions

For purposes of this chapter, we define six terms. In using modifications and accommodations as instructional practices, it is important to use terminology in a similar way.

Inclusion is not a placement strategy or a type of classroom. Inclusion is an educational philosophy that acknowledges that all children are

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children first and that children have the right to participate as full members of their community. Therefore, inclusion promises children and their families access to environments in their community, alongside typically developing children. Inclusion, however, provides more than access. After all, years of research have demonstrated that the physical placement of children with disabilities into the same classroom with typically developing children does not guarantee that children will be socially and instructionally included (e.g., Bricker, 1995). Inclusive schools, programs, and communities provide the teaching, guidance, and ongoing coaching that children and adults need to be successful (DEC, 2009; Schwartz, Sandall, Odom, Horn, & Beckman, 2002).

A curriculum *modification* is a change in a classroom activity or material that allows a child to participate (Sandall & Schwartz, 2008). A modification may also mean a change to what is being taught or expected from an individual child and, thus, related to the child's IEP or IFSP. But the assumption underlying the use of relatively simple changes that we label modifications is that these changes lead to increased participation and that increased participation leads to increased learning.

An *accommodation* allows the child to participate in the same activity or learning experience but with a change in timing, setting, scheduling, response, and/or presentation. Using a large print book and extending the time for snack to allow more independent eating are examples of accommodations. For purposes of this chapter, the terms accommodations and modifications are used interchangeably. We note that other terms may also be used such as adjustments and adaptations. The important point is that the change increases the probability that the child will access and participate in the learning environment and the activities and experiences within the environment.

Further, accommodations and modifications can increase *access to the general education curriculum* for children with disabilities with an eye toward not just achieving access but making meaningful progress within the curriculum. IDEA 2004 specifies that statements regarding access to the general education curriculum be specified in the child's IEP.

Intentional teaching means that teachers act with specific outcomes or goals in mind for children's development and learning (Epstein, 2007). In this chapter, we contend that while modifications and accommodations can be fairly simple to make, they must be carefully planned with a clear purpose in mind.

Data-based decision making is the process of using child performance data to know whether or not the instructional practice (i.e., modifications and accommodations) is successful or if adjustments need to be made. The practice is successful when the child is truly participating and increasing in their independent participation. Data are collected via observations and then reflected upon in order to decide if changes need to be made.

Modifications and Accommodations Within a Tiered Framework

The modifications and accommodations for young children with disabilities and other special needs that we describe here are one tier of the Building Blocks framework (Sandall & Schwartz, 2008). Building Blocks provides a set of educational practices designed to help teachers be more effective at including, teaching, and meeting the specialized needs of young children. Consistent with other tiered systems of supports (see Buysse & Peisner-Feinberg, 2013), the Building Blocks framework begins with a strong foundation of providing a high-quality learning program for all children. In the Building Blocks framework, the universal intervention (i.e., Tier 1) is a quality program that implements the necessary *modifications* to support participation and learning. That is, we split the foundational block or the universal intervention into two blocks—the quality program and the more specific curriculum modifications and accommodations. The secondary intervention (i.e., Tier 2) is embedded learning opportunities, and the tertiary intervention (i.e., Tier 3) is explicit, child-focused instructional

strategies that offer more intensive and highly individualized support.

The Teaching Pyramid (Fox, Dunlap, Hemmeter, Joseph, & Strain, 2003; Hemmeter, Ostrosky, & Fox, 2006) is another example of a tiered system of support for early childhood with a particular focus on social-emotional development and intervention. Similar to Building Blocks, the Teaching Pyramid includes nurturing and supportive relationships plus high-quality supportive environments as their Tier 1 level of support. Again, while the foundational tier is the universal promotion level for all children, the Teaching Pyramid recognizes that this tier may also include modifications to support the engagement of the individual child by way of such changes as structuring a transition from one activity to another or using an individual visual schedule for one child.

These tiered systems of support when utilized in early childhood settings recognize that while most K-12 versions move from a high-quality, universal curriculum to targeted supports, early childhood teachers actively and intentionally consider changes to the social and physical environment before trying out more specialized instruction. Such modifications and accommodations can be thought of as little changes that have a big impact.

Universal Design

The strong foundation or universal intervention requires careful planning and implementation. While this chapter focuses on making modifications and accommodations, it is useful to think a bit about the concept of universal design. Universal design principles come to us from the field of architecture and focus on buildings, products, and environments that are accessible to everyone from design to production. These principles have been applied to education and can be consolidated into three essential principles (e.g., Blackhurst et al., 1999; CAST, 2006; Mason, Orkwis, & Scott, 2005). The principles are:

- Multiple means of representation: This principle involves provision of instruction, questions, expectations, and learning opportunities in a variety of formats and at different levels of complexity that addresses a range of ability levels and needs.
- Multiple means of engagement: This principle involves presentation of a variety of opportunities to capture children's attention, curiosity, and motivation and addresses a range of interests and preferences. Engagement is maintained through scaffolding, repetition, and appropriate challenges.
- Multiple means of expression: This principle involves giving children a variety of means and formats for responding, demonstrating what they know, and expressing thoughts, feelings, and ideas. Children have options in their use of materials as well.

Universal design for learning has been interpreted through an early childhood lens (Conn-Powers, Frazeur, Cross, Krider Traub, & Hutter-Pishgahi, 2006; Lieber, Horn, Palmer, & Fleming, 2008). Universal design helps teachers welcome every child and family and plan for full and equitable access to the early childhood program. Using these design principles, teachers adjust for differences for all children, not just for those with disabilities. However, the use of universal design does not negate the need to make modifications and accommodations to meet the individual needs of particular children. To support progress in meeting high-priority goals for some individual children, the teacher will need to make individualized modifications and accommodations.

Meeting Individual Needs Through Individualized Supports

Universal design goes a long way toward contributing to children's learning, independence, social interactions, and communication. It means that many accommodations happen at the planning stage rather than after the fact. However, for some children and to meet some of their learning needs, individualized supports are needed. Researchers have investigated the acceptability of individualized supports as well as the effectiveness of such supports. In this section, we examine

the ways that teachers can adapt the social and physical environment in order to enhance children's participation and learning.

Wolery et al. (1994) used survey methods to ascertain how easy or hard it is for early childhood teachers to adapt their classroom activities and areas to include young children with disabilities. They found that early childhood teachers use a wide variety of classroom activities (e.g., circle time, free choice time) and learning centers (e.g., dramatic play, sensory table). Teachers reported that the presence of children with disabilities did not restrict their use of classroom activities and areas. Teachers reported that classroom activities and centers were easy to moderately easy to adapt. From this study, the authors concluded that the sorts of activities and centers that early childhood teachers typically use do not present barriers to inclusion of children with disabilities. A next step was to identify the practices that teachers used to make those adaptations.

As part of our work with the Early Childhood Research Institute on Inclusion (Odom, 2002), we observed early childhood classrooms in order to better identify the practices that facilitated successful inclusion. As it turned out, we also needed to interview teachers who successfully included children with and without disabilities. The depth of planning and care that teachers undertook to help children participate in classroom activities and centers was not always apparent. Teachers were working "behind the scenes" to plan for modifications and accommodations such as determining the size and composition of groups, the length of time for various activities, the signals for transitions, and so forth. Indeed, if those modifications and accommodations were effective, the observers would see a smooth-running classroom and might not notice the changes that had been implemented.

Sandall and colleagues (2000) held focus groups with teachers and therapists experienced in early childhood inclusion classrooms. The participants were given classroom scenarios and encouraged to share modifications and other changes they might make in order to include a child who was not participating. From these thirteen focus groups that were held across the country, all sorts of modifications were identified. The modifications were grouped into eight categories, and the categories were confirmed by an expert group of researchers in early childhood inclusion. The eight categories are environmental support, materials adaptation, activity simplification, child preference, special equipment, peer support, adult support, and invisible support. With a focus on preschool-aged children and early childhood classrooms, these modifications are described along with numerous examples in Sandall and Schwartz (2008).

Campbell, Kennedy, and Milbourne (2012) describe a set of modifications and adaptations for toddlers. These modifications are designed to be used in both home and group settings to adapt daily activities and routines. The modifications are organized along a continuum from least to most intrusive supports. The hierarchy includes five types of adaptations: adaptations to the environments, adaptations to activities and routines, adaptations to materials, and adaptations to instructional practices. Taken together, the Sandall and Schwartz (2008) and Campbell et al. (2012) along with other lists of modifications (e.g., Cavallero & Haney, 1999; McCormick & Feeney, 1995) provide teachers with ideas and practices based on experience as well as research.

Trivette, Dunst, Hamby, and O'Herin (2010) completed a systematic review of the literature on the effects of various adaptations on the behavior of young children with disabilities. They describe adaptations as including changes to the environment, the materials, and/or the activity. The adaptations resulted in child behavior change most notably in the areas of communication and cognitive behavior but also to social and motor behaviors. Adaptations were most effective when used for ten or more sessions. Children with various developmental disabilities and needs were included in the studies. Further, this research synthesis supports the contention that modifications, accommodations, and adaptations make possible child participation in the classroom and other early learning settings and that participation in turn enhances child learning (e.g., Wolery et al., 1994).

Modifications and Accommodations

The following section draws from the description and examples of curriculum modifications found in Sandall and Schwartz (2008). These categories grew out of the focus groups we held with teachers and represent their experiences. Whenever possible we reference the literature for additional research and experiential support. These practices are also consistent with Division for Early Childhood (2014).

Environmental Support

There are a many ways that teachers alter the physical, social, and temporal environment in order to promote children's participation. The physical environment might be changed by rearranging the furniture or learning centers. (e.g., Nordquist, Twardosz, & McEvoy, 1991). The social environment might be changed by rearranging the social groupings, predetermining where children sit or play or how many children are in a play group (e.g., Chandler, 1998). The temporal environment might be changed by altering the schedule or changing the length of time for activities (e.g., Hemmeter, Ostrosky, Artman, & Kinder, 2008).

Materials Adaptation

Teachers may adapt toys, utensils, and instructional materials by increasing stability, making them larger or brighter, or making them easier to use. For example, Hsieh (2008) showed that preschool children's use of toys increased when the toys were modified by using adaptations such as knobs, switches, and Velcro strips. Day, McDonnell, and Heathfield (2005) describe modifications to emergent literacy materials for children with visual impairments including props, book bags, and audio versions of books.

Activity Simplification

Teachers may simplify common activities and routines by breaking down the activity into steps or parts, changing the number of steps, and helping the child finish a multi-step activity with success. Activity simplification draws from the well-established special education practice of task analysis. The teacher analyzes multi-step toys such as puzzles and shape boxes and activities such as washing hands and uses the analysis to simplify the task. Quite often, pictures or other visual supports are added to guide the child through the steps.

Child Preferences

Teachers may incorporate a child's preference into the ongoing routines and classroom experiences. This could be the child's preferred toys, preferred people, or preferred activity. DiCarlo and Vagionos (2009) describe a systematic method for identifying preferred toys and materials and then placing those materials within underutilized learning centers as a way to increase children's learning opportunities. Preferred storybooks have the added features of relevance and familiarity (Dennis, Lynch, & Stockall, 2012). Another way to tap into child preferences is to give choices. McCormick, Jolivette, and Ridgely (2003) provide guidelines for choice making in early childhood settings.

Special Equipment

Using special or adaptive equipment is another way to increase access and participation. Most children will need to learn to use the special equipment such as communication and mobility devices first through explicit instruction. But once learned, the special equipment becomes a modification that increases access. For example, Deitz, Swinth, and White (2002) studied the effects of a powered mobility riding toy on the participation of two children with significant motor disabilities. After they learned to use the toy, the children demonstrated increased self-initiated movements during gym time and recess. In another study, Schilling and Schwartz (2004) examined the effects of therapy balls as alternative seating for preschoolers with ASD. This modification required little learning; the therapy ball was substituted for sitting on a bench, chair, or on the floor. The children increased their engagement in ongoing activities as well as their in-seat behavior. Sadao and Robinson (2010) provide more examples and guidance for using assistive technology.

Peer Support

Peers also help their classmates take advantage of learning opportunities in the classroom. Peers model and they also join their classmates in play and other activities and encourage participation. Garfinkle and Schwartz (2002) describe a study where proximity to peers, shared attention, and a peer leader were used to increase children's engagement and imitation of peers. Various buddy-day and peer-buddy supports (e.g., Kohler, Greteman, Raschke, & Highnam, 2007) have been described as a way to increase social behaviors.

Adult Support

Similar to peer support, adults may provide purposeful but low-key support when they model, join children in play and other activities, and encourage participation. In our observations of classrooms, adult support is often the most obvious method of support, but sometimes, perhaps especially during free play, adults may interfere or disrupt rather than support. Thus, when we think of adult support as a curriculum modification, we emphasize that the adult establishes themself over time as a reliable conversation or play partner (e.g., Joseph & Strain, 2004) and then is able to simply join the child at a learning center, comment, and encourage as a method of supporting participation.

Visual Support

A wide variety of visual supports such as visual activity schedules, pictures as prompts and process charts, or visual task analyses have been described (Meadan, Ostrosky, Triplett, Michna, & Fettig, 2011). Johnston, Nelson, Evans, and Palazolo (2003) used a graphic symbol to indicate the child's request to play to increase social initiations for children with ASD. While visual supports can serve much the same function as modifications described previously, they are ubiquitous in classrooms and deserve special mention. Given their widespread use, it is important that teachers and teams check in periodically to determine if the visual is still working and necessary or if it is contributing to visual clutter in the environment.

Planning and Using Modifications and Accommodations

An individual child's need for modifications and accommodations can be determined through observation of the target child's behavior (Sandall, Joseph & Schwartz, 2009). Observational data will provide the teacher and the team with information as to the child's specific concern. What activities or learning centers is the child not accessing? What about the child's level of participation? Is the child wandering? Is the child frustrated? Does the child look busy and engaged but, upon closer observation, the child is making only fleeting efforts to use the toy or interact with peers? Does the child seem to need lots of help from an adult? These are the sorts of questions the teacher and team can ask. Once the concerns are pinpointed, the team thinks through the observations to determine what level of support the child might need to better participate in classroom activities. The team matches the level of support to the child's learning need. Sometimes a modification or accommodation will be useful. And, sometimes, the child will need more support in terms of embedded teaching or even more individualized teaching. But regardless of the level of selected, the planning, implementing, and evaluation process involve the five steps shown in Fig. 18.1.

Assess

The first step involves observing and gathering data on the child of interest. Teachers and classroom teams can complete an assessment form to determine if the child is fully participating in all activities. The Child Assessment Worksheet (Sandall & Schwartz, 2008), the Child Participation Evaluation (The National Center on Quality Teaching & Learning, 2013), and the Ecological Congruence Assessment (Wolery, Brashers, & Neitzel, 2002) are examples of useful assessment forms that help guide observations and organize the findings. In this process the teacher and other members of the team

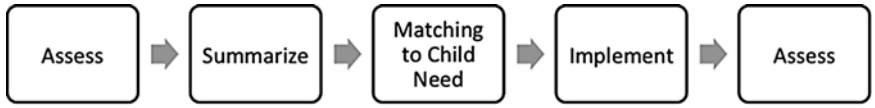

Fig. 18.1 Framework for planning, implementing, and assessing

observe the child in all activities and routines throughout the day and collect information on the child's functioning in authentic contexts. The Child Assessment Worksheet (Sandall & Schwartz, 2008) puts the classroom schedule in one column and the general classroom expectations for any child's participation in the next column. Then in the final column, the team discusses and records whether the individual child's participation is a strength (i.e., the child participates independently), average (i.e., the child participates much the same as the other children), or a concern (i.e., the child doesn't participate or needs a lot of help to participate). Thus, the form serves as documentation of the team's observations. The form could be completed at an after-school team meeting or debriefing.

Summarize

Next, the team summarizes and discusses the findings. Using the assessment form, the team looks for areas of strengths and concerns. They also look for patterns. For example, does the child struggle with open-ended activities but do just fine when activities are structured? Or does the child participate easily at the beginning of the school day but diminish as the day goes on? The team summarizes the information, notes activities and areas with low participation, and identifies priorities. The team might also examine the needs identified in the classroom observation in relation to the child's IEP or IFSP. Lack of participation may signal a need for targeted instruction. But some classroom needs may warrant a simple modification or accommodation to ease access and participation. The team identifies those activities that likely need a modification. A child may require one or many modifications or accommodations. Sometimes the same modification, such as a visual reminder, can be used in several activities or routines.

Match Modifications and Accommodations to Child Needs

Now the team has a list of activities and routines that are areas of concern. They've identified the priorities. The next step involves clarifying the concern, brainstorming possible modifications, and developing the implementation plan. One part of clarifying the concern is to talk about what the child does (e.g., he waits by the cubbies and gazes unfocused at the classroom) and what team members are currently doing or have already tried (e.g., one of the teachers goes to the child, guides him to a play center, and gives him a toy). Next, the team brainstorms ideas for making modifications or accommodations to enhance participation. The team can use various compilations of modifications or their own ideas to identify a modification. It is also useful to know what modifications have been associated with what child behaviors. For example, modifications and accommodations have been used to increase appropriate behavior (Gauvreau & Schwartz, 2013), teach play skills (Barry & Burlew, 2004), increase direction following (Campbell & Tincani, 2011), promote peer engagement (Betz, Higbee, & Reagon, 2008), decrease latency during transitions (Angell, Nicholson, Watts, & Blum, 2011), teach children to play video games (Blum-Dimaya, Reeve, Reeve, & Hoch, 2010), and teach requesting and responding (Choi, O'Reilly, Sigafoos, & Lancioni, 2010). Building Blocks (Sandall & Schwartz, 2008) catalogs modifications by type and also by areas of the classroom (e.g., dramatic play, snack time).

From their brainstorming and drawing from their experience, the team makes their best hunch to match the modification to the child's need.

Implement

Next, the team creates their plan to implement the modification. This should be a fairly simple statement or description of the modification or accommodation. For example, for the child who waited by the cubbies, the modification might be: place a choice board in Max's cubbie, when he arrives at school point to the choice board and ask Max to find his first play area. Or for a child who rarely looks at story books or goes to the book corner, the modification might be: station the child's favorite classroom aide in the book corner and put more books about cars and trucks in the area. The description of the modification should go on the team's lesson plan or activity matrix (see below) so that all remember to use it. Implementation will also require that a modification be created, such as the choice board, or additional resources gathered, such as finding more books about vehicles. Before leaving the planning meeting, a person is assigned the job of making the modification or finding the resources.

Sometimes teams identify modifications that, while likely to work in the long run, require that the child learn how to use the modification. For example, the child needs to learn how to use their voice output device or learn how to follow an activity schedule. Sometimes the new skill can be taught quickly and the modification is used. But if the new skill will take time to teach and learn, it is better to plan for embedded or intensive teaching before considering the practice a modification.

With the modification plan in place (on the lesson plan or activity matrix), the team implements the modification as indicated. For the most part, we expect that a modification will result in greater access and participation fairly soon. If no change in child behavior is observed within a few days, it's time to go back and try another modification. But if the modification does work, the team will want to continue its use.

Assess

The final step in ensuring if children are demonstrating increased participation and independence after the incorporation of a modification or accommodation is ongoing progress monitoring. By observing and documenting child performance, teams can determine whether or not the modification or accommodation is effective, if a change is needed, and when the child no longer needs the modification. As data demonstrate that the child is independent, the modification or accommodation may be faded or revised in some way. In some cases, modifications can be decreased in size, managed solely by the child, or faded from certain activities completely. However, many modifications are simple and unobtrusive and might well remain in the classroom. After all, many adults use to-do lists, visual reminders, and many other modifications to enhance their own participation in everyday activities.

At the same time, teachers and teams don't want a child to become overly reliant on a modification when the child could participate on their own. The benefits of ongoing assessment or progress monitoring in classrooms are well documented in the research. For school-aged children, frequent data collection and analysis have been associated with more frequent and accurate changes to instruction to better meet children's needs (Fuchs, Fuchs, Hamlet, & Stecker, 1991), improved quality of IEP objectives (Codding, Skowron, & Pace, 2005), and increased child performance (Fuchs & Fuchs, 1986). To date, few studies have addressed how data is used to determine if certain modifications/accommodations are effective in early childhood. We suggest that teams observe and document regularly. But we also suggest that data on the effectiveness of modifications does not need to be collected as frequently as for more specialized instruction. Teachers need to deploy their resources wisely. Collect data frequently on high-priority, high-intensity needs that require specialized instruction. Collect data regularly but less frequently on needs that are fulfilled with modifications or accommodations. Anecdotal notes may be sufficient,

but sometimes it will be necessary to count behaviors or time a child's participation in an activity to see if the modification has had an effect. In addition, teams can return periodically to the Classroom Assessment Worksheet as a way to review a child's participation throughout the school day and to determine any other needs for support.

Examples of Modifications in Early Childhood Programs

George is a three-year-old boy with developmental delays who attends an inclusive preschool program. He loves tractors, construction vehicles, and water play. George's teachers notice that his participation is uneven and that he sometimes has outbursts of inappropriate behavior. They decide to use an assessment tool to observe him across activities throughout the school day. The observational data show that he actively participates during free choice time and on the playground. He makes choices, plays with other children, and tries out new things. The data also show that he demonstrates some problem behavior during more structured activities, such as circle time, small group lessons, and during transitions when he is lined up next to other children. During these times, he tries to leave the group and find something else to do. He often escapes to the book area. Teachers brainstorm and decide that George may benefit from modifications that simplify the expectations for certain activities and reinforce waiting, taking turns, and being a member of the group. The team decides on three modifications for George. They use visual reminders with pictures of what needs to happen "first" and what will happen "then" (e.g., first we do our small group lesson, picture of children at table, and then we go to the playground, picture of the playground) to help George participate in less-preferred activities before going to a preferred activity (environmental support). The team also decides to modify circle time by having George sit next to a peer who participates in all the songs and activities and makes things fun (peer support). Finally, they plan to modify the difficult transitions by giving George a book to carry to the next activity (child preference). After a week with the modifications in place, team members start to notice that George is participating and that his problem behavior seems to have declined. They give it another week and then collect observational data that confirms their hunches. The modifications are low cost and low resource and so they keep them in place for the time being.

Also in George's class is Maria. Maria, a four-year-old girl with global developmental delays, has low muscle tone and difficulty expressing herself with words. She has a passion for My Little Pony and tries hard to do what the other children in the class are doing. She has different strengths and challenges than George though she struggles in some of the same activities and learning centers. Maria's assessment shows that she also has difficulty during circle times. About midway through circle time, Maria starts to slouch and often lies backward on the floor, probably due to her low muscle tone. During the transitions to and from the playground, Maria often lags behind and then ends up the last in line for washing hands for snack. The team brainstorms ideas for modifications that might work for Maria and decide on four. At circle time, she is given a cube chair to sit in. This provides her with firmer support and places her feet on the floor (special equipment). Part way during the circle, she is given a Little Pony to hold to see if this helps maintain her attention (child preference). During the long transition, Maria gets to be first or second in line (environmental support). Children pair up for this transition so Maria is paired with a child who transitions easily (peer support). Almost immediately, the team observes that most of these modifications are effective. They also see that holding the Little Pony seems unnecessary and gets in the way of other props used at circle time. They make an alteration and give Maria the Little Pony at the end of circle time to take to her next activity.

These examples help give a sense of what modifications and accommodations look like in action. They also show that while the planning and implementation process are systematic, it does not have to take an excessive amount of time. Barton, Reichow, Wolery, and Chen (2011) offer another detailed example of planning to increase participation at circle time.

Activity Matrices

An activity matrix is a simple way for teachers to plan and organize information about the goals and learning targets for children. Matrices are also planning tools that help early childhood education teams be thoughtful about when, where, and how to individualize instruction or provide modifications or accommodations (Schwartz, Sandall, & Gauvreau, 2013). Activity matrices remind teachers about the planned schedule, number of children and activities, number of adults available to support children's learning, and the activities that require intensive adult supervision (Sandall & Schwartz, 2008). Matrices can also communicate the learning goals for each child without requiring any additional meeting time. Matrices are an efficient way for a classroom or program team to discuss, plan, and implement instruction within their ongoing routine (Schwartz, Sandall, & Gauvreau, 2013). See Fig. 18.2 for a sample activity matrix.

Activity matrices can be constructed for an individual child or for the whole class. For a classroom's activity matrix, the schedule of activities and routines is listed down the first column. The names of the children in the class are listed across the top row. Then in the resulting cells, the team writes key information for the individual child. This is where the team writes in individual learning targets or needs and the corresponding individualized level of support whether that support is a curriculum modification, embedded teaching, or more intensive instruction. Generally, the matrix does not include the description of activities and lessons for the whole group or small groups. Rather, it serves as a communication tool about the planned individualized support.

An activity matrix provides teachers and classroom teams with a reference document. We know that simply placing children with disabilities in the same classroom with children without disabilities does not lead to reciprocal friendships, independence, and full participation. Teachers must intervene with modifications, accommodations, and instruction to ensure each child is engaging appropriately with their classroom environment and with their peers. Ensuring everyone can participate in all activities is a crucial component of any program serving young children with and without disabilities.

Matrices enable teachers to organize the teaching day and see where and when they plan to provide modifications, accommodations, and other individualized supports. The activity matrix serves as the classroom team's visual support. The activity matrix in conjunction with the five-step process of planning, implementing, and evaluating ensures that the teacher act intentionally to meet the learning needs of each child in the classroom.

Summary

Curriculum modifications and accommodations are purposeful changes or adjustments to the social and physical environment. The aim of these changes is to help the child gain access to and participate in the learning opportunities within the early childhood learning environment. The use of modifications and accommodations is built on a process of observing children in their classroom environments and using those observations to determine appropriate and individualized supports. Modifications and accommodations are relatively easy to design and implement. Many examples were provided in this chapter. Those little changes can yield big impacts.

Classroom Schedule	Rena	Timothy	Luis
Arrival		Initiate greetings	
Choice Time	Write her name with correct letter formation and orientation to a line **CM** – use name card		Play appropriately with close-ended toys, such as puzzles, pegs, or put in toys **ELO**
Circle		Participate by imitating a teacher's actions, orienting his body towards the group, and responding **ELO**	Imitate gross motor actions **ELO**
Outdoor Play	Climb stairs using alternating feet **ELO**		
Snack	Use a fork or spoon **ELO**	Respond to peers **ELO**	
Shared Reading			
Departure		Zip his coat **CM** – use ring on zipper	Follow routine classroom directions **CM** – use visual schedule

CM = curriculum modification

ELO = embedded learning opportunity

Fig. 18.2 Sample activity matrix

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The Role of Speech-Language Pathologists in Providing Early Childhood Special Education

19

Services and Supports

Elizabeth R. Crais and Juliann Woods

Speech-language pathologists (SLPs), as one of the members of an early childhood special education team (ECSE), play an important role in helping shape a child's future. Depending on the child's immediate needs and the concerns of the family and other professionals, the SLP participates in a variety of roles that may range from being the primary service provider to providing consultation to the family or other professionals who have a larger role with the child, or joining in classroom instruction. SLPs often play a key role in working with children who have needs in the areas of communication, language, speech, feeding and swallowing, cognition, hearing, emergent literacy, social-emotional behavior, and autism spectrum disorder (ASD). SLPs also play a critical role in the assessment and provision of assistive technologies, including the use of augmentative and alternation communication (AAC).

The services and supports provided by SLPs in early childhood special education settings mirror those of other team members with the exception that the SLP's focused expertise is in communication, language, and speech. Background information on communication and language, the factors affecting development, the prevalence of communication and language disorders, and some key disorders that SLPs address are provided. The chapter then discusses common roles and the kinds of interventions that are provided by SLPs in ECSE settings.

Language and Communication as a Foundation for Learning and Social Interaction

Language and communication skills play a major role in children's overall learning. The term *language* will be used in this chapter to represent any conventionalized *symbol system* (e.g., words, signs, picture symbols) the child may use to interact that is consistently recognized by others. Alternately, the term *communication* refers to any *means* that the child uses to interact with others (e.g., eye gaze, gesture, body movements, facial expression, vocalizations, words) or any combination of two or more means. Therefore, language is only one form of communication, and communication can occur without language.

The early means of communication often are thought of as developing during the prelinguistic (before the use of symbols) and early linguistic

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stages and can also be used later along with language to augment a message (e.g., pointing while saying "Look"). These prelinguistic behaviors are fundamental for the child in many ways. Importantly, they can signal the child's intentional communication and often serve as a stimulus for others around the child to communicate to the child (e.g., "Oh, you want your bottle" when the child reaches for a bottle). Therefore, as children become more proficient in communicating and caregivers react responsively, the input the child receive increases, demonstrating the important transactional nature of communication between the child and those surrounding the child (Sameroff & Fiese, 2000). For example, as children (both with and without disabilities) begin to babble, caregivers take this as a sign that the child is ready for more sophisticated language and they respond by increasing the complexity of their language (Warlaumont, Richards, Gilkerson, & Oller, 2014). Gestures are one of the most consistent early indicators of intentional communication use and thus can provide a window into the child's developing communication skills; the amount and type of gesture use can help in early identification and is predictive of later language (Crais, Watson, & Baranek, 2009; Wetherby, Goldstein, Cleary, Allen, & Kublin, 2003). Children indicate their interest in objects by reaching to request a cup or a book or in people when they wave bye-bye.

The acquisition of language and communication also has a strong transactional relationship with other developmental domains (e.g., social-emotional, motor, cognitive, adaptive). Therefore, it is important to remember that language and communication are not only critical skills to acquire, but they also influence and are influenced by learning that occurs in other domains. Take for example play skills which have long been linked with the development of language and communication (Bates, Bretherton, Snyder, Shore, & Volterra, 1980; Thal, 1991). For ECSE providers, it is useful to know that the level of symbolic play exhibited by young children can be predictive of later language skills (Lyytinen, Laakso, Poikkeus, & Rita, 1999; Lyytinen, Poikkeus, Laakso, Eklund, & Lyytinen, 2001). For example, Lyytinen et al. (1999) documented that symbolic play skills at 14 months of age were predictive of receptive and expressive language at both 24 and 42 months. Although specific play skills are not viewed as prerequisites for particular language skills, they can help mark a readiness for development in some stages of language. For example, single action play schemes (e.g., child puts empty cup to mouth to drink) may signal a readiness for learning consistent communicative gestures and/or single words or symbols.

A child's play skills or interest in objects can also influence the kind of interactions the child receives from others and the learning opportunities that can occur. For children with ASD who exhibit fewer actions on objects and play with fewer objects (Pierce & Courchesne, 2001; Wetherby et al., 2003), there may be fewer things for the child to communicate about to others. In addition, the adults (and other children) surrounding the child may be less likely to interact and communicate with the child because there are few objects and actions that interest the child, resulting in less communicative input to the child. Therefore, a focus in ECSE on helping children develop their play skills and expand their interests can provide more objects and actions on objects for caregivers and children to engage in, as well as a context for providing more things for the child and caregiver to talk about to enhance the child's communication skills (Yoder & McDuffie, 2006).

In parallel, advancing communication and language skills can also enhance a child's play, especially in activities like symbolic play where the use of gestures and/or words can signal the child's intent (e.g., pouring motion or use of the word "juice" to indicate pouring juice). Thus, the child's play becomes more comprehensible to parents or other children, allowing the play partner to then follow the child's lead and respond by reciprocating in play (e.g., holding out an empty cup to be "filled" by the child). Therefore, a focus in ECSE on enhancing children's gestural and language skills can help enhance their play skills and, perhaps even more importantly, their ability and opportunities to interact and play with others.

Early language skills are also linked with later language and literacy skills (Catts, Fey, Tomblin, & Zhang, 2002; National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network, 2005; Skibbe et al., 2008). Thus, examining and enhancing a child's early communication and language skills are important both for the child's current level of skills and also as a predictor of and potential bridge to later skills.

Factors Affecting Communication and Language Development

In viewing communication and language development as transactional processes, it is important to look closely at key factors that may influence both the input the child receives and the child's output. The work of Sameroff and MacKenzie (2003) points to the multifaceted ecological factors such as the child and family's culture, home environment, and the characteristics of both the child and family that help shape the child. Commonly known factors such as the education and income of the parents have positive influences on children's language skills, as well as other areas of development (Duncan & Brooks-Gunn, 2000; Hart & Risley, 1995; Rowe, Pan, & Ayoub, 2005). For example, mothers whose income and educational levels are higher use more diverse and complex language and also have children who exhibit superior language skills than do mothers whose education and income are lower (Rowe et al., 2005). The work of Vernon-Feagans et al. (2008) with mothers from rural areas with low incomes has indicated that additional factors influencing the diversity of maternal input were the mother's knowledge of child development, maternal responsivity, as well as the child's temperament.

Parental style of talking has been another key factor in maternal input and child output. For example, mothers who have a more facilitative style (e.g., less directive, more responsive to the child's focus) typically have children who have larger vocabularies and higher reading skills (Fewell & Deutscher, 2004; Masur, Flynn, & Eichorst, 2005). Another factor is children's age, with mothers (including those with low income) increasing the amount of their talking and the diversity of their vocabulary as their children age between the first and third year of life (Rowe et al., 2005). In addition, the child's communicative output further influences the input provided by the parent. Abraham, Crais, Vernon-Feagans, & the Family Life Project Phase 1 Key Investigators (2013) observed this kind of effect on verbal productivity of mothers from low-income and rural environments during book reading with their 15-month-old children. The mothers whose children were most communicative (e.g., sounds, gestures, words) produced more words and diversity of words in response to their children, thus again demonstrating the transactional process. Finally, these researchers documented large variability in the amount of talk provided by mothers from low-income and rural environments; thus, care needs to be taken in attributing amount of maternal talk or type of style to groups of parents depending on their educational or income level. More important is the effort to observe each child with a disability and her/his caregivers to identify ways the caregivers can encourage communication with the child.

Additionally, other factors such as genetic or congenital issues (e.g., Down syndrome, Fragile X), sensory issues (e.g., hearing loss, vision), familial history (e.g., learning disabilities, stuttering), birth history (e.g., anoxia, low birth weight), and environmental factors (e.g., parental substance abuse, toxins) may also impact a child's communication and language skills (ASHA, 2008a, 2008b). Further, as the work of Sameroff and Fiese (2000) indicated, children can have one or more risk factors, and no one risk factor is necessarily linked to a particular outcome. Indeed, there can be a range of developmental outcomes resulting from any one factor. It is important to examine cumulative risk and the effect multiple risk factors may have on the child's level of development.

Prevalence of Communication Delays and Disabilities

The CDC's most recent figures (Boyle et al., 2011) place the overall prevalence of developmental disabilities at 13.8 %, and similarly the

Department of Education indicates that 13 % of children 3–22 years are served by an Individual Education Program (ED Data Express, 2014). In contrast, only 2.77 % of the population of children birth to three were served under Part C and only 4.9 % of children three to five were served in Part B in 2013 (Early Childhood Technical Assistance Center, 2014). Thus, service systems have much progress to make in identifying earlier children with disabilities so they can receive the services and supports they need. A major factor in young children being referred for special services is often due to language or communication deficits. Indeed, many of the children seen for special education services have some type of communication or language deficit either as their primary or secondary disability (ED Data Express, 2014). In many children with ASD, hearing loss, Down syndrome, or intellectual disability, communication deficits are of major concern. For these children, SLPs may play a larger role, whereas for other groups of children, those with attention deficit disorder or other health impairments, their role may be more limited or specialized (e.g., articulation or feeding disorders).

SLPs Contributions to Screening and Diagnosis/Assessment

SLPs can contribute to the screening process for children with special education needs due to their knowledge of communication, language, and social skills. In addition, they are familiar with evidence-based early predictors of later communication and language skills and therefore can help guide decision making about the need for referral for special education services. Some general guidelines can be utilized such as early communication and language skills are a strong predictor of later skills (Chiat & Roy, 2008; Watt, Wetherby, & Shumway, 2006) and receptive language is a key predictor of both future receptive and expressive language skills (see Paul & Roth, 2011 for a review of predictors). In addition, skills such as the repertoire of gestures the child uses are important for later receptive skills, whereas joint attention and consonant inventory are predictive of later expressive skills (Watt et al., 2006). Therefore, a child with deficits in all of these areas would be a good candidate for early intervention services, whereas a child with only a mild delay in expressive language (with age level skills in all other areas) may be more likely to "catch up" to peers without intervention.

In the diagnosis/assessment process, SLPs can use their knowledge of profiling a child's skills across areas within communication and language to help in decision making (Crais, 2011). For example, for a child with a communication and/or language delay, it is important to develop a profile of the child's strengths and challenges across multiple areas *within communication* to help in diagnostic and assessment decisions as well as in intervention planning. Areas to examine include the phonological or sound system the child uses (e.g., number of consonants, omitting sounds); the child's vocabulary, both receptive and expressive; the level of the child's syntax or sentence structure (using single words versus multiple words in a sentence); the morphemes (e.g., "s" for plural, "ed" for past tense); and the child's use of pragmatic skills (e.g., the social rules for interacting such as how to start a conversation with a peer). As noted, a number of these skills are highly predictive of later language skills (Watt et al., 2006) and thus can be valuable in assessment and intervention planning. The child's strengths and challenges can then be used to identify gaps in the child's skills and address these gaps by using the child's strengths from which to build an intervention plan. For a detailed overview of assessment practices for SLPs, see Crais (2011).

As noted previously, it is also helpful for children in the assessment process to have their skills profiled across *all areas* of development (fine and gross motor, cognition, communication, and social-emotional), so as to gain a complete profile of a child's skills before planning intervention. SLPs and other team members, including the parents can contribute to this kind of profiling through standardized, observational, and parent-report measures. The collaborative process between the family and the SLP and other team member's is integral to the assessment and intervention planning process. Experiences with and

expectations for communication are grounded in the sociocultural ecology of the family. Learning from the caregivers about communication in their everyday settings and their preferences about their child's communication provides the context for the child's profile (Crais, 2011; Woods, Wilcox, Friedman, & Murch, 2011).

Disorders with Particular Deficits in Communication and Language

The following section highlights the SLP's role for children with disorders that have specific communication intervention needs. Although a number of professionals will work together to provide the services and supports, it is quite common for an SLP to play a prominent role with these children and families.

SLPs' Role with Children who are Deaf or Hard of Hearing (D/HH). Due to the varying impacts that hearing loss can have on a child's speech and language development, children suspected of developmental delays should receive comprehensive audiologic assessment and monitoring for signs of hearing loss (ASHA, 2004). The implementation of universal newborn hearing screening across the USA has resulted in many children who are D/HH being identified as infants (Joint Committee on Infant Hearing, 2007); however, for children with unilateral hearing loss, late onset or progressive hearing loss, mild losses not detected by newborn screening, or auditory neuropathy/dyssynchrony, identification may be much later. It is important to identify intermittent conductive hearing loss associated with otitis media, and therefore professionals and parents should monitor closely young children who are frequently sick with colds or upper respiratory infections. Early identification of hearing loss and appropriate early intervention have been shown to result in improved developmental outcomes for young children (Moeller, 2000).

In terms of which professionals perform audiologic assessment with *infants and toddlers*, ASHA provides clear guidelines, "Audiological assessment is performed by appropriately credentialed and qualified audiologists who possess a current ASHA Certificate of Clinical Competence where required and/or valid state license where required by law" (ASHA, 2004, p. 4). The joint committee (2007) also recommends screening of developmental milestones for all infants and young children by the family's pediatrician and immediate referral to an SLP for a speech and language evaluation if a child does not pass the global screening. For *older children* who are seen in preschool and school settings, SLPs can screen for hearing loss or middle ear pathology using conventional pure-tone air conduction methods (including otoscopic inspection), otoacoustic emissions screening, and/or screening tympanometry (ASHA, 2007a, 2007b). In addition, SLPs are among the professionals who provide services to children who are D/HH and are uniquely qualified to provide assessment of and intervention services in language, speech, and cognitive communication areas.

With the advent of cochlear implants, children who are D/HH are able to receive auditory stimulation at a very young age, during the key period for the development of speech and language skills (Kirk, Miyamoto, Ying, Perdew, & Zuganelis, 2000). Numerous studies have documented that children who receive implants before 3 years of age can acquire speech and language at a rate similar to that of peers with normal hearing, which can help lessen the gap in language development after implantation (Kirk et al., 2002; Svirsky, Robbins, Kirk, Pisoni, & Miyamato, 2000). Children's cognitive and social-emotional skills can also be commensurate with age with early identification and timely and appropriate interventions (Moeller, 2000; Yoshinaga-Itano, Baca, & Sedey, 2010). In addition, children with cochlear implants show better outcomes in speech and language development and speech perception, when compared to children who are D/HH and use hearing aids (Kirk et al., 2002). It is not clear, however, which factors predict success with cochlear implants (e.g., Geers, 2003). Therefore, assessment of the communication skills of children with cochlear implants is important pre- and post-implant to help in making recommendations regarding intervention planning, and SLPs can play a key role in this process.

Further, most children with hearing loss (without severe additional disabilities) should be able to develop spoken language and listening skills if identified early, provided with early and appropriate EI services, and fitted with amplification (Yoshinaga-Itano et al., 2010). Guidelines for the delivery of EI services to children who are D/HH can be found in Muse et al. (2013).

SLPs' Role in Assistive Technology Services. Children with developmental disabilities often have difficulties in daily routines and in interaction with others. Assistive technology (AT) is a means to address these deficits and can help the family and professionals support the child's development across a range of areas (Mistrett, 2004; Wilcox, Guimond, Campbell, & Weintraub Moore, 2006). AT includes a continuum of supports including devices, environmental modifications, and assessment and intervention strategies. In addition, the level of availability, technical complexity, and cost which children may benefit from AT also vary. Devices or accommodations may include "low-tech" inexpensive items such as pencil/crayon grips, adapted materials, and chairs. AT can also be more specialized to include touch screens, individualized switches, or speech-generating mechanisms (Wilcox et al., 2006). AT services also include the assessment of the child and environment, and gaining, implementing, and evaluating the equipment or modifications. Because of their expertise, SLPs can play a significant role on the team and can make recommendations to the family and other team members regarding AT devices and services. In collaboration with other team members who have expertise in positioning or mobility and fine motor and cognitive skills, the team can plan accordingly.

The use of augmentative alternative communication devices has increased in use for young children to support communication, language, and verbal speech development, especially for children with complex communication needs. Although still small in number, results from studies such as Binger and Light (2007) and Kent-Walsh, Binger, and Buchanan (2015) suggest that providing varying forms of augmented models increases symbol comprehension and/or production for preschool children. Use of AAC can help individuals not only meet their immediate communication needs but also support development of new language and communication skills. Studies of AAC use in young children highlight the essential role of the partner in communication interactions to provide language models and input to the child (Binger, Kent-Walsh, Ewing, & Taylor, 2010). SLPs with the ECSE team must also address partner coaching on how to interact and support the child using the AAC device (Douglas, Light, & McNaughton, 2013) for the child to be able to focus on productive communication.

Romski et al. (2010) compared three parent coaching language interventions, including two with AAC to increase the spoken words of 30 toddlers with a wide range of developmental disorders and significant communication delays (i.e., fewer than ten spoken words). They found a positive communication effect for each approach; however, children in both augmented interventions produced more target, spoken words than those in the speech only intervention. They concluded that augmented communication does not hinder, and actually aids, speech production abilities in young children with developmental delays. Not only were parents able to support their children's communication intervention with fidelity at the clinic and at home using AAC, their perceptions of success became more positive. Using a self-administered measure, parent's perceptions of the severity of the child's language difficulties decreased for the augmented intervention groups but increased for the spoken intervention (Romski et al., 2011).

SLPs' Role for Children with Down Syndrome. SLP's supports for families of children with Down syndrome (DS) illustrate the importance of intervention for prevention of communication disorders secondary to the diagnosis of intellectual disabilities (ID). Down syndrome is the most common genetic cause of intellectual disabilities with a wide range of associated developmental delays (Abbeduto, Warren, & Conners, 2007) including communication, speech, and language. While often social and interested in interactions with others, young children with DS begin to show delays in communication and language

development early. Of importance for the EI/ECSE team is that expressive language, a critical skill for functioning in everyday situations, is one of the areas of greatest delay (Roberts, Price, & Malkin, 2007). First words are likely to occur around 18 months. The language gap between children with and without DS widens throughout the preschool years. For example, most children are reported to have 50 single words by 24 months, whereas only 54 % of children with DS use 50 words by 48 months. The transition from single words to multi-word utterances is also prolonged (Iverson, Longobardi, & Caselli, 2003).

For children with DS, expressive use of language lags behind what would be expected for children based on language comprehension skills and should be taken into account as the team and family consider use of assistive technology or AAC. Several factors contribute to the disproportionate delay in expressive communication experienced by young children with DS and are important considerations for early intervention professionals. One factor is limited intelligibility. While the onset of babbling generally occurs on time, there may be a reduction in the variety of vowels and consonants early, and speech patterns begin to diverge in the second year (Kent & Vorperian, 2013; Oller, 2000). A review of studies of articulatory and phonological development in children with DS illustrates that phonological development is both delayed and disordered. Speech sounds develop slowly and error patterns can be related to anatomical differences (Bunton & Leddy, 2011). There is a lack of articulatory precision, pausing and phrasing, as well as a reduction of consonant clusters and final consonants overall (Kent & Vorperian, 2013). Intelligibility is reduced in connected speech (Stoel-Gammon, 2001).

Two-thirds of children with DS experience sensorineural or conductive hearing loss that is often a result of frequent ear infections with effusion (Abbeduto et al., 2007). Because of structural differences in the ear, children with DS are more susceptible than children who are TD to frequent ear infections and the collection of fluid in their ears (Abbeduto et al., 2007). Combined with deficits in short-term auditory memory or phonological working memory, this may pose additional barriers to the language development of children with DS, including the ability to learn through imitation (Chapman, Seung, Schwartz, & Bird, 1998). Thus,

SLPs typically have an important role in working with children with DS due to their speech and language deficits.

Studies of naturalistic language intervention have shown modest positive outcomes for children with DS (Yoder & Warren, 2002; Yoder, Woynaroski, Fey, & Warren, 2014). Often, outcomes for children with DS have been less strong than those for children with other intellectual disabilities and highly variable. For example, children with DS with functional object play increased vocabulary in response to a higher dosage intervention than did others without play skills (Yoder et al., 2014). The use of AAC, specifically sign language or speech-generating devices, is gaining support (Romski et al., 2010; Wright, Kaiser, Reikowsky, & Roberts, 2013) as a bridge to verbal language production. Modeling manual and spoken words to support learning and use of new language also appears to be a promising mode for children with DS, but additional adaptations to address the specific skills and needs of children with DS may be needed to make naturalistic interventions more effective (Wright et al., 2013).

SLP's Role with Children with ASD. Children with ASD are characterized by deficits in social communication and interaction and repetitive behaviors and interests (APA, 2013). In addition, to be diagnosed, a child must have deficits in social-emotional reciprocity, nonverbal communicative behaviors used for social engagement, and developing and maintaining relationships. Because these characteristics typically fall within a strong area of expertise for SLPs, they are often a key member of the team working with children with ASD. As a number of sources have documented, social communicative behaviors indicative of ASD can be observed in some children as early as the first year of life and in many by the second year (Bryson et al., 2007; Colgan et al., 2006; Landa, Holman, & Garrett-Mayer, 2007;

Ozonoff et al., 2010; Sansosti, Lavik, & Sansosti, 2012; Van Naarden Braun et al., 2007; Watson, Crais, Baranek, Dykstra, & Wilson, 2013; Wetherby, Brosnan-Maddox, Peace, & Newton, 2008; Wiggins, Baio, & Rice, 2006). Characteristics seen at 12 months of age in some children later diagnosed with ASD include reduced eye contact, social smiling, response to name, requesting, and joint attention, as well as atypical speech vocalizations and poor imitation skills, a smaller than typical inventory of gestures, and some atypical play skills (Mitchell et al., 2006; Ozonoff et al., 2010; Paul & Roth, 2011; Rozga et al., 2011; Watson et al., 2013; Zwaigenbaum et al., 2005). In addition, many of these deficits are similarly seen in older preschool children as they may not have acquired these skills at younger ages (or may have lost some of them through a regressive pattern). These behaviors can signal the child's limited interest in engaging with others, and therefore, early detection and diagnosis are critical, as well as the initiation of early intervention. SLPs can help parents and other caregivers (e.g., early care and education providers, preschool teachers) focus on enhancing the child's engagement and interest in playing and interacting with others and also increasing the child's interactive opportunities. SLPs may work closely with all team members to ensure there are many opportunities throughout the day for the child to want and need to communicate with others and to be encouraged in these interactions.

An additional area where SLPs may make strong contributions is in ISFP and IEP programming for children with ASD. In recognizing the importance of early developing communicative skills (e.g., gestures, eye gaze, sound making, reciprocity, babbling, imitation, intentionality) and their interconnections and hierarchical development, SLPs can help identify weaker areas and those of strength for the child. Helping build communicative skills in both horizontal ways (adding breadth to the child's communication system) and vertical ones (gaining higher and more sophisticated ways to communicate) is equally important for children with ASD because they may have uneven skills. For example, some children with ASD who use words, may not use those words in a functional way (beyond naming things) to request things or protest things not wanted. Thus, words alone may not be functional for the child unless the child understands how to use the words to communicate with others. In addition, because of the unevenness in skills, a child may have difficulty communicating if there is a communication breakdown and the child does not have an alternate way to indicate a need/want. For example, if a child uses a word to request something and the adult does not understand the word or the request, the child could point to the object, pick it up to show it to the adult, or simply use eye gaze looking back and forth between the object and adult to "show" it to the adult. However, if the child does not have these alternatives means (what some would call "lower level" skills) in their repertoire, their communicative efforts will be thwarted and they may turn away in frustration. In this case, the SLP could work with the child and her/his caregivers to help the child learn some of the underlying and alternative behaviors to communicate when a breakdown occurs. This type of detailed communication analysis is a strength for SLPs and their contributions may be to help highlight the communicative skills the child is lacking and plan strategies to help the child learn the needed skills. In a parallel fashion, SLPs have skill in identifying a child's language strengths and need areas and helping target the next "just right steps" in intervention for a child with ASD.

The final area that SLPs have expertise is in analyzing the play behaviors of the child and helping parents and other providers recognize the kinds of play skills the child exhibits and those that could benefit the child. As noted previously, play and language can be supportive of each other's development and both should be areas of focus for preschool children with ASD.

In terms of evidence-based interventions to guide decision making, the *Guidelines for Speech-Language Pathologists in Diagnosis, Assessment, and Treatment of Autism Spectrum Disorders Across the Life Span* (ASHA, 2006) identified several major research conclusions. First, there is clear empirical support demonstrat-

ing that a variety of approaches are effective in enhancing the communication skills of children with ASD covering a range of interventions from behavioral to developmental (National Research Council, 2001). In addition, recent studies with infants and toddlers provide growing evidence that early behavioral interventions are effective for some children with observable ASD symptoms (Carter et al., 2011; Dawson et al., 2010; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010; Landa, Holman, O'Neill, & Stuart, 2011; Schertz, Odom, Baggett, & Sideris, 2013). Unfortunately, there are few studies that compare interventions with each other; therefore, relative effectiveness is less known as is determining which intervention is effective for which children. It is clear that no intervention is effective for all children with ASD or to the same degree (ASHA, 2006); thus, stronger research studies are needed to determine which interventions are effective for which children (Wallace & Rogers, 2010). Indeed the *Guidelines* (ASHA, 2006) recommend that professionals who want to determine whether a child is making progress with an intervention use systematic methods such as single-subject research design.

The NRC (2001) also identified essential active components of effective interventions for children with ASD that have continued to play a prominent role in many current interventions. They include that children who are enrolled in EI by 3 years of age have better outcomes than those who begin after 5. That at a minimum, active engagement in intensive intervention for 5 h per day for 5 days per week is necessary to achieve optimal outcomes. The makeup of these hours could be spread across direct services from an SLP and other professionals and high-quality preschool programs, plus engagement with the child's primary communication partners (e.g., caregivers, siblings). Additionally, the learning opportunities need to be brief, developmentally appropriate, and sequenced over time with an attentive adult. A further essential element is a strong role for caregivers and some component of caregiver training so that caregivers can generalize what they've learned to new situations and contexts. In a review by Levy, Kim, and Olive (2006) of parent-implemented interventions with children with ASD, the results indicated that parent involvement resulted in favorable outcomes in speech, language, and play skills. From an instructional context, the ratio of teacher to children must be low; in fact a 2:1 ratio is recommended, although may depend on the children's functioning level. Ongoing progress monitoring is recommended with adaptations made as necessary. Further, the NRC (2001) recommended six types of instruction: (a) functional, spontaneous communication; (b) social instruction in varied settings during the day; (c) targeted play especially focused on peer interactions; (d) acquisition of new skills along with generalization and maintenance to naturalistic settings; (e) the use of functional assessment with positive behavioral supports focused on challenging behaviors; and (f) targeting functional academic skills when developmentally appropriate.

SLPs' Role for Children with Childhood Apraxia of Speech

Children with childhood apraxia of speech (CAS) may have many speech symptoms or characteristics that vary depending on their age and the severity of their speech problems making both a clear description of the disorder or a definitive diagnosis a challenge for the early childhood team and the SLP. CAS is viewed as an impairment of speech motor control or praxis (Murray, McCabe, Heard, & Ballard, 2015). CAS can be associated with delayed onset of first words, a limited number of spoken words, or the ability to form only a few consonant or vowel sounds. These symptoms usually may be noticed between ages 18 months and 2 years and may indicate suspected CAS. As children produce more speech, usually between ages 2 and 4, characteristics that likely indicate CAS include vowel and consonant distortions; separation of syllables in or between words; and voicing errors, such as "pie" sounding like "bye." Specific indicators that help to identify CAS include the child making obvious movement of the jaw, lips, or tongue trying to make the sounds; difficulty moving smoothly from one sound, syl-

lable, or word to another; and vowel distortions (ASHA, 2007a, 2007b). With CAS, the child is attempting to say the sounds and words correctly but isn't able. Usually, the child with CAS does not have difficulty with nonspeech movements such as chewing, licking, or swallowing. Children with CAS may also have problems with other fine motor skills such as cutting, coloring, and writing, or even gross motor difficulties such as limb apraxia (ASHA, n.d.). Many children with CAS also have language problems, such as difficulty comprehending speech, reduced vocabulary, or difficulty with word order. The difficulty with speech and later language development may even result in problems with reading and spelling as the child gets older.

Because of the intelligibility issues experienced by children with CAS, most interventions focus on increasing communication and language skills. Speech production is a major emphasis, expanding the child's repertoire of sounds and sound combinations; however, when limited oral production is possible, the focus may also include the use of AAC such as gestures, manual signs, communication boards, or voice output systems (ASHA, n.d.; Yorkston, Beukelman, Strand, & Hakel, 2010). For most children with CAS, intensive, individualized intervention is needed; however, naturalistic contexts are preferred where caregivers can play a major role. The array of interventions include a focus on motor planning approaches using motor learning theory (Maas, Gildersleeve-Neumann, Jakielski, & Stoeckel, 2014; McCauley & Strand, 1999), linguistic (Velleman, 2003), sensory cuing (Hall, 2000), tactile cuing (Hayden, Eigen, Walker, & Olsen, 2010), integral stimulation (Strand & Skinder, 1999), integral phonological awareness (McNeill, Gillon, & Dodd, 2009; Moriarty & Gillon, 2006), and rhythmic approaches (Helfrich-Miller, 1994), or some combination.

Due to the limited literature examining approaches to CAS interventions, only preliminary effectiveness data are available. Two motor interventions (integral stimulation and tactile cuing) and a single linguistic approach (integrated phonological awareness) have been shown to be effective in both direct outcome measures and generalization effects (ASHA, n.d.; Murray et al., 2015). In terms of the amount of intervention, several studies have indicated that three to five individual sessions per week is recommended; however, for younger children, shorter and more frequent sessions may be needed (Hall, Jordan, & Robin, 1993; Skinder-Meredith, 2001; Strand & Skinder, 1999).

Service Delivery Options Used by the SLP on the ECSE Team

SLPs who provide services in ECSE settings may play a variety of roles such as team member, direct service provider, service coordinator, consultant, coach, resource locator, insurance liaison, advocate, administrator, and policy maker (ASHA, 2008a, 2008b). Thus, SLPs may have a range of responsibilities in relation to children with disabilities in ECSE settings, the child's caregivers, and other professionals working with the child and/or caregiver similar to other team members.

From a historical perspective, SLPs ("speech teachers" or "speech doctors" in the early years) initially provided services one to one in unidisciplinary settings and focused primarily on elocution and stuttering (Balboa, 2008; Duchan, 2002). With advances in education, medicine, audiology, and the advent of World War II, the field broadened to include a focus on aphasia, traumatic brain injury, and hearing loss. In addition, teams of professionals began to develop to enhance services in a broader array of settings (e.g., schools, hospitals, veteran's hospitals). In current times, SLPs work in a range of job settings and across differing types of teams. In addition, some SLPs continue to practice in unidisciplinary settings including private practice, university clinics, hospitals, etc. In this situation, the SLP will assist caregivers in creating a plan with potential collaborations with those who share in caring for and/or providing services to the child and family (ASHA, 2008a, 2008b, Guidelines). In settings where SLPs are part of an interdisciplinary team, their contributions may vary depending on the knowledge and skills they possess and those represented by other professionals on the team. For example, an SLP who

has expertise in feeding/swallowing may be hired on an EI team where the OT on the team also has feeding/swallowing expertise and may already be providing these types of services. Therefore, the team would collectively decide what types of children the SLP would serve and how to handle the overlap in expertise held by the OT and SLP. The end result may be that the SLP would provide feeding/swallowing services to additional children the team serves or may work exclusively with children who have primary speech and language issues that match the SLP's other areas of expertise.

Another issue in service delivery is the location of the intervention, ranging from home, clinic, school, or community, to integrated classrooms, segregated classrooms, and pullout settings (Schooling, Venediktov, & Leech, 2010). Reviews of service locations have resulted in mixed findings, but were also limited by the settings examined (i.e., classroom versus pullout, segregated versus integrated). A review by McGinty and Justice (2006) looked at the evidence for the effectiveness of intervention delivered in classrooms versus pullout services for children with language impairments. Whereas one study resulted in no differences on expressive language scores and positive results on receptive language for pullout services (Valdez & Montgomery, 1996), two other studies indicated better outcomes for classroom-based services (Throneburg, Calvert, Sturm, Paramboukas, & Paul, 2000; Wilcox, Kouri, & Caswell, 1991). Similarly, a study by Buysse and Bailey (1993) revealed no significant differences on developmental outcomes between segregated and integrated classroom services; however, there were more gains in social and behavioral outcomes in integrated settings. Rafferty, Piscitelli, and Boettcher (2003) also found greater gains in language skills in integrated programs, however, only for the children with severe disabilities.

Regardless of setting or service delivery option, early intervention/early childhood services and supports are based on the same core principles (ASHA, 2008a, 2008b; NECTAC, 2008 Guidelines). The first principle—services and supports are family centered and culturally responsive—emphasizes the unique role of the family and their beliefs, values, priorities, and preferences in the development and implementation of an individualized plan for the child. Families are active participants and decision makers throughout the process, integrating their cultural and linguistic values and practices. Developmentally supportive services that promote children's participation in their natural environments is the second principle based on theoretical and empirical models of child development that acquisition and use of communication occurs within a social and cultural framework. Services and supports offer realistic and authentic learning experiences and promote meaningful and functional communication with family members, peers, caregivers, and team members. The third principle—services are comprehensive, coordinated, and team-based—speaks to the essence of this chapter. SLPs may be one of several professionals working with the child and family. Communication and collaboration to ensure the child and family priorities are addressed efficiently and effectively is the responsibility of every team member regardless of the method of service delivery. Finally, services and supports are based on the highest quality internal and external evidence that is available. The integration of the highest quality and most recent empirical research, informed professional judgment and expertise, and family preferences and values guides the service delivery model identified for the child and the manner in which the roles of the SLP are enacted.

The following section highlights some of the types of evidence-based interventions that may be provided by SLPS in early childhood special education settings.

Evidence-Based Interventions Focused on Communication and Language

A number of comprehensive interventions and specific teaching strategies for promoting communication and language in young children have empirical support within the literature, such as

environmental arrangement (which may include AT adaptations; Demchak & Downing, 1996), milieu approach (Hancock & Kaiser, 2002), responsive adult interaction patterns (MacDonald & Gillette, 1988; Mahoney, Powell, & Finger, 1986), and parent-implemented interventions (Arthur, Butterfield, & McKinnon, 1998; Hemmeter & Kaiser, 1994). Of these interventions, naturalistic or milieu teaching techniques are the most frequently researched, and while each has specific components, this group of interventions typically includes basic features of following the child's lead, providing natural consequences, embedding techniques throughout the child's daily routines and activities, and providing caregiver support/training in multiple settings and contexts (Wolery & Hemmeter, 2011). Implementation of intervention techniques that are appropriate to the individual family and child as well as the individual(s) who will be responsible for implementing and monitoring the outcomes will be outlined in the IFSP to ensure that the techniques are used consistently, systematically, and accurately.

Research in communication-focused interventions is expanding with the importance of this expansion underscored by the prevalence of communication impairments in children with various etiologies and the predictive relationship between communication skills and later academic and social performance (Johnson, Beitchman, & Brownlie, 2010). Because of the integral role communication has in young children's participation in everyday activities, research is increasing to support the recommended practices for infants and toddlers with communication delays that incorporates intervention within natural activities through collaboration with parents (American Speech-Language-Hearing Association [ASHA], 2008a, 2008b; Early Intervention Program for Infants and Toddlers with Disabilities & 34 C.F.R. pt. 303, 2011; Sandall, Hemmeter, Smith, & McLean, 2005). Although the importance of translational research is widely recognized (Durlak, 2013; Justice, 2008; Other Communication Disorders, 2012), to date, early communication intervention research has been limited in its direct translation to implementation in community settings in which children regularly receive services (e.g., preschools, Head Start programs) rather than home settings where parents are included. For infants and toddlers served in natural environments, child outcomes, while essential, do not address the whole story. Early communication interventions should be examined also in relationship to the process and context used to teach parents (Schertz, Baker, Hurwitz, & Benner, 2011; Trivette, Dunst, & Hamby, 2010; Woods & Brown, 2011).

Parent-Implemented Interventions

Several intervention studies and systematic reviews have shown that parents can effectively use communication strategies and supports with positive effects on their children's communication outcomes (e.g., Boyd, Odom, Humphreys, & Sam, 2010; Girolametto, Weitzman, & Clements-Baartman, 1998; Kaiser & Roberts, 2013; Kashinath, Woods, & Goldstein, 2006; Law, Garrett, & Nye, 2004; Roberts & Kaiser, 2012; Wetherby & Woods, 2006). The interventions examined in these studies were based on the established framework that parents can and do have an instrumental role in their children's language development (Hart & Risley, 1995; Landry, Smith, & Swank, 2006), and teaching parents to use specific communication interactions and support strategies may enhance their children's skills.

To examine the effectiveness of parent-implemented interventions, Roberts and Kaiser (2011) conducted a meta-analysis of 18 parent-implemented communication intervention studies. The children in the studies ranged from 15–77 months and included children with primary language impairments (11 studies) and secondary language impairments (7 studies), including ASD, Down syndrome (DS), and developmental delay (DD). Children receiving parent-implemented interventions had positive, significant effects for expressive language when compared to nontreatment groups, particularly for expressive language form, $g = 0.82$, $p < .01$. When parent-implemented and therapist-

implemented interventions were compared, child language outcomes were similar or slightly higher for children receiving parent-implemented interventions. Intervention strategies common across effective studies included (a) responsiveness to child communication, (b) expanding child communication, (c) enhancing the type of language input, and (d) balancing parent and child communication to establish reciprocal supportive communication exchanges.

In five recent randomized control trials, researchers examined parent-implemented interventions for toddlers and young preschool-age children (Carter et al., 2011; Roberts & Kaiser, 2012; Rogers et al., 2012; Wetherby et al., 2014). Roberts and Kaiser (2012) and compared language outcomes of children between 24 and 42 months with primary language impairments in a combined clinic and home Enhanced Milieu Teaching (EMT) intervention program. Rogers et al. (2012) examined the effects of a clinic-based parent-implemented version of the Early Start Denver Model (P-ESDM) for toddlers at risk for ASD. Carter et al. (2011) studied parent responsivity and child communication of toddlers with red flags for ASD following participation in Hanen's More than Words (HMTW) combined group and individual parent training intervention. The children in the comparison groups received "business as usual" supports; many of the children and families in the P-ESDM and HMTW studies participated in various community-based interventions, whereas 92 % of the children in the EMT study did not receive any language intervention. Interestingly, only the EMT study demonstrated significant main effect differences between intervention and control groups. Without carefully defining or controlling the intervention that the control groups in the P-ESDM and HMTW studies received, the results are difficult to interpret beyond stating that each of the examined interventions was similarly effective as other interventions that children and families may be typically receiving. The role of parent intervention involvement in the control groups was not reported. In addition to location variations (e.g., home or clinic) of the respective parent-implemented intervention, the researchers in each of these three studies used different processes to teach the parents to implement intervention strategies. This highlights the issue that although parent-implemented intervention studies share the common focus of teaching parents to implement specific strategies, the intervention and process in which parents are taught varies substantially (Baranek et al., 2015).

Limitations of Parent-Implemented Intervention Studies

When examining limitations of parent-implemented intervention studies of toddlers, two additional considerations related to IDEA Part C service delivery can be noted—the parent's role and the service location. IDEA Part C stipulates that early intervention services and supports are designed to build the families' capacity to support their children's development and are to be provided in their natural environments, including both physical locations (i.e., setting) and the family's routines and activities (i.e., context) (IDEA, 2004; NECTAC, 2008). Family capacity building underscores an important distinction among the broad category of parent-implemented interventions. Although the terms training and coaching are often used interchangeably or in a nonspecific manner, there are important differences between the two approaches (Kemp & Turnbull, 2014). Specifically, training parents to implement intervention in *predetermined* intervention contexts (e.g., preschool, clinic setting) is different than collaborating with parents as decision makers in the process of coaching them to embed intervention in their everyday routines. Parent training often entails the interventionist providing information, modeling strategies while the parent watches, and providing specific instructions to the parents on what and how to use strategies within play activities (e.g., Fey et al., 2006; Girolametto et al., 1998). However, family-guided parent coaching includes parents as integral decision makers and collaborators in how, where, and when the intervention is implemented (Kashinath et al., 2006; Wetherby & Woods, 2006; Woods, Kashinath, & Goldstein, 2004). Interventions using a parent coaching

approach focus on the triadic interaction of the interventionist supporting the bidirectional parent–child interactions and communication (Salisbury & Cushing, 2013; Woods et al., 2011). To be determined as effective and efficient, parent-implemented communication interventions for young children overall should address both the needs of the child and of the parent.

Classroom- and Collaboration-Based Approaches

Classroom- and collaboration-based approaches are described as those in which SLPs join the early childhood special education team in the classroom providing intervention to individuals or to small groups of young children in their general and special education classroom settings directly or by supporting other team members to embed a planned intervention within specified activities throughout the day (Hadley, 2014; Kamhi, 2014). SLPs also may team teach with general and special education classroom teachers using lessons and scaffolding strategies that integrate communication intervention with instruction in the regular curriculum.

One area for SLP participation in PreK classrooms is preventative language and literacy development for children at risk for language delays and possibly susceptible for later reading difficulties. A prevention orientation emphasizes the importance of focusing attention toward the design and delivery of interventions that boost children's achievement of pre-reading skills, particularly oral language and vocabulary. The embedded–explicit model of emergent literacy intervention (Justice, Invernizzi, & Meier, 2002) is designed to guide the SLP who works with preschool children through the use of a multitiered intervention for ensuring at-risk children's attainment of critical emergent literacy skills in collaboration with the classroom daily activities. Multiple examples of interactive storybook reading as an instructional practice have had positive effects on young children's vocabulary development (Goldstein, 2011; Justice, Kaderavek, Fan, Sofka, & Hunt, 2009). This practice expands on the context of shared book reading (i.e., adult–child engagement centered on a book) by embedding specific learning opportunities on identified target words or grammatical forms focusing on the interaction between the adult and child during storybook reading as a way to introduce new vocabulary and reinforce language development by engaging the child in dialogue.

Evidence-based reviews or meta-analyses of SLP communication interventions in the preschool classroom are limited and have variable findings. SLPs incorporate a variety of interventions in class-wide, small group, and individual interventions with young children.

Specific procedures such as recasts, focused stimulation, and enhanced milieu teaching have been examined with children of various age groups and disability types. Studies examining specific procedures alone are more variable; however, packaged that incorporate multiple naturalistic strategies as a key ingredient do appear to be effective (Roberts & Kaiser, 2011, 2012).

Hadley (2014) discusses two additional important considerations for the SLP and the team, sufficiency of opportunities, and distribution of practice, as she draws her conclusion that there is a critical level of input for preschoolers to gain language skills including vocabulary and grammatical markers. The evidence suggests that children with language impairments need more opportunities to learn than children with typical language (Proctor-Williams, 2009) and that exposure below a critical dose level will not be effective (Proctor-Williams, Fey, & Loeb, 2001). Gray (2003) found that preschoolers with LI required an average of 27 trials to comprehend a new word and 49 trials to produce a new word compared with a mean of 13 for comprehension and 24 for production by same-aged typically developing children. In this study, approximately twice as many trials as were needed to map a new word with its referent by the children with LI and that they also required more trials to comprehend new words than the typically developing group did to produce them. Studies of children with LI show the same advantage of distributed over massed practice. Evidence for this comes from studies of both vocabulary and grammar. These

findings emphasize the importance of collaboration and coordinated planning between the team and the family to ensure acquisition of skills.

The contents of this chapter are intended to describe the collaborative role of the SLP as a member of the early intervention/early childhood special education team to support the child, family, and other team members to enhance communication, language, and literacy development. In addition, specific interventions for feeding and swallowing, speech and phonology, or in AAC/AT are provided through a variety of service delivery approaches. The diverse roles of the SLP range from the primary service provider to the classroom consultant confirm that there is much to learn about efficacy and effectiveness of communication interventions. While many evidence-based interventions are available, more are needed to support the diversity of important outcomes to be achieved and the roles that SLPs may play. At this point in our evolution, team members should incorporate supports and services matched to the unique and changing needs and priorities of the children and families. Keeping the child and family at the focus of intervention and the source of decision making is the linchpin of quality services. Connecting families with resources in the community, with their health and education programs, and with other families of children with disabilities promotes engagement, participation, and implementation. Evidence supports communication as key to high-quality and productive life.

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Occupational Therapy in Early Intervention and Early Childhood Special Education

20

Linn Wakeford

Introduction

Young children with disabilities and their caregivers often face multiple challenges as they participate in everyday life. Some of these challenges may lie in the successful completion of various activities, such as eating a meal, getting dressed, or putting together a puzzle. Other challenges may lie in relationships with others—communicating, sharing, and playing together. Parents may find relatively simple tasks and routines such as grocery shopping, doing the laundry, or bathtime very demanding, and teachers may find that circle time, snack time, and outdoor play require extra planning and effort. It is the role of the occupational therapist (OT) to help address these and other challenges for both young children with disabilities and their caregivers. The domains of occupational therapy (OT) practice include a primary focus on enhancing participation in personal activities of daily living (e.g., basic self-care tasks), instrumental activities of daily living (e.g., meal preparation, care of pets), formal and informal education, work (including volunteering), play (e.g., constructive, social, symbolic, and outdoor play), leisure (e.g., hobbies, restorative activities), and social participation at the levels of community, family, and friendships (AOTA, 2014). Patterns, routines, and habits in these areas of occupation are addressed, as are the social, communication, sensory processing, cognitive, emotional, and motor aspects of occupational performance. In addition, occupational therapists (OTs) working with young children consider not only the abilities of the individual child to engage successfully in these daily life occupations and activities but also the ways in which adult caregivers (parents, teachers, etc.) are involved and the contexts in which children participate.

This chapter provides an overview of the work of occupational therapists in early childhood settings, i.e., early intervention and early childhood special education. The contexts in which this work occurs are described in the next section, followed by a summary of the theoretical and conceptual model guiding practice and a description of the process of assessment, intervention, and measuring outcomes. Current challenges for OT practice in early childhood settings are identified in the summary and conclusions, along with potential directions for future growth.

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Contextual Influences on Practice

While there are multiple influences on OT practice with young children, there are several that over the past few years have become more pronounced. These include regulation and reimbursement, the change in the client population for OTs working in early childhood settings, and the increasing influence of everyday technologies. While there is no space in this chapter for in-depth discussion, each of these contextual frames is summarized below, followed by a discussion of the ways in which OT services may be delivered.

Regulation and Reimbursement

Young children diagnosed with disabilities or chronic health conditions may receive OT services through private providers who bill insurance, Medicaid, or parents (private pay) for reimbursement but may also receive services under Part C (Early Intervention) or Part B of the Individuals with Disabilities Education Act (IDEA; http://idea.ed.gov/). These sources of regulation and reimbursement provide a context for practice in which the OT must attend not only to the specific needs of the child and his/her caregivers but also to the requirements of various agencies and institutions for how and when services are delivered and to the financial resources of the family or school setting. The ongoing negotiation involved in how best to integrate institutional, financial, and personal needs and resources of families is a daily professional activity for OTs working in early intervention.

Changes in Client Populations

Over the past 10 years, the population of young children receiving OT services has changed and now includes more children with autism spectrum disorders (ASDs), more diversity of race/ethnicity, culture, socioeconomic situations, and family composition. OTs also are becoming more involved in infant mental health services (Chandler & Yun, 2006). These changes have created demands for OTs working in early childhood settings to have greater openness to cultural and lifestyle differences than ever before and to increase their foundational and practical knowledge related to ASD, other developmental disabilities, and infant mental health. This is in addition to the previously existing demands for competence in working with children, families, and classroom/childcare staff, knowledge of numerous childhood diagnostic issues, assessment and intervention methods, and the ability to navigate the systems in which services typically have been provided. Both current practice and OT education continue to evolve in order to meet these newer demands as these contexts for practice change.

Technology

A third notable context for the delivery of OT services is the growing influence and use of social media and various technologies in the everyday lives of most Americans. Therapists, teachers, and families have become more reliant of the use of email, texting, and other technologies for communication, and the potential immediacy of these communications has changed expectations about the availability of others to respond. Social media (including blogs) present ethical challenges in terms of what social media connections are appropriate, what and how much one can say in online venues without violating the privacy of others, and the extent to which social media posts about any therapeutic activity should be permitted. The volume of information available on the Internet about childhood diagnoses, treatments, and "cures" is impossible to sift through without clear ideas about what is valid and reliable, and this presents challenges to both parents and therapists. A similar situation exists in the explosion of software applications available for tablets, laptops, and smartphones that target young children, young children with disabilities, and their teachers and parents. Lastly, more and more sophisticated assistive technologies and devices are being developed to support children and families

in a variety of activities and environments, and those working in early childhood environments must attempt to maintain current understanding of the assistive devices and methods that will be most useful to their clients.

Models of Service Delivery

Occupational therapy services may be provided to young children and their families in a variety of ways. OTs providing services under Part C must comply with mandates for implementing intervention in natural environments, and the most common of those environments is the child's home. Because each state interprets the terminology in Part C a bit differently, there are some states in which early intervention services must be implemented in the home, and other states that allow more flexibility based on parent preferences, and may permit the OT to provide services in a childcare setting. OT services delivered under Part B must be delivered in an educational environment unless the child is considered "homebound" by the school system, in which case services may be provided in the family's home.

Broad models of service delivery range from quite segregated (i.e., one-on-one with the child and therapist) to quite integrated (i.e., embedded within the child's typical environments and daily activities/routines). Each of these models provides unique advantages and disadvantages in general, but in early intervention/early childhood settings, segregated models are not recommended in most cases. Even if the OT provides a relatively high level of direct service to the child during a session, the presence and involvement of parents, teachers, or other caregivers is critical to the ongoing implementation of the intervention and the outcomes. In a review of the evidence supporting various service delivery models for OT in early intervention, Kingsley and Mailloux (2013) found that while models that are family centered and routine based and include parent participation appear to be highly effective in general, there was not a single method or setting that was notably more effective than others and that flexibility in service delivery to include combined approaches was important. Table 20.1 provides an overview from most to least segregated models.

The field of early childhood has long advocated the use of coaching models for service delivery, and over the past 10 years, coaching has become more popular in occupational therapy as well. Though it is still far from prevalent as a method of service delivery for OTs in early intervention, the development of the occupational performance coaching approach (Graham, Rodgers, and Ziviani, 2009) and early qualitative and quantitative investigations of OT coaching are moving this method steadily forward as a very promising means of service delivery (Foster, Dunn, and Lawson, 2013; Graham, Rodgers, and Ziviani, 2010; Novak, 2014). Results of these early studies indicate that parents value the coaching relationship and feel greater self-efficacy as parents and that a coaching model can support both children and parents in achieving specific goals related to occupations and social participation.

Conceptual and Theoretical Models for Practice

Before moving to discussions about assessment and intervention practices that OTs may use working with young children, it is important to note that there are a number of theories and models that can be used to guide these practices. These models are intended to support a common outcome—the optimal fit among the child, his or her environment, and the routine or activity in which the child is engaged. However, the models differ in terms of what they seek to change and how they propose that those changes occur. This significantly influences the course of intervention, which may be aimed at remediation, modification, or education. For instance, models that propose to change the child's intrinsic abilities as a way to create this optimal fit will support a remediative approach to intervention, focusing strategies on changing something about the child, rather than on the environment or the activity. Other theories or models may focus more on making changes in the environment or changes

Table 20.1 Typical models of service delivery from most to least segregated, adapted from McWilliam, 1996

	Model of service delivery	Focus of therapy	Social context	Adult roles
Most segregated	*Individual segregated* (also known as "pullout"): takes place in a location other than where typical daily routines are currently happening (clinic space, therapy room, empty hallway, etc.)	Directly and exclusively on individual child	Child Therapist	*Therapist*: provides direct service *Parent or teacher*: provides information before therapy and receives information after therapy
↕	*Small group segregated*: takes place in a location other than where typical daily routines are currently happening (clinic space, therapy room, empty hallway, etc.) and involves more than one child with special needs	On children with special needs	Child Therapist Other children (peers, siblings)	*Therapist*: provides direct service *Teacher*: decides schedule with therapist and which peers will participate *Parent and teacher*: provide and receive information before and after therapy
	Individual in context but segregated: takes place in physical location where typical activities and routines are happening, but therapy actually happens in a space apart from that activity	Directly and exclusively on individual child	Child Therapist	*Therapist*: provides direct service *Parent and teacher*: conduct activities, play with other children, keep them from disrupting therapy; may watch therapy session, and provide and receive information after therapy
	Group in context: takes place in physical location where typical activities and routines are happening; group may include children who are typically developing and those who are not	All children in group, peer interactions, with particular attention to meeting special needs	Child Therapist Other children (peers, siblings)	*Therapist*: provides direct service Parent or teacher: may only provide/receive info pre and post, may conduct activities and play with other children, may participate in therapist's group, and may participate in planning activity *Other therapist*: may co-treat with OT
	Individual during routine: takes place wherever target child is and within context of typical, ongoing activities and routines	Directly but not exclusively on individual child	Child Therapist Other children (peers, siblings) Parent and/or teacher	*Therapist*: provides direct service *Parent or teacher*: plans and conducts activity including focal child, observes therapist's interactions with child, provides information before, and exchanges information with therapist after *Other therapist*: may co-treat with OT
Most integrated	Consultation	Parent and/or teacher, as related to the needs of child, can vary from expert to collegial model	Child may or may not be present Therapist Parent and/or teacher	Exchange information and expertise, plan future interventions, give and receive feedback, and foster collaborative relationship

within the activity or routine itself. Although not always explicit, most models support the OT in providing education to others about diagnostic issues, treatment options, potential outcomes, available resources, and advocacy.

Overarching Concepts

There are several documents that can help to frame or guide OT practice in early childhood settings. The Occupational Therapy Practice Framework III is intended to describe "the central concepts that ground occupational therapy practice" (AOTA, 2014, p. 53). It covers the domain of practice (areas of occupational performance, the skills and patterns related to that performance, contexts and environments, and client factors involved in occupational performance) and the practice process (evaluation, intervention, and outcomes). While it is not a theory or model, the OTPF-3 does provide guidance to practicing therapists. The World Health Organization's International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001) also provides a structure and language for thinking and communicating about the various aspects of function and disability that may be experienced by any individual and the environmental and personal factors that may contribute to that experience. Although the structure of and language within the OTPF-3 and the ICF differ to some extent, they are compatible and can provide the OT with useful language and organization of concepts when working with young children and families.

In addition to the OTPF-3 and the ICF, there are several overarching theoretical approaches that guide OTs to examine multiple aspects of a child's situation when completing assessments and designing intervention. Though modeled somewhat differently, ecological (Bronfenbrenner, 1992), transactional (Cutchin & Dickie, 2012; Sameroff, 2009), and dynamic systems (Smith & Thelen, 2003) theories all recognize an ongoing interaction among the child and his or her environment and highlight the importance of context as an influence on performance. Each of these theories allows for a holistic view of situations made difficult due to a child's disability, health condition, risk factors (such as poverty or poor access to care), etc. These theories also allow the OT to consider the effect on parents, siblings, and others and may lead to interventions that seek to change aspects of the environment (including social contexts), aspects of the task, and/or behaviors of the child in order to create an optimal fit and ultimately successful engagement (Humphry & Wakeford, 2006, 2008). Similar theories that have arisen within the field of occupational therapy include Person-Environment-Occupation (PEO; Law et al., 1996), Ecology of Human Performance (EHP; Dunn, Brown, & McGuigan, 1994), Occupational Adaptation (OA; Schkade & Schultz, 1992), and the Model of Human Occupation (MOHO; Kielhofner, 1985).

Practice Models

In addition to these overarching concepts, OTs working with children may also be guided in their thinking by practice models that focus on specific aspects of disability or of a situation. These may include, but are not limited to, theories of motor control and motor learning (Shumway-Cook & Woollacott, 2000), sensory processing (Baranek, 1998; Dunn, 1997; Dunn, Saiter, & Rinner, 2002), coping (Williamson & Szczepanski, 1999), attachment, family systems, and behavior.

The Occupational Therapy Process

Preparation for Practice

Occupational therapy practice in the United States (US) is regulated at both national and state levels. In order to practice, OTs must have graduated from an entry-level educational program accredited by a national accrediting body (Accreditation Council for Occupational Therapy Education, ACOTE), passed a certification exam administered by a national certifying board (National Board for Certification in Occupational

Therapy, NBCOT), and obtained a state OT license wherever their practice is located. Entry into the profession is currently at the master's level for registered occupational therapists (OTRs) and at the associate's degree level for certified occupational therapy assistants (COTAs). Prior to 2007, individuals could become an OTR with a bachelor's degree, and there are a number of OTRs still practicing with that initial entry level degree.

Preparation for working in early childhood settings. While entry-level OT educational programs are designed to prepare "generalist" practitioners, OT curricula routinely include significant content related to working with children. In addition to learning objectives related to assessment, treatment planning, implementation, and outcome measurement, student outcomes for content specific to young children typically include knowledge and competencies related to childhood occupations; disability and health conditions in childhood; working with families, teachers, and other care providers; best practices in early intervention and early childhood special education; and establishing therapeutic relationships with children and family members. Also, the development of cultural competence, self-awareness, and reflective practice are generally curriculum-wide content that is reiterated and applied to working in early childhood settings.

Enacting Practice

Occupational therapy practice with young children includes screening and assessment, planning and implementing intervention, and measuring the outcomes of that intervention. It also includes documentation of these processes in a manner that is accessible to stakeholders at many different levels, including parents, teachers, and payer sources. In addition, practice involves the use of the therapist's knowledge and abilities in the areas of activity analysis, therapeutic use of self (TUOS), and clinical reasoning. The next section of this chapter addresses these often tacit, but extremely important, aspects of therapist engagement, before going on to the more explicit aspects of practice involved in the process of OT assessment and intervention.

Therapist engagement in the OT process. In addition to specific skills and knowledge related to how young children engage with the world around them; about how injuries, illnesses, and disabilities may interfere with that engagement; about families; and about assessment tools and intervention strategies, OTs make use of skills in activity analysis, developing therapeutic relationships, and holistic reasoning about children and their situations.

Activity analysis. Activity analysis, or "occupational analysis," is used to both break down an activity into its smallest component parts and at the same time to understand the activity as a whole. This simultaneous top-down and bottom-up examination of an activity allows the OT to see how the activity may usually be done and in what context, figure out which parts of it are presenting challenges or barriers to success for a particular child, and develop reasonable hypotheses about what strategies may allow for more successful engagement. For instance, an OT may observe a teacher spoon-feeding a child with oral control problems to respond to the teacher's concerns that the child seems to have difficulty swallowing foods like applesauce and yogurt and often coughs or gags. During the observation, the OT is analyzing the teacher's activity of "spoon-feeding" and the child's activity of "eating food from a spoon." The OT begins to think about how these tasks are completed successfully and also about the smaller steps that comprise each task. The OT notes that the teacher is seated in a higher position than is the child, so that as the teacher brings the spoon to the child's mouth, the child tips her head back to look at the spoon and then receives the spoon into her mouth with her head tipped back too far for easy swallowing. She also notes that the child wants to eat quickly and the teacher is responding to the child by feeding her at a rate that may be too fast for the child to actually swallow one spoonful before taking in another. Slowing the rate of feeding, repositioning the teacher relative to the child, and encouraging

the teacher to present the spoon at the level of the child's mouth while her head is in a neutral position are potential solutions to the issue generated as a result of the therapist's analysis of the activity.

Therapeutic use of self. TUOS is understood as the therapist's intentional use of his/her personality, insights, and interpersonal reasoning in a manner that fosters client success in the therapy process. It is the way in which the OT develops a positive therapeutic relationship with a client, and it includes an emphasis on caring, empathy, respect, rapport, and trustworthiness. Despite the fact that a single definition of TUOS has yet to be embraced by the profession as a whole, it has been considered a key aspect of practice since the field emerged, and the results of a national survey published in 2009 (Taylor, Lee, Kielhofner, & Ketkar, 2009) indicated that more than 80 % of OTs practicing in the United States consider TUOS their most powerful tool. In addition, TUOS has been endorsed as a key element of the intervention process by clients/patients in a variety of settings (Crepeau & Garren, 2011; Darragh, Sample, & Krieger, 2001; Palmadottir, 2007).

In early childhood settings, TUOS may be employed with the child and/or caregivers. In this context, there are actually three therapeutic relationships in which the OT is involved: OT with the child, OT with the caregiver, and OT with the child/caregiver dyad. The OT must attend to and continue to develop each of these relationships over the course of the total intervention, as well as in each intervention session or activity. TUOS may be used to encourage the cautious child to try something new, the isolated child to engage, or the "I can do it myself" child to accept help when it's needed. TUOS may also be used in the process of helping a young mother better read her baby's cues about hunger and fatigue; helping a father figure out for himself, rather than "being told," that his roughhousing manner of play often frightens his toddler; or helping a teacher develop the courage to talk with the parents of a child who is struggling with self-regulation in the classroom.

Although most research related to the importance of TUOS in OT practice has been conducted with therapists and adult clients, Harrison, Romer, Simon, and Schulze (2007) discovered that mothers of children with disabilities saw their relationship with their child's therapist as a key element of their ability to learn and use intervention strategies and techniques. In addition, both Woolfolk and Unger (2009) and Harrison et al. (2007) found that the relationship between the intervention provider and the child was an important contributor to the nature of the parent-interventionist relationship. Given the challenges experienced by parents of young children with disabilities (Bagby, Dickie, & Baranek, 2012; DeGrace, 2004; Larson, 1998), it is essential that OTs working in early childhood settings go beyond simply a "family-centered" philosophy and endeavor to establish and maintain therapeutic relationships that support children and empower families to create success not only in therapy contexts but in everyday life.

Clinical reasoning. Clinical reasoning is the ongoing thought process in which OTs combine their understanding of the child/family/caregiver situation; their knowledge of specific childhood disabilities, illnesses, or injuries; knowledge in other areas (e.g., family systems, preschool classrooms, etc.); theoretical and conceptual models; assessment and intervention methods; clinical and scientific evidence; and their own insights and experiences. The outcome of clinical reasoning is formulation of hypotheses about what actions on the part of the therapist will be most helpful to the child/caregiver, both in the moment and as part of a longer-term vision. This reasoning then also leads to implementing those actions. Clinical reasoning is typically a tacit process and is often what is transpiring when observers only see that the OT is "playing with" the child or "shopping with" the mother and her toddler. Despite its tacit nature, clinical reasoning is a core foundation of practice.

Table 20.2 Areas of occupation often addressed by OTs working in early childhood settings (adapted from AOTA, 2014)

Occupation	Examples
Activities of daily living (ADLs)	Activities and routines involved in child's dressing, bathing, toileting, and feeding/eating, including participation of both child and adult
Instrumental activities of daily living (IADLs)	Child participation with adult in activities such as pet care, shopping, meal preparation, and religious/spiritual activities
Rest and sleep	Bedtime routines, modifications to the environment that support child sleep, and nighttime safety (e.g., making sure child is safe if he/she wakes up in the night)
Education	Participation in childcare or preschool classroom environments, learning activities in home or community contexts
Play and leisure	Child exploration of toys and ways of playing, participation in play activities of various types, and supporting routines and time management to allow parent leisure activities with or without child
Social participation	Peer interactions and development of friendships in a variety of settings, participation in family events and activities at home and in the community

Screening and Assessment

The OT process begins with an evaluation process that allows the therapist to identify child, family, and/or classroom needs in the areas of occupation most relevant for each particular child, including the aspects of the context, or environment, in which those occupations occur. Table 20.2 outlines occupations/activities and routines that are often addressed by OTs working in early childhood settings.

Screening. OTs may engage in screening of young children in several contexts. Screening methods may be used to determine a child's potential need for OT services, to determine a need for a particular type of OT services (such as feeding therapy), or as part of a multidisciplinary effort to identify children who are at risk for delays or for specific diagnoses, such as autism. Screening methods typically are based on caregiver interviews and structured activities or observations and may make use of standardized tools such as the Denver Developmental Screening Test. OTs may also develop checklists or other non-standardized questionnaires that are completed by parents or teachers and generally are intended to help caregivers determine whether or not the child may benefit from OT services.

Assessment. Though the occupational therapy assessment process may begin with a referral based on a specific need, the practitioner typically is interested in gathering a holistic perspective on the child, typical environments, and desired or necessary occupations. This is accomplished through a combination of interviewing caregivers, structured and unstructured observations, and, at times, the administration of standardized assessment tools. Adherence to recommended practices that include child- and family-centered approaches dictates that the concerns, priorities, and desired outcomes of the family/caregivers be considered central to the occupational therapy process (AOTA, 2014), so identifying those priorities and goals during the assessment is critical. As the priority occupations are identified, the therapist can begin to ascertain what makes those targeted occupations difficult, what current occupations are successful and why, what may be the role of the physical and social environment in supporting or inhibiting the performance of occupations, and to what extent the child's likes, dislikes, temperament, abilities, and other characteristics support or inhibit occupational performance.

Of particular importance to the assessment process is an analysis of occupational performance (AOTA, 2014), and this should be included in the assessment process whenever possible. As noted by Polatajko, Mandich, and Martini (2000), the OT should observe the child's interest/motivation and his/her understanding of and actual ability to perform all or part of an activity, in the natural context. In addition, the efficiency of performance, the amount and types of assistance needed, and the spoken and unspoken expectations

regarding that performance must be understood by the therapist. This direct observation can offer valuable insights into difficulties and successes experienced by the child and caregiver that are not readily available with other methods of assessment.

Standardized assessment tools may be used to gather additional and specific information about the motor, sensory, social communication, and cognitive abilities the child brings to his/her performance of daily occupations. While the results of these tests often offer only a time- and context-limited "snapshot" of the child's abilities, they may provide the OT with a better understanding of the child's skills in areas that influence performance of multiple occupations in multiple contexts. Also, as the limitations of standardized assessments have received greater recognition within early childhood fields in general, newer testing tools tend to include activities that are more common to everyday life or assess functional status in key areas of activity, such as the Pediatric Evaluation of Disability Inventory (PEDI; Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992) and the Revised Knox Preschool Play Scale (RKPPS; Knox, 2008). These tools also may include observation of parent/child interactions as a method, include parent/caregiver report, and/or allow for transdisciplinary assessment (Dunn, 2002; Haley et al., 1992; Linder, 2008).

Documentation of screening and assessment. Results of screenings are typically documented briefly, summarizing the outcomes of the screening methods and including recommendations regarding the need for more in-depth assessment or for referral to other professionals. A full occupational therapy assessment typically results in a narrative report that includes observations, results of caregiver interviews, testing outcomes, the therapist's interpretation of all assessment results, identification of child strengths and needs, and recommendations for further action. Recommendations may include the initiation of OT services, referral to other professions, strategies for use by caregivers, and timelines for reassessment. The specific format for both screening and full assessment reports may be determined by the specific practice setting or payer source (i.e., Medicaid), but reports are typically intended to communicate results and recommendations to a variety of audiences, including caregivers (parents, teachers, etc.), payers, and other professionals.

Planning and Implementing Intervention

OT intervention for young children typically takes place in a team context. That team may be comprised of a small number of care providers, such as when the OT and a parent are working together for the benefit of a child, or may include a number of other providers, including but not limited to teachers, physical therapists, speech/language pathologists, psychologists, medical care providers, and others. Regardless of the size of the team, collaborative approaches are recommended practice.

Goals. Collaborative planning and implementation of intervention begins with establishing goals that reflect caregiver priorities and the needs of the child in everyday environments. Goal statements should make it clear what outcomes are desired, and those goals should be written using language that is easily understood by everyone on the team. When necessary, basic goal statements may be augmented with more specific information about motor, social communication, sensory, cognitive, or emotional components of the goal in order to meet documentation requirements for insurance companies or Medicaid, but the primary, functional purpose of the goal should still be clear.

For children/families receiving services under IDEA, Part C, goals or targeted outcomes are documented as a part of the Individualized Family Service Plan (IFSP). The IFSP may include family or parent goals, as well as goals specific to changes in the child's participation, and could include goals such as finding an inclusive childcare program or eating meals together one evening a week. IFSPs are reviewed at least every 6 months. For children ages 3 years and

older, services are provided under IDEA, Part B, and goals are documented as part of an Individualized Education Plan (IEP). However, IEP documents for preschoolers typically do not include family-focused goals but rather reflect more focus on early learning and classroom-based activities than do IFSP goals. Examples of these classroom goals include the use of writing/cutting tools or art supplies, building/construction play, and/or interacting with peers, in addition to goals related to basic self-care activities (toileting, washing hands, eating, and/or dressing).

Intervention. The implementation of intervention designed to help the child and family meet goals may include a wide variety of methods and strategies and most often involves the use of multiple methods in combination. The OT Practice Framework identifies both approaches to and types of intervention, and these are summarized in Table 20.3. While the majority of interventions provided to a child/family should be of the *occupation/activity* type, *preparatory* methods such as splinting, range of motion activities, or active play (to raise a child's level of alertness and attention) may be used in the first part of an intervention session to help the child become ready to engage in the activity that is the focus of the session. Preparatory methods should never be the focus of a treatment session. Education and advocacy types of intervention in early childhood are often used to support parents, teachers, and other caregivers in learning about a variety of topics related to the needs of the child and accessing services accordingly. Successful implementation of these caregiver-focused types of intervention rely heavily on the collaborative relationship established by the OT and the caregiver and the ability of the OT to provide information and advocacy in a time, place, and manner that is acceptable to the caregiver. Group OT interventions in early childhood settings may occur in classroom/childcare situations, but it is important to distinguish them from inclusive models of service delivery. Group interventions typically target similar needs in two or more children with disabilities, such as addressing classroom tool use (e.g., scissors and markers), in the context of an art activity, for three preschoolers with motor delays. In contrast, a group of children in a preschool classroom may take part in an art activity led by the OT, but only one child in that group may have a disability. This latter example represents inclusive service delivery, rather than a group intervention.

Although not explicitly included in the types of intervention identified in the OT Practice Framework, relationship-based interventions are gaining attention from OTs working in early intervention because of the foundational importance of parent-child relationships in child growth and development (Case-Smith, 2013). Relationship-based approaches are designed to support reciprocal, contingent, responsive interactions between parent and child and allow the OT to address both child and parent occupations and social interactions in the intervention context (Stewart, 2008). This is particularly important for OTs addressing issues related to infant mental health but also is extremely relevant in other early intervention situations. Positive parent-child relationships facilitate growth and change in children's cognitive, social communication, motor, and self-regulation skills and therefore provide a logical support for the implementation of other OT interventions as well. Evidence for relationship-based intervention primarily comes from outside the field of OT, having been investigated largely by those in the field of early childhood development (e.g., Greenspan & Weider, 1998; Mahoney & Perales, 2003; Mahoney & Perales, 2005; Solomon, Necheles, Ferch, & Bruckman, 2007). However, in a 2010 study by Jaegermann and Klein, the researchers found that mothers of infants/toddlers with sensory-regulatory difficulties had better interaction, communication, and teaching behaviors with their children after receiving an OT-implemented intervention designed to support the parent-child relationship than did mothers whose children received Sensory Integration therapy (Ayres, 1979; Bundy & Murray, 2002) or no intervention. Although this study was conducted with a very small number of participants and child outcomes were not reported in the article, it does provide some indication that OT's use of relationship-based intervention may be helpful.

Table 20.3 Intervention methods used by OTs and examples from early childhood settings (adapted from AOTA, 2014)

Method	Examples
Approach to intervention	
Establish/restore	Establish the skill of self-feeding with a spoon for young child with a cerebral palsy, restore a parent's ability to bathe a child safely by using a specially designed bath chair
Modify	Adapt the task of "requesting" with the use of picture symbols for desired items for a preschooler with autism spectrum disorder; modify a feeding utensil by building up the handle with foam, making it easier for the child with motor challenges to hold it for self-feeding
Maintain	Implement classroom strategies that allow a child with behavioral challenges to maintain attendance in a childcare program
Prevent	Prevent social isolation of a mother by connecting her with a play group that includes children with disabilities, use supportive seating and positioning strategies to prevent a child with cerebral palsy from developing movement limitations that interfere with independent play
Create/promote	Help parents promote more variety in a child's play by rotating toys available in the child's play area, provide intervention in the context of "play dates" for parents and children who haven't tried this yet
Types of intervention	
Occupations and activities	Outdoor play for the child who finds playground equipment challenging, engaging in play with food items for the child who is a picky eater
Preparatory methods	Play a game of chase or hide-and-seek before activities such as puzzles or blocks for a child who needs active play before attending to sedentary tasks, applying a soft hand splint before manipulative play to allow a child with cerebral palsy to have a more effective grasp
Education	Provide teachers with information about creating a picture schedule for the classroom, provide parents with information about how new foods may be introduced to a picky eater
Advocacy	Support parents in understanding their rights in an IEP meeting at the preschool, work with a local religious institution to better understand the needs of families of children with autism spectrum disorders
Group interventions	Work with a group of mothers and young children with CP on (swimming) pool activities and water safety

Evidence-based intervention. Although it is not possible within the context of this chapter to provide a comprehensive exploration of all intervention approaches, types, and strategies that may be used by occupational therapists in early intervention/early childhood settings, it is important to address evidence-based practice explicitly. Occupational therapy itself cannot be considered as the focal point of the question, "Is it an evidence-based intervention?" any more than can the field of pharmacy, physical therapy, nursing, or teaching. There are simply too many ways of reasoning about, choosing, and implementing interventions for that to be possible, and there are also far too many types, strategies, and combinations of strategies that may be used in the process of occupational therapy for young children and their families. Whether or not an OT is engaging in evidence-based practice must come from an objective assessment of the extent to which that therapist is effective in using a combination of client evidence, the best scientific (research) evidence available, and his/her own experience and knowledge in a manner most likely to support the child and family in meeting their goals. In addition, when a reasonable body of scientific evidence is not available, the evidence-based practitioner often measures outcomes in a manner that seeks to determine whether or not the intervention is effective for the particular child/family in question.

The *American Journal of Occupational Therapy* (*AJOT*) recently published a series of literature reviews on interventions for children ages 0–5 (and their parents). A review of research related to interventions to promote *social-emotional development* (Case-Smith, 2013) indicated that overall there was low to moderate evidence of positive effects from these interventions across all ages and contexts. However, when examined by age group, there were several interventions found to be moderately to highly effective for infants and toddlers and different interventions that had similar effects for preschoolers. For very young children, evidence supported relationship-based and touch-based (e.g., infant massage) interventions to facilitate positive parent-child interactions and attachment, and interventions that promoted joint attention to encourage joint activity and engagement of parent/child dyads. Preschool children benefitted from interventions that fell into broad categories of peer-mediated strategies and direct instruction. Modeling, prompting, positive reinforcement, child choice, small group activities, and intentional use of technology as a conduit for social interaction were among the specific strategies supported in the literature.

In another systematic review, Case-Smith, Frolek Clark, and Schlabach (2013) examined research literature related to interventions designed to promote motor skills in children ages 0–5. These authors found that interventions using a developmental approach to target motor skills may have efficacy in the short term but that there is very limited evidence for long-term effects, and that opportunities to develop functional motor skills in context may be missed. Similarly, interventions based on neurodevelopmental treatment (NDT; Velikovi and Perat, 2005) had a low but positive short-term effect, but no evidence for long-term efficacy. Studies reporting on constraint-induced movement therapy (CIMT; Taub, Uswatte, & Pidikiti, 1999) for children with hemiplegic cerebral palsy were among the specific approaches included in the review, and although CIMT has resulted in positive outcomes for children overall, specific protocols for very young children are not yet well-developed or tested. Therefore, questions about the necessary duration and intensity of the intervention, and whether or not unilateral or bilateral training approaches are most effective, remain unanswered at present. Effective interventions targeting motor skills included meaningful play activities, use of the social (peer) context, parent involvement, and a focus on functional goals, and were based on dynamic systems and motor learning theories. In addition, the authors of the review found that supplementing these interventions with strategies based on behavioral models (shaping, reinforcing, etc.) and on basic learning theories (e.g., scaffolding, considering motivating factors) may enhance the positive effects of the intervention, overall.

In a third systematic review published in AJOT, Frolek Clark and Schlabach (2013) present evidence from the literature regarding interventions designed to support the cognitive development of children ages 0–5. These interventions fell into two main categories: those based on a developmental approach and those that specifically addressed joint attention skills. Similar to results in the review on interventions targeting motor skills, interventions based on developmental models had some short-term effectiveness but inconclusive evidence for lasting effects. This was particularly true for infants who were born preterm and first received services in the NICU; parenting interventions, modifications of sensory environments, cognitive and language enrichment activities, and motor activities all had good positive short-term effects when implemented in the NICU and/or at home (as appropriate), but the studies that included long-term follow-up did not result in sustained gains when children were ages 5 years and older. Interventions that addressed joint attention skills were primarily implemented with young children with ASD and were demonstrated to have positive effects overall on play, language, and social interactions of preschoolers with ASD. Overall, there is a significant lack of research related to the use of interventions targeting cognitive skills by OTs working in early intervention/early childhood settings, and Frolek Clark and Schlabach (2013) note that there is a specific need for research related to preliteracy skills, and studies

examining the long-term benefits of early cognitive interventions are needed.

Evidence-based interventions for children with sensory processing differences, particularly in young children with ASD, are outlined in Wakeford and Baranek (2011) and Wakeford (2012). These interventions include strategies that come from relationship-based approaches, peer-mediated interventions, the use of visual supports in various forms (schedules, narratives, video models), learning theories (scaffolding, child choice, priming), behavioral theories (prompting, fading), and the music therapy literature (e.g., Kern, Wakeford, & Aldridge, 2007; Register & Humpal, 2007). There continues to be a paucity of conclusive research or supportive evidence for Ayres' Sensory Integration therapy, and it remains a popular but controversial method.

Although research to date has often focused on the effectiveness of a specific intervention in a specific context and may focus relatively exclusively on a remediative approach, the practice of occupational therapy should not reflect this same perspective. That is, the focus of intervention should be to support the child and family to participate in daily activities and routines, as well as special life events, in a variety of environments, in a manner that is satisfactory and meaningful. This is seldom accomplished using one approach to intervention, and as noted above, the interventions that were most effective even in targeting remediative goals often used more than one type of or approach to intervention. Research evidence is extremely useful in designing and implementing successful interventions, particularly when there are specific needs in areas of child development, but there are many layers of both meaning and behavior involved in supporting occupational engagement, particularly for young children *and* their families/caregivers. Therefore, understanding and enacting intervention-related data collection are an important part of providing evidence that an intervention, singly or as part of a "package," is working effectively to help a child and family meet their goals.

Measuring Outcomes

The outcomes of OT intervention with young children and their families may fall into one or more of the following categories: occupational performance, participation, quality of life, prevention, role competence, or health and well-being (AOTA, 2014). While goal achievement typically is used as a primary measure of outcomes, additional measures may include satisfaction ratings or indicators of increased knowledge or self-efficacy from parents/teachers or changes in scores on functional assessments of performance or participation such as the PEDI (Haley et al., 1992) or the RKPPS (Knox, 2008). Goal attainment scaling (GAS; McDougall & Wright, 2009; McLaren & Rodger, 2003) is being used more frequently as a measure of outcomes in intervention research and can be very useful, though somewhat time-consuming, in clinical contexts as well. Originally designed to support measurement of progress in social work settings, GAS quantifies not only goal achievement (a "0" point denoting expected change) but also two levels of less than expected change in performance (quantified as −1 and −2) and two levels of more than expected change (quantified as +1 and +2). In this way, change in performance can be measured more accurately. GAS allows progress without goal achievement (for instance, moving from a−1 to a−1) or achievement beyond what was expected to be documented. Regardless of the methods used, outcome measurement should occur over the course of intervention, rather than just at a defined "end point," in order to assure that progress is being made, that targeted goals remain appropriate, and that parents and other caregivers have ongoing information about how and when changes in child or family performance are occurring.

Another key purpose for measuring outcomes frequently and attentively is to assess the efficacy of the intervention itself. This aspect of outcome measurement is directly related to evidence-based practice and is important particularly in situations in which there is little empirical support for using

the selected intervention with an individual child. This is the "intervention-related data collection" referred to briefly in the last section of this chapter. As the fields of early intervention and early childhood education embrace more fully the ideals of implementation science and the measurement of fidelity to intervention, OTs working in these areas of practice must also begin to examine more carefully not just whether or not goals are being met but also the extent to which the intervention is being implemented as it was intended. In situations in which a child and his/her caregivers are not achieving their stated goals, there are multiple potential explanations, including an ineffective intervention *or* an effective intervention that is not being delivered as it was intended. In order to rectify the situation, it is important to know which of these two scenarios is occurring. Outcome measurement in this case must include not only the extent to which progress is being made or goals achieved but also how the intervention is being implemented.

Chapter Summary and Conclusions

Occupational therapy with young children and their caregivers occurs in diverse and complex contexts and requires knowledge, reasoning, and skills related not only to childhood illness, injury, risks, and disabilities but also to interacting effectively with parents, teachers, and other potential team members, cultural competence, and the variety of social, physical, and virtual environments to which children, even young children, and their families have access. Overarching theoretical and conceptual models are useful in framing these multiple factors and seeing them as interrelated and inseparable, that is, transactional. The OT process itself begins with a thorough, holistic assessment of the child's ability to participate in everyday and special events, routines, and activities and the ways in which the child's participation is influenced by and influences parents, family members, teachers, and other caregivers. Goals for therapy should then be developed collaboratively, prioritizing the concerns and wishes of parents, teachers, and the child him/herself, and should be focused on the achievement of outcomes related to occupational performance, quality of life, health and well-being, prevention, participation, and/or role competence. Intervention methods and strategies should be directly related to enhancing the achievement of goals and should be selected using evidence/knowledge about the child and his/her contexts, the best scientific evidence available, and the experience and expertise of the therapist. Progress and goal achievement should be assessed throughout the course of intervention, and additional data about fidelity of implementation of the intervention may need to be collected in order to determine whether or not a particular intervention is effective for the child/family in question.

Challenges

Beyond the typical challenges of time management, documentation demands, reimbursement issues, working as part of a team, and, at time, difficult relationships with clients, OTs working in early childhood settings experience challenges related to EBP, the increasing diversity of the client population, and the ongoing influences of technology on social and occupational participation. These should all be considered "positive" challenges, i.e., they represent opportunities for learning and development for OTs working with young children and their caregivers, but they are challenges, nonetheless.

EBP presents challenges for several reasons. These include the extreme variations among therapists in their definitions of evidence and EBP and in therapists' willingness and ability to examine their intervention methods and adopt alternative approaches when there is not reliable evidence to support those interventions. This challenge is particularly relevant to the issue of continuing professional competence and the ethical mandate to provide the best care possible to children and their families. The number of continuing education (CE) opportunities available for OTs working with young children with autism is just one example of how issues of evidence-

based practice, professional competence, and ethics converge. Searching the website of a single company that offers CE to OTs, there are 49 courses that address working with children with ASD. Although many of these CE events may focus on evidence-based concepts and interventions, there is no standard method of evaluating these or other sources of ongoing professional development nor is there a way of ascertaining how therapists actually use their new learning in practice. Challenges to EBP also exist in the paucity of early intervention research conducted by OTs working in early childhood settings and in the time-management and workload issues that constrain those working in clinical settings from participating in formal research or even engaging in intervention-related data collection. There continues to be a significant need for OT researchers to partner with clinicians to engage in clinically relevant (translational) research and for clinical practice settings to recognize the value and return on investing in clinicians' engagement in activities that contribute evidence-based intervention.

OTs working in early childhood settings are typically Caucasian women who come from moderate-to-high socioeconomic backgrounds, yet the families they work with may be very different from them in terms of culture, ethnicity, socioeconomic situations, and sexual orientation (among other things). These situations can present significant challenges to establishing rapport, communicating appropriately about what the child and family need or want, and delivering services in a context in which a family's daily life activities and routines may not be familiar to the OT. Although increasing diversity in the field of OT, and in early childhood OT, has been a priority of the American Occupational Therapy Association for a number of years, change is happening slowly, and there is a continuing need to further develop both diversity in the field and opportunities for increasing positive diversity perspectives and understanding for those OTs already practicing.

As noted previously, there has been a distinct rise in and popularity of social media over the last 10 years and an ongoing rapid development of more sophisticated technology products (both hardware and software, including "apps"). This "virtual" environment offers challenges to the OT in early childhood settings in multiple ways, from basic dilemmas such as whether or not it is appropriate to "friend" a parent on Facebook or just keep up with the latest early learning software to more difficult decisions about how to help parents discern what is accurate, reliable information from websites or problem-solve about how much time a child should be permitted to engage with an iPad instead of a person. While many of these situations must be handled on a case-by-case basis, there is still a significant need for OTs to develop a better understanding of the roles of technology in society as a whole, and more specifically in the lives of young children and their parents, and to consider the ethical aspects of these situations.

Conclusions and Future Directions

Occupational therapy provides a vital service to young children and their families and other caregivers in a variety of settings, working with others to support full social and occupational participation in daily life, despite the challenges and barrier presented by reimbursement, service provision, and policy issues. As the profession continues to develop in service to these young clients and those who care for them, it will be imperative to improve therapist participation in all aspects of evidence-based practice; to increase the diversity of the workforce to meet the growing needs of diverse populations, to support therapists in truly open, inclusive, family-centered practices; and to help therapists and families navigate the constantly changing world of technology that influences all of our lives.

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Role of Physical Therapy Within the Context of Early Childhood Special Education

21

Elizabeth T. Kennedy and Susan K. Effgen

Introduction

In early childhood settings, physical therapists (PTs) play a critical role in the lives of young children with limitations in physical abilities as the ability to move enhances opportunities for a child to learn within their environment, to develop friendships, and to communicate with others (Houwen, van der Putten, & Vlaskamp, 2014). Importantly, the mastery of age appropriate gross and fine motor skills is known to be a predictor of self-independence, along with improved quality of life (Öhrvall, Eliasson, Löwing, Ödman, & Krumlinde-Sundholm, 2010). PTs have been recognized as an integral team member since the Education for All Handicapped Children Act was first authorized in 1975. Under its reauthorizations, now titled the Individuals with Disabilities Education Improvement Act (IDEA, 2004), the role of the PT is specifically defined as one of the related services to support students with disabilities 3–21 years of age to benefit from special education and to be included in general education to the fullest extent possible (Education of the Handicapped Act Amendments of 1986). In 1986, reauthorization services were expanded to include infants and young children, and PTs could be a primary service provider based on the individual needs of the infant and family. Serving this age group of infants and children with disabilities birth to 5 years of age has long been an established area of physical therapy practice (Pearson & Williams, 1972) unlike some other disciplines included in the 1986 legislation.

PTs providing services within early childhood special education (ECSE) are acutely aware of the immediacy of addressing the needs of developing children to position these young children for future success in education. Addressing the unique functional and developmental needs of young children at early stages of development is critical to ultimately improve these children's ability to live independently and for later successful employment.

Theoretical Framework for Physical Therapy Services for Young Students or Children

The theoretical framework for physical therapy services for young children in ECSE is multidimensional, based on decision-making models embracing the strengths and the unique needs of

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each child. The International Classification of Functioning, Disability and Health (ICF) model provides the overarching framework for evidenced-based decision making regarding intervention support services for children with disabilities (Goldstein, Cohn, & Coster, 2004). This model formally developed by the World Health Organization (WHO) and endorsed by the American Physical Therapy Association (APTA), and many other organizations serve as an interdisciplinary framework for the provision of physical therapy services to meet the individual needs of a child within a changing environmental context (APTA, 2014a, 2014b; Atkinson & Nixon-Cave, 2011; Schiariti, Selb, Cieza, & O'Donnell, 2014; Vargus-Adams & Majnemer, 2014). Most specifically, the ICF-CY for children and youth provides a more specific guide for PTs working in the schools (Lollar & Simeonsson, 2005). Socio-ecological constructs within the ICF are congruent to the paradigms of social ecological theory (Palisano et al., 2012). As compared to earlier impairment or deficit models, the ICF framework holistically includes the strengths as well as the areas of deficits in the evaluation and development of support strategies to meet the needs of the young child. The ICF framework serves to organize decision making into three broad levels: (1) participation, (2) activities, and (3) body structures/function while providing for consideration of personal and environmental characteristics that would certainly impact child outcomes. With a top-down approach, the level of participation is considered first and informs the PT as to how a child functions in the environmental context of the early childhood curriculum. The environmental context includes consideration of relationships with peers and other significant adults customary for a specific child. Secondly, the level of activities provides guidance with regard to individual skills the child needs to be successful at the participation level. Finally, the level of body structure/functions provides guidance with characteristics related to physiological functioning, including psychological and anatomical, to support participation. With specifics to ECSE, decision making for services with relevance to a child's individualized education program (IEP) objectives is considered within the ICF model with a focus on supporting the child's ability to participate in the general curriculum. Finally, the quality of body systems and organ function to afford a child to be optimally functional with the ECSE context is considered with relevance to activity and participation. Decisions to provide support services also consider the need for additional skills required for a child to participate. In the early childhood context, this model is grounded as a collaboration of many people's efforts: teachers, family, other related professionals, staff, and the child's community. Ultimately, PTs recognize that successful learning outcomes are based on effective interrelationships between the child, the child's environment, and tasks or activities being asked of the child (Shonkoff, 2010).

As an example, consider Dani a 3-year-old girl with a diagnosis of cerebral palsy who is able to walk a few steps with her walker but is dependent on others for mobility outside the classroom. She recently received a power wheelchair but lacks skills to safely operate the chair. Dani's limited skills with her wheelchair interfere with her interacting with classmates on the playground. On the participation level, Dani is not able to meaningfully play with her age appropriate peers on the playground. On the activity level, Dani has limitations in being able to safely maneuver her wheelchair. On the body function/structure level, Dani has the cognitive abilities to operate the chair but lacks upper extremity coordination to operate controls on the power chair. A PT would consider all the broad levels of function in planning and intervening for support services, including the expertise of support personnel and architectural considerations for operation of the power chair. Additional frameworks of reference include knowledge of typical growth and development, principles of motor control and motor learning, and principles of neuromuscular rehabilitation (Adolph & Berger, 2011; Bhat, Landa, & Galloway, 2011; Effgen, 2013; Shonkoff, 2010). As sub-theoretical frameworks, dynamic systems theory and neuronal group selection theory provide PTs with a specific neuromuscular systematic frameworks of reference

for examination, evaluation, and diagnosis of deficiencies to support the development of motor function and to prevent motor impairments to meet the changing demands of a child's educational environment (Bhat et al., 2011; Effgen, 2013; Houwen et al., 2014).

Knowledge, Expertise, and Education of Physical Therapists

Physical therapy practice is governed by federal, state, and local legislation and rules. All PTs are required to have a current license to provide physical therapy in the state in which they practice, including District of Columbia, Puerto Rico, and the Virgin Islands. Physical therapy licensure in the United States requires an applicant to graduate from a Commission on Accreditation in Physical Therapy Education (CAPTE) program and to successfully pass the National Physical Therapy Examination (NPTE). Additional requirements exist for internationally educated PTs. Licensed PTs may have graduated as entry-level PTs from a baccalaureate, masters, certificate, or clinical doctoral professional program although the Doctor of Physical Therapy (DPT) will be required for all new applicants for licensure after Jan 1, 2016 as stated in the Guide to Physical Therapist Practice (APTA, 2014). Rules and regulations for PTs are managed by regulatory boards in each state jurisdiction, and it is the responsibility of therapists to be aware of their state regulations. The APTA, the professional organization for PTs, exhibits a strong commitment to voluntarily self-regulate in the promotion of quality healthcare and to engage trust with consumers of physical therapy (APTA, 2014) including PTs who work in early intervention and educational-based settings. In addition, commitments to lifelong learning, self-regulation, and delivery of quality healthcare are foundational ethical responsibilities supported by the APTA. Key self-regulating documents (http://www.apta.org/Ethics/Core/), such as the Guide to Physical Therapist Practice (2014), the Code of Ethics for the Physical Therapist, and Standards of Ethical Conduct for the Physical Therapist Assistant (2013), serve as beacons to reflect current best practice in the dynamic and evolving context of practice.

Entry-level PTs are licensed to practice across a wide range of settings and clinical practice areas. The focus of the entry-level DPT program is to prepare PTs to be "minimally qualified" across all settings according to CAPTE guidelines. The wide general focus across the life span, in varying contexts, with varying diagnoses and conditions, leaves little time for in-depth learning of any specific area of practice such as pediatrics. The future of physical therapy is moving toward specialist certification to obtain these additional skills. A PT may seek certification as a pediatric clinical specialist (PCS). This certification and recertification process is governed by the American Board of Physical Therapy Specialties. Residency programs in pediatrics are on the rise along with increased offerings by the APTA to support and mentor those who are working in the area of ECSE. PTs present with a richness of knowledge, skills, and abilities with a background in anatomy, neurodevelopment, motor control, and body systems to problem solve, communicate, and educate others in promoting the child toward their functional outcomes as stated on the IEP.

Competencies for Physical Therapists Practicing in School Settings

There are no advanced credentials specifically for PTs working in school-based or early intervention settings although standards for competencies in early intervention (Chiarello & Effgen, 2006) and school-based physical therapy practice (Effgen, Chiarello, & Milbourne, 2007) have been adopted by pediatric PTs as a guide for professional development. These competencies go beyond those expected of entry-level PTs. The nine content areas of the school-based competencies with their main behavioral indicators are listed in Table 21.1. These competencies can be used by PTs in their planning for professional development. They can also be used by administrators and educators by

Table 21.1 Competencies for school-based therapists (Effgen et al., 2007)

Content Area 1: The Context of Therapy Practice in Schools
1. Knowledge of the structure, global goals, and responsibilities of the public education system, including special education
2. Knowledge of federal (e.g., IDEA, Rehabilitation Act of 1973, & ADA), state, and local laws and regulations that affect the delivery of services to students with disabilities
3. Knowledge of the theoretical and functional orientation of a variety of professionals serving students within the educational system
4. Assist students in accessing community organizations, resources, and activities
Content Area 2: Wellness and Prevention in Schools
1. Implement school wide screening program with school nurse, physical education teacher, and teachers
2. Promote child safety and wellness using knowledge of environmental safety measures
Content Area 3: Team Collaboration
1. Form partnerships and work collaboratively with other team members, especially the teacher to promote an effective plan of care
2. Function as a consultant
3. Educate school personnel and family to promote the inclusion of the student within the educational experience
4. Supervise personnel and professional students
5. Serve as an advocate for students, families, and school
Content Area 4: Examination and Evaluation in Schools
1. Identify strengths and needs of student
2. Collaboratively determine examination and evaluation process
3. Determine student's ability to participate in meaningful school activities by examining and evaluating.
4. Utilize valid, reliable, cost-effective, and nondiscriminatory instruments
Content Area 5: Planning
1. Actively participate in the development of the individualized education program
Content Area 6: Intervention
1. Adapt environments to facilitate student access to and participation in student activities
2. Use various types and methods of service provision for individualized student interventions
3. Promote skill acquisition, fluency, and generalization to enhance overall development, learning, and student participation
4. Imbed therapy interventions into the context of student activities and routines
Content Area 7: Documentation
1. Produce useful written documentation by:
2. Collaboratively monitor and modify student's IEP
3. Evaluate and document the effectiveness of therapy education programs
Content Area 8: Administrative Issues in Schools
1. Demonstrate flexibility, priority setting, and effective time management strategies
2. Obtain resources and data necessary to justify establishing a new therapy program or altering an existing program
3. Serve as a leader
4. Serve as a manager
Content Area 9: Research
1. Demonstrate knowledge of current research relating to child development, medical care, educational practices, and implications for therapy
2. Apply knowledge of research to the selection of therapy intervention strategies, service delivery systems, and therapeutic procedures
3. Partake in program evaluation and clinical research activities with the appropriate supervision

providing an outline of the knowledge and skills that PTs should have or acquire to provide quality care for students with disabilities. The APTA Section on Pediatrics Task Force on School-based Physical Therapy Performance Appraisals (2013) has adapted these competencies for suggested use in performance appraisals. They have added a tenth competency for supervisors, mangers, and team leaders and changed the competency area of research into advocacy.

Provision of Physical Therapy Services: IEP Development, Evaluation, Reevaluation, and Collaborative Goals

The PT's role as a consultant and an advocate is very important during the development of the IEP to assist other IEP team members in understanding the child's disability. PTs have specialized knowledge, skills, and abilities that are valuable in the evaluation of the structure and function of the musculoskeletal system, neuromuscular system, cardiovascular system, and integumentary system (wound, burn, and scar management) (Effgen, 2013). Considerations for support services include ecological assessments to determine how a child's disability affects the child's ability to participate and progress in the general education. Specifically for preschool children, considerations include how a child's disability affects the child's ability to participate in age appropriate activities with typically developing peers. PTs are often involved during the eligibility process as PTs have expertise to provide a realistic understanding of the child's physical abilities with relevance to functional capabilities and the motor domain. PTs are commonly recognized for their expertise in evaluating and diagnosing physical limitations and managing developmental outcomes of children with known disabilities. For example, the role of the PT is obvious with diagnoses such as cerebral palsy. On the other hand, young children with subtle physical or motor problems without a diagnosis may also require the expertise of a PT to determine if the child's limitations are related to underlying difficulties in percept motor development or physical impairments such as a developmental coordination disorder.

The ECSE general curriculum has a broad focus on community-based settings beyond the traditional school-based classroom which is often very different as compared to the general education curriculum of an older child (DEC, 2007). An evaluation of the environment, including architectural barriers, is critical for decision making for support services with relevance to the ICF model.

Physical therapy often becomes involved during the evaluation phase when initial screening recommendations indicate that a PT evaluation would be beneficial to assist in the identification of a disability or to help identify education supports that would be the most appropriate in supporting functional movement or to enhance developmental outcomes. In keeping with the federal regulation Section 300.347, the PT targets an evaluation by first reflecting on the child's present levels of academic achievement and functional performance, then how the child's disability affects the child's ability to participate in a general early childhood curriculum, how the disability affects current progress in a typical early childhood curriculum, and finally how the disability affects a child's inclusion to participate in activities including recreation with typically developing peers.

PTs strive to work effectively within interdisciplinary team environments to support the development of the IEP and subsequent objectives for the child if warranted. As mentioned before, the PT may serve as the point person to bridge gaps between related services personnel in ECSE and the medical community, thereby achieving successful outcomes for the child in the educational curriculum. As an interdisciplinary competency, the ability to effectively work within a team-based environment is now embraced as a core competency by professional preservice training programs across all healthcare disciplines. This is evidenced by the growth in acceptance of the interdisciplinary professional education (IPE) framework embraced by many entry-level programs as a staple rather than a novel approach to

preparatory education. The next generation of PTs graduating will certainly benefit from progressive education practices in preservice training being exposed at an earlier time in their professional careers to the development of effective team practices along with a greater focus on family-centered care.

Service Delivery Models

Evidenced-based decisions for intervention requires sound rationale involving detailed problem solving to determine the best methods of support to address the child's needs (Effgen et al., 2007). Physical therapy services are provided in collaboration with families as the primary decision-makers for their children along with teachers, other related service providers, support staff, and caregivers. Importantly, the PT recognizes that early life experiences will shape the trajectory of educational and functional outcomes and determine the most effective method of service delivery to influence development and learning outcomes. Physical therapy support is most effective when embedded with multiple opportunities to develop, to enhance, or to acquire new motor skills, allowing ongoing opportunities for safe exploration and purposeful play with objects (Adolph & Berger, 2011; Bhat et al., 2011; Carvalho, Tudella, Caljouw, & Savelsbergh, 2008; Lobo, Kokkoni, de Campos, & Galloway, 2014; Lobo et al., 2014). Decisions regarding service delivery vary in keeping with child maturation and changing environmental demands. Recent research offers insight that typical skill acquisition develops within an ecological framework requiring thousands of hours of repetition and practice across variable environments (Adolph et al., 2012). For example, a typical infant learning to walk is thought to walk approximately the length of 46 football fields in a 6-h day based on infant laboratory data. Think about just how much practice a young child with a disability gets learning to walk or perform other motor skills. This lack of practice might explain why outcomes are not as successful as desired.

Delivery of physical therapy support has commonly been categorized into five models of service delivery: (1) collaborative model, (2) integrated model, (3) direct model, (4) consultative model, and (5) monitoring model (Effgen, 2013). No service delivery model is considered best, and they are not mutually exclusive. The PT must consider the best evidenced-based method of providing intervention for an individual child's needs. The models vary in amount of service time, methods of intervention, and primary contact for intervention to address the immediate needs of the child and to prevent problems that might interfere with future learning outcomes.

The collaborative and integrative models are common for PTs providing services in ECSE settings. With role release as appropriate, these models typically reflect a relaxing of professional roles with an emphasis on development of an integrated plan based on IEP team consensus decision making (Gagnon et al., 2010). The integrative model philosophical stance assumes key individuals in the child's life, in addition to PT, are integral to the child's success for the child to generalize and obtain needed practice for the learning of a new motor skill. Foremost, PTs seek to provide intervention support within the child's learning environment naturally by environmental adaptation, embedding intervention within learning activities, and provision of education to those most intimately involved with the child on an everyday basis, within a developmentally and culturally appropriate framework.

Direct services by a PT or physical therapist assistant are required when specific physical therapy intervention cannot be safely delegated to other key individuals or during a stage when a child needs a more controlled intervention session when learning a new motor skill. During the early learning stage of motor skill acquisition, the PT may need the opportunity to determine the most effective approach to support child participation and adjust task complexity to promote functional outcomes. In the past, physical therapy was often provided in a "take-out" model of service delivery with the child taken out of the education environment for direct "hands-on"

intervention in a separate location. This model is hopefully used less frequently today with the top-down intervention approach favoring a routine approach over an isolated intervention approach. The routine-based, task-oriented, or activity-based approach is much easier to be carried over for retention of skills as compared to the more isolated model. Unfortunately, direct "hands-on" intervention is still the preferred method of intervention by most school-based PTs (Effgen & Kaminker, 2014; Thomas & Wilmarth, 2015). PTs in educational settings make recommendations for referrals to community- based settings as appropriate if needs of the child go beyond the child's IEP and they require more frequent, intensive services.

Consultation and monitoring are used as fundamental support at any stage of the child's educational curriculum including eligibility, curriculum support accommodations, transition planning, and decision making to discharge from PT services. Consultation and monitoring are most common when the child is at the fluency or generalization level of skill performance. Effective communication is imperative for the provision of effectual consultative support. The PT has specific knowledge, skills, and abilities as a healthcare professional to serve as a liaison between community healthcare providers and educational staff to promote an understanding of the child's medical diagnosis related to disability and anticipated outcomes. In addition, the PT uses these skills to enhance communication and build relationships between schools and community healthcare providers. Consequently, PTs in the school setting need to analyze efficiently and synthesize quickly information for the development of appropriate recommendations.

A comprehensive physical therapy evaluation considers the age of the child, diagnosis, cognitive functioning, and specific needs identified during an evaluation process or determines the need for continued physical therapy services. Administration of a standardized test of motor and functional performance provides information to document present level of performance and to monitor progress. Commonly used tests for the early childhood population include Peabody of Developmental Motor Scales (Folio & Fewell, 2000), Bruininks Oseretsky Test of Motor Proficiency (Bruininks & Bruininks, 2005), Movement Assessment Battery for Children (Henderson & Sugden, 2007), and Test of Gross Motor Development (Ulrich, 2000). Very few standardized assessment tools are available to measure a child's activity and participation levels. The Pediatric Evaluation of Disability Inventory-CAT (Dumas et al., 2012) and the Gross Motor Function Measure (Alotaibi, Long, Kennedy, & Bavishi, 2013) are commonly used to detect changes in mobility or motor function. A variety of reliable measurement tools are available to assist in the evaluation of variables related to body/structure function in the determination of motor or physical disability.

The impact of funding on service delivery takes a very different color as compared to physical therapy provided outside the school-based setting. As a discretionary service, physical therapy services are services covered under IDEA legislation and are not a consideration when determining whether or not a child is eligible for services (Effgen, 2013). IDEA regulations require physical therapy services for every eligible child who has a recognized need based on the IEP. At the same time, reimbursement for direct physical therapy services may be billed to certain entitlement programs as a funding source for children who meet eligibility requirements. Medicaid is the most well known of these programs. In addition to meeting documentation requirements for IDEA, the PT must document in accordance with the entitlement funding source. The eligibility requirements, benefits covered, limits to coverage, and setting where service is covered vary from state to state requiring the PTs to be cognizant of their state Medicaid requirements. The challenge arising from mixed sources of funding is that PTs have to be knowledgeable in billing language for the funding source. For example, Medicaid requires documentation for services and letters of medical necessity for assistive technology or adaptive equipment to be written in medical language. The PT may need to provide additional documentation to meet funding source requirements. In addition to services

covered by IDEA funding, the PT is often involved in accessing and providing letters of medical necessity from additional payers or community resources to best meet the needs of the child to support participation in the educational setting.

Evidenced-Based Intervention

IDEA states that special education and related services should be "based on peer-reviewed research to the extent practicable" [IDEA, PL 108-446 Sec. 614.(d)(1)(a)(iv)]. The US Department of Education funded a program at the Center on Personnel Studies in Special Education at the University of Florida to describe the current research and evidence that support effective intervention in schools (http://copsse.education.ufl.edu/). That program and the recent Council for Exceptional Children (2014) publication highlight the critical need for more research. An analysis of systematic reviews of physical therapy interventions for school-aged children (Effgen & McEwen, 2008) for the center found only nine major areas of pediatric physical therapy intervention with sufficient research to have a systematic review completed. Fortunately, recently there has been slightly more research and many more systematic reviews. However, there is still certainly not enough evidence to provide sufficient support for many interventions used by PTs with young children having disabilities. There is even less evidence regarding the exact protocols to use and the most effective frequency, intensity, and duration of intervention provision (Gannotti, Christy, Heathcock, & Kolobe, 2014).

PTs use a wide variety of interventions to influence the ICF levels of participation, activity, and body structure and function. Recently, many PTs have been focused on performance-based or top-down approaches to achieve activity and participation goals (Novak et al., 2013). These approaches are based on motor learning and motor control theories along with ecological principles (Smits-Engelsman et al., 2013). Task-oriented/activity focused approaches place an emphasis on functional skills which are broken down into steps or parts that might be practiced independently or linked together to complete the task. The focus is on essential activities of daily living, movement independence, and participation at home, school, and community. A recent systematic review of interventions for children having cerebral palsy suggests that this focus on task-oriented training and not the underlying impairments in body structures and function has transformed rehabilitation and generated many evidenced-based interventions (Novak et al., 2013). Table 21.2 provides a succinct review of common physical therapy interventions for children with disabilities. The literature suggests that in general ICF activity and participation interventions such as constraint-induced movement therapy (CIMT), partial body weight-supported treadmill training (PBWSTT) especially for infants with Down syndrome, the use of power mobility, and adaptive seating/positioning have shown promise as reported in systematic reviews. The evidence, though by no means extensive and generally not related to a specific age group of children, suggests that these should be considered as possible interventions. As noted in an important, comprehensive review of intervention research for children having cerebral palsy (Novak et al., 2013), older interventions such as neurodevelopmental treatment (NDT) (Blauw-Hospers & Hadders-Algra, 2005; Brown & Burns, 2001; Butler & Darrah, 2001; Martin, Baker, & Harvey, 2010), conductive education (CE) (Darrah, Watkins, Chen, & Bonin, 2004), and sensory integration (SI) do not generally have research evidence to support their continued use. Decisions for evidenced-based intervention must be made with considerations for individual educational needs, child personality and traits, environmental influence (including supportive adults), and opportunities to explore movement and practice newly developing skills in many settings and contexts. Evidenced-based practice is evolving. Research support for many interventions, especially task-oriented interventions, is being documented. Practice guidelines for common pediatric

diagnoses are being developed. The APTA has just published guidelines for the management of congenital muscular torticollis (Kaplan, Coulter, & Fetters, 2013). Many evidenced-based care recommendations are available from the Cincinnati Children's Hospital (http://www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/recommendations/default/). There is still a need for guidelines regarding optimum duration and timing of intervention to facilitate learning and retention of motor skills. Evidence exists to support increased frequency of practice within the environment; the functional task is to be used in the home or school, as opposed to settings the child does not frequent. The PT in ECSE setting strives to obtain an optimal balance between offering the right amount of challenge to promote motor skill development, to offer opportunities to problem solve for motor learning, and extensive practice while implementing adaptations as needed to address physical limitations (Adolph et al., 2012; Damiano, 2006; Lobo, Harbourne, Dusing, & McCoy, 2013). Evidenced-based practice will need to be cost-effective, based on integration of best available research, PT expertise, and child and family values.

Quality Assurance

The appraisal of job performance of PTs in the ECSE context must consider the effectiveness of how physical therapy impacts student learning outcomes (SLO) in their achievement of their academic and functional goals as required by IDEA [Sec. 614. (d)(1)(A)(II)]. As a related service, PTs serve as team members to support the SLO although not necessarily directly involved in teaching the child. Job performance appraisal should involve the consideration of multiple variables for the meaningful determination of whether a PT is providing effective support for children in the environmental context and not be based on student performance in domains not related to physical therapy services (e.g., math and reading ability). Variables making evaluation of job appraisal more complex are that so much of physical therapy support involving education of relevant staff and families; recommendations for positioning, equipment, and assistive technology; recommendations for activity-based intervention implemented by others; personal factors of the child; and environmental characteristics subject to change.

An ideal situation for the evaluation of physical therapy services would be for the appraisal to be performed by a supervising PT with experience in providing physical therapy services in an educational setting. The reality is many PTs are supervised by administrators or other nonphysical therapy professionals who do not have the physical therapy background to provide meaningful feedback on the PTs' knowledge, skill, or clinical decision-making ability. In all cases, the overarching question related to job performance is "does a PT effectively influence educational and functional outcomes?" The Section on Pediatrics of APTA has published a framework to guide performance appraisal of school-based therapists with relevance to student outcomes (Task Force on School-Based Physical Therapy Performance Appraisals (Task Force, 2013)). This appraisal guide is in keeping with federal mandates for job appraisal according to the American Recovery and Reinvestment Act of 2009. Stipulations of this legislation indicate that appraisals should include valid and reliable measures across two points in time, along with the ability to compare measurement across time. In addition, competencies for PTs working in schools are also available for reference as previously mentioned (Effgen et al., 2007). Core ethics documents are available as benchmarks for expected professional behaviors as expected for PTs and physical therapist assistants (APTA, 2013, Oct 22). As a final point, all job appraisals should offer opportunities for self-reflection and professional development.

The physical therapy performance appraisal guidelines developed by the special task force of school-based pediatric PTs should be considered (Task Force, 2013). Recommendations include performance based on a representative sample of SLOs and or job performance based on aggregates of service delivery models. PTs are also involved with children with deteriorating disease processes with a primary outcome focus of

Table 21.2 Evidence to support effectiveness of common physical therapy interventions

Intervention systematic review or key study	Description	Comments
Adaptive sitting, standing, and positioning (Chung et al., 2008; Harris & Roxborough, 2005; Stavness, 2006; Verschuren et al. 2011)	Custom design and application of support devices based on therapeutic principles used during sitting, standing, and lying. Adaptive devices may enhance postural stability and alignment, improve volitional arm and hand function, maintain range of motion, and prevent pressure ulcers	Adaptive positioning requires a team approach for successful implementation. Low levels of evidence suggest improved upper extremity function with adaptive seating in children with cerebral palsy (Chung et al., 2008; Stavness, 2006). Adaptive seating likely optimizes the starting conditions for movement by increasing the base of support and providing a stable origin for the trunk and leg muscles in children with cerebral palsy (Harris & Roxborough, 2005). Supported standing programs positively affect bone mineral density, hip formation, and leg range of motion (Paleg, Smith, & Glickman, 2013).
Cardiorespiratory fitness programs (Fowler et al., 2007; Johnson, 2009; Verschuren, Ketelaar, Takken, Helders, & Gorter, 2008)	Aerobic exercise training to increase endurance, fitness, and gross motor function	There are health-enhancing benefits to physical activities for those with cerebral palsy (Verschuren, Darrah, Novak, Ketelaar, & Wiart, 2014) and developmental disabilities (Johnson, 2009).
Constraint-induced movement therapy (CIMT) (Huang et al. 2009; Reidy et al., 2012; Sakzewski, Ziviani, & Boyd, 2014)	Involves constraining the unaffected upper limb in those with hemiplegic cerebral palsy with a splint, cast, or mitt for portions of every day. During that time, there is structured, intensive intervention focused on the affected limb	Appears to be an effective intervention; however, set protocols and critical threshold for intensity are not yet determined.
		Constraint-induced movement therapy might not be anymore effective than intensive therapy without constrain to improve upper limb function (Wallen et al., 2011).
Partial body weight-supported treadmill training (PBWSTT) (Damiano & DeJong, 2009; Valentin-Guidol, Mattern-Baxter, Girabent-Farres et al., 2011; Zwicker & Mayson, 2010)	Treadmill training involving partial body weight support apparatus or for an infant/toddler while being held by an adult. Partial unweighting allows the child to practice walking safely at a faster, more typical pace	Appears to be highly effective with infants having Down syndrome (Looper & Ulrich, 2010; Ulrich, Lloyd, Tiernan, Looper, & Angulo-Barroso, 2008; Ulrich, Ulrich, Angulo-Kinzler, & Yun, 2001). Study participants walked on average 100 days (3 months) earlier than controls without treadmill training. (http://www.youtube.com/watch?v=03_ZFLPRlEE).
		Somewhat conflicting findings for those with cerebral palsy and other neurological disabilities. Children with cerebral palsy showed an overall increase in walking speed and gross motor performance.
		Willoughby, Dodd, Shields, and Foley (2010) found PBWSTT may be no more effective than overground walking for improving walking speed and endurance for children with cerebral palsy.
Power mobility (Livingstone & Paleg, 2014)	Powered devices (carts/wheelchairs) allowing children with severely limited mobility to move around and explore their environment independently	Power mobility is most commonly used with children with a poor prognosis for functional mobility. These devices should be considered for children with disabilities who lack efficient, independent mobility around 12 months of age. Children having the following diagnoses might benefit from power mobility: spinal muscular atrophy types I and II, high-level spinal cord lesions, severe arthrogryposis, osteogenesis imperfect, and cerebral palsy generally those with more severe limitations at gross motor classification system levels IV and V (Livingstone & Paleg, 2014).

Strengthening/resistance training (Behm, Faigenbaum, Falk, & Klentrou, 2008; Darrah, Fan, Chen, Nunweiler, & Watkins, 1997; Dodd, Taylor, & Damiano, 2002; Mockford & Caulton, 2008)	Specialized technique of exercise involving the progressive use of a wide range of resistive loads, including body mass, and a variety of training modalities designed to enhance health and fitness	Used with children having a wide variety of diagnoses to improve functional skills and fitness.
		Does not increase spasticity in children with cerebral palsy and probably improves functional skills (Damiano, 2006).
Range of motion (ROM)/stretching (Pin, Dyke, & Chan, 2006)	The use of active or passive movement through joint range or the use of splints, cases, orthoses, and positioning to keep joints within their range of motion, to increase range of motion or defer surgery (Wiart, Darrah, & Kembhavi, 2008)	Range of motion activities are used with those having different diagnoses.
		Range of motion can be maintained by prolonged passive stretching using splints or casts in those with cerebral palsy (Autti-Ramo, Suoranta, Anttila, Malmivaara, & Makela, 2006). Brief passive range of motion activities are of questionable benefit to those with cerebral palsy (Novak et al., 2013; Pin et al., 2006).
		However, passive range of motion can be beneficial for those with other diagnoses such as congenital muscular torticollis (Kaplan et al., 2013).
Task-oriented approaches (also referred to as activity-based, or goal-directed training) (Blank, Smits-Engelsman, Polatajko, & Wilson, 2012; Novak et al., 2013)	A variety of top-down approaches to intervention where child motor performance is analyzed to identify factors in the behavior and context that influence performance. Then strategies are developed for better interaction between child, task, and environment (Blank et al., 2011)	Task-oriented approaches focus on functional skills which are broken down into steps/parts that might be practiced independently or linked together to complete the task. Teaches essential activities of daily living and stimulates participation in home, school, and community. The approaches are based on current motor learning and motor control theories along with ecological principles (Smits-Engelsman et al., 2013).
		There are different task-oriented approaches for different diagnoses.
Therapeutic exercise (generic term involving many different interventions including some of those interventions noted above) (APTA, 2014a, 2014b)	Systematic performance or execution of planned physical movements or activities intended to enable the child to remediate or prevent impairments of body functions and structures, enhance activities and participation, reduce risk, optimize overall health, and enhance fitness and well-being (APTA, 2014a, 2014b)	May involve large body movements or highly selected movement of specific muscles or body parts. Body movement maybe be manually facilitated or guided in addition to visual or verbal prompting and ques. Wide array of intervention options are included in therapeutic exercise for a wide range of diagnoses.

assisting the student to maintain the highest level of participation possible. A list of tests and measures are published in the task force recommendations as an easily useable table with the purpose of the measure, time required to complete the measure, age limits, who should administer the measure, and ICF category designation (Effgen & Howman, 2013). All recommended tests and measures are valid, and reliable and provide a meaningful strategy to compare measures over time with the sensitivity to reflect change in SLO.

Summary/Conclusions

PTs can support regular and special education teachers and other related service professionals through the development of child-directed and activity-based programs within the child's ECSE setting. PTs have unique knowledge and skills that complement those of other ECSE professionals. As a member of the student's service delivery team, the PT works with the student, the family, and all other team members to assist the child in attaining the best possible academic and functional outcomes. PTs seek to provide intervention support within the child's learning environment naturally by environmental adaptation, embedding intervention within learning activities, and provision of education to those most intimately involved with the child on an everyday basis.

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Early Childhood Special Education in Context of Pediatrics and Medical Home

22

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Introduction

For many young children, special education eligibility is often concurrent and deeply interconnected with special health, behavioral, and socioeconomic needs. Because of these additional factors, the broader context of early intervention (EI) includes not only Early Childhood Special Education (ECSE) specialists but also services from a wide range of healthcare providers, social service providers, therapists, and others. Although it is not the responsibility of the ECSE professional to address all these needs, when viewing the special educational requirements of individual children, ECSE educators might more completely serve the children by also recognizing the coexistence of each child's unique health and socioeconomic issues, whether or not they appear in the child's IEP. To comprehensively attend to the issues of children with disabilities who have diverse needs, various models and approaches have been devised, one of the more prominent of which is the medical home model.

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Medical Home Defined

One description of medical home aptly suggests the metaphor of a patient-centered medical home (PCMH) as "an anchor in the turbulent and ruthless ocean of the healthcare system" (Luo, 2010). Few would deny that the healthcare system in the USA can be overwhelming to patients and especially to those who have significant developmental delays or learning difficulties and their families. Figure 22.1 is a care map created by Lind (2012), a parent trying to navigate the system for her son. This figure provides an illustration of the number and complexity of services and supports a family and child may need to navigate. To appreciate the relationship between Early Childhood Special Education and medical home, it is critical to first understand the meaning, origin, and purpose of the medical home.

While the word "home" tends to elicit visions of a specific location, most definitions of medical home incorporate the idea of medical home as a model or a philosophy rather than characterizing it as a place. According to the National Center for Medical Home Implementation: History (n.d.), a program of the American Academy of Pediatrics (AAP), "A family-centered medical home is not a building, house, hospital, or home healthcare service, but rather an approach to providing comprehensive primary care." The word "medical" implies that the sole needs of the patient are medical and that the person providing care is a

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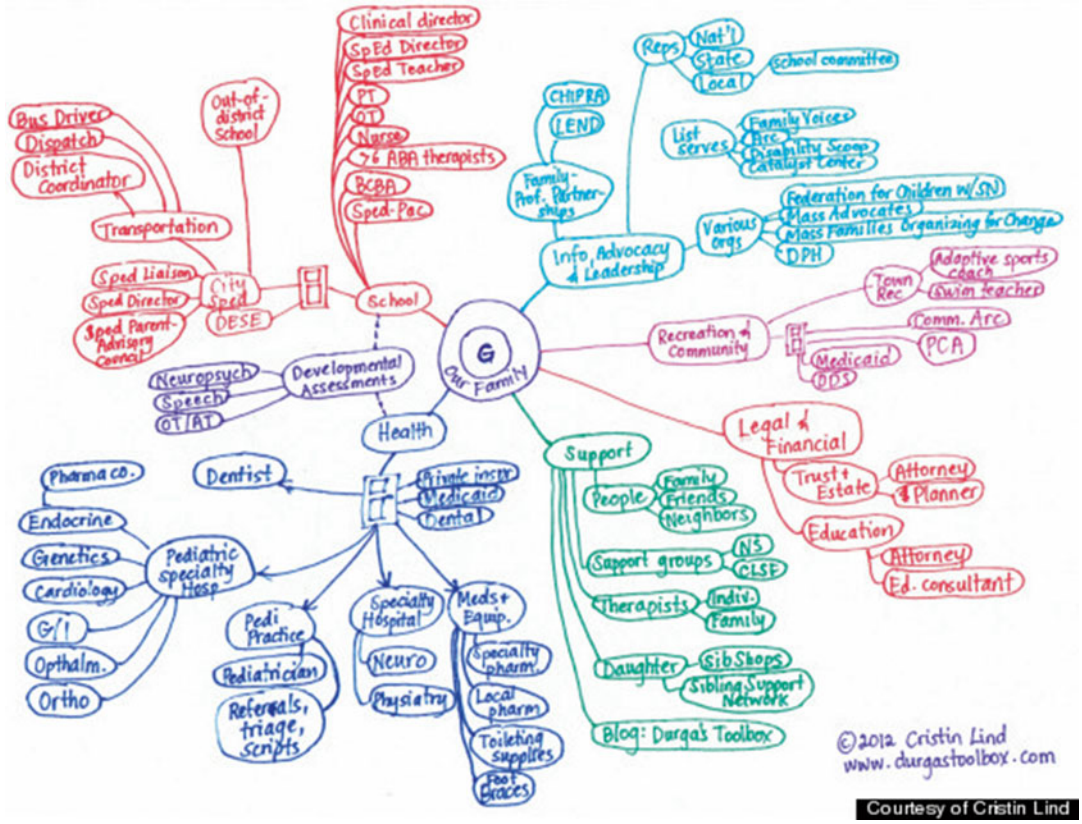

Fig. 22.1 Christin Lind's care map (2012). http://durgastoolbox.com/2012/09/19/durga-tool-9-my-care-map-or-the-picture-that-tells-a-thousand-words/

physician. Such an implication is not accurate. Despite the name, the intent of the medical home is to be comprehensive and coordinated. The coordination of care may be provided by someone of another discipline (e.g., nurse practitioner, therapist, early childhood special educator, mental health provider). Consequently, the term "healthcare" is often used in place of "medical" to convey the more broadly encompassing approach of a healthcare home. A healthcare home is most often centered in a primary care setting, but also can be centered with other providers who take on the roles that define the medical home model.

The originators of the modern concept of medical home, the AAP, define medical home as an approach. Whereas the term was originally used to describe a place—a single source of all medical information about a patient—the term now refers to a partnership approach with families to provide primary healthcare that is accessible, family centered, coordinated, comprehensive, continuous, compassionate, and culturally effective (Sia, Tonniges, Osterhus, & Taba, 2004). The AAP's most current statement about medical home from their website is:

> Every child and youth deserves a medical home.
>
> The American Academy of Pediatrics (AAP) developed the medical home as a model of delivering primary care that is accessible, continuous, comprehensive, family-centered, coordinated, compassionate, and culturally effective to every child and adolescent. A pediatric medical home is a family-centered partnership within a community-based system that provides uninterrupted care with appropriate payment to support and sustain optimal health outcomes. Medical homes address preventative, acute, and chronic care from birth through

> transition to adulthood. A medical home facilitates an integrated health system with an interdisciplinary team of patients and families, primary care physicians, specialists and subspecialists, hospitals and healthcare facilities, public health and the community. (AAP, 2014)

The Center for Medical Home Improvement adds that "A 'medical home' is a model for providing comprehensive primary care to children with special health care needs" (2014).

Definition of Children with Special Health Care Needs

While it is important for everyone to take part in a well-functioning medical home, it is especially important for Children with Special Health Care Needs (CSHCN). The current definition of CSHCN came into use in 1998 (McPherson et al., 1998). A workgroup appointed by the Maternal Child Health Bureau (MCHB) developed the definition. After consideration of various approaches, the group developed the following definition: "Children with special health care needs are those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of the type or amount beyond that required by children generally."

The MCHB workgroup defined health and related services broadly to include the continuum of services that may be required to maintain or improve the health and functioning of children. These services may include:

- Specialized/enhanced medical and nursing services (e.g., physician subspecialties, hospital specializing in the care of children, and enhancing preventative and primary services)
- Therapeutic services (e.g., physical, speech, and occupational therapies, mental health services, and home health and home nursing services)
- Family support services (e.g., family counseling and education, comprehensive case management and care coordination, and respite care)
- Equipment and supplies (e.g., durable medical equipment and assistive devices)
- Related services (e.g., early intervention, special education, transportation, and social services)

Since this definition was offered, the Centers for Disease Control (CDC) and MCHB have collaborated on telephone surveys that attempt to obtain prevalence figures regarding the number of children with special healthcare needs. The most recent survey, based on data collected in 2009–2010, yielded a national prevalence of 15.1 % for children meeting the definition of CSHCN (CDC, 2012). This survey also breaks the prevalence into age groups. Children birth to 5 years old had a prevalence of 9.3 %; children 6–11 years old had a prevalence of 17.7 %; and children 12–17 years old had a prevalence of 18.4 %. Boys had an overall prevalence of 17.4 %, and girls had an overall prevalence of 12.7 %.

Another informative survey is the National Survey of Children's Health. The most recent survey was done in 2011–2012 and published in June 2014 (U.S. Department of Health and Human Services, Health Resources and Services Administration). One of the factors looked at in the survey is the prevalence of chronic physical or mental health problems that have an impact on children's well-being. This survey is done through telephone interview of parents responding to a list of 18 chronic health conditions. About 24 % of parents indicated their child had one or more of these 18 conditions, and almost 10 % of those parents reported two or more conditions. Of those having a chronic condition, almost 50 % were said to have a moderate or severe current condition. The National Survey of Children's Health for 2011–2012 also reported that 3.1 % of children 12–35 months received early intervention services, and 6.6 % of children aged 36–71 months received preschool special education services.

The approach to defining children's eligibility for Part C or special education services varies state by state. For example, Rosenberg, Robinson, Shaw, and Ellison (2013) found that across the country there were 22 different definitions of Part C eligibility. For the annual child count of children 3–21 years, states report eligibility for special education in 12 different federally designated categories, but the definitions of who is eligible in each of these categories vary across the states. It is likely that any child eligible for Part C or

special education will meet the definition of a child with special healthcare needs. However, not all children with special healthcare needs will receive special education services. Although MCHB and the Department of Education use different definition systems, they share interest in and commitment to coordinated systems of care.

Title V programs for CSHCN under MCHB, in partnership with Healthy People 2010 and the President's New Freedom Initiative, identified six core outcomes/indicators to measure progress in meeting the goals of providing community-based systems of services for children with special healthcare needs (U.S. Department of Health and Human Services, 2007). These indicators, taken directly from the National Survey of Children with Special Health Care Needs, are:

- Families of children and youth with special healthcare needs partner in decision-making at all levels and are satisfied with the services they receive.
- Children and youth with special healthcare needs receive coordinated ongoing comprehensive care within a medical home.
- Families of CSHCN have adequate private and/or public insurance to pay for the services they need.
- Children are screened early and continuously for special healthcare needs.
- Community-based services for children and youth with special healthcare needs are organized, so families can use them easily.
- Youth with special healthcare needs receive the services necessary to make transitions to all aspects of adult life, including adult healthcare, work, and independence (p. 44).

With its focus on comprehensiveness and emphasis on care coordination, a medical or healthcare home is recognized to be part of a larger community or system of care that includes and extends beyond the medical neighborhood to address social and mental health needs, such as special education and early intervention. To deliver comprehensive and coordinated care, the healthcare home must be able to connect children with any type of services required, whether those are within the healthcare system/medical neighborhood or in the broader community. Figure 22.2, shows the relationships among service providers in the coordination of care (McAllister, 2014).

The medical home approach, although based partially on traditional principles, fosters a much more comprehensive model of care. Some notable differences between standard or traditional care (today's care) and the PCMH approach are displayed in Table 22.1 (Duffy, 2010). Note the shift in focus from provider centric to patient centric and from treatment of illness to promotion of wellness.

History and Purpose of the Medical Home

In 1967, the concept of medical home was created within the American Academy of Pediatrics (AAP) and defined as "the center of a child's medical records" (National Center for Medical Home Implementation n.d.) The motivation at the time was to address the fragmentation of medical records in the care of children with special healthcare needs (CSHCN). Due to the complexity of meeting the diverse needs of CSHCN, it was imperative that a single entity has access to children's records in order to safely and effectively coordinate interventions and services. The section entitled *History of the Medical Home at the AAP* (National Center for Medical Home Implementation, n.d.) lays out the landmarks of the development of the model. The next major step occurred in 1992, when the AAP published a more comprehensive policy statement on medical home. The concept of the medical home has evolved considerably since its inception and continues to evolve. For example, it has become the patient-centered medical home (PCMH) and now includes individuals of all ages with a focus on person- and family-centered comprehensive care. It is intended to foster a partnership between patients and healthcare providers in cooperation with a team of specialists and community resources. The recently enacted Affordable Care Act promotes and provides incentives for the use of the health (medical) home model in many aspects of care to include children with special

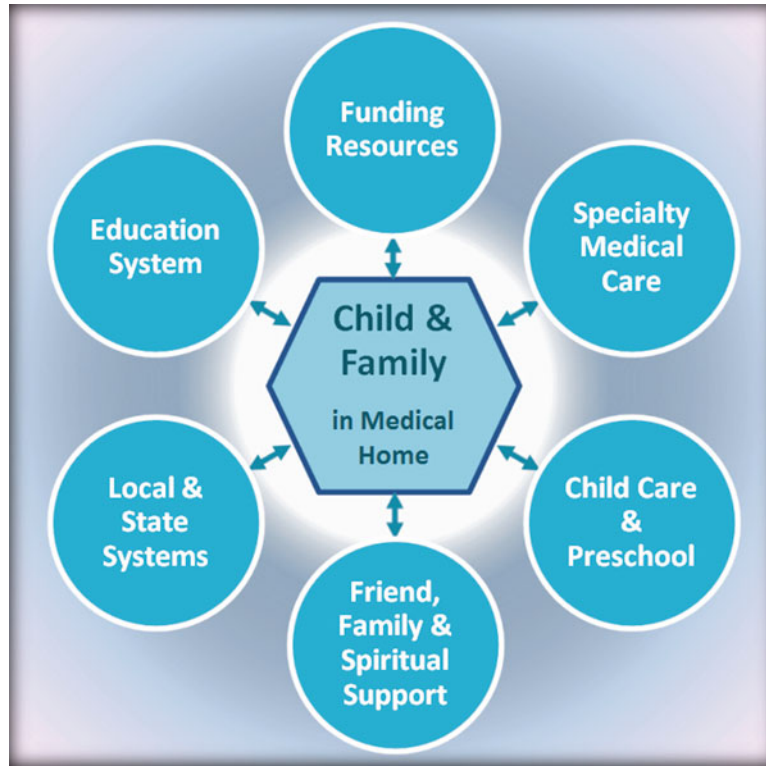

Fig. 22.2 McAllister, 2014

Table 22.1 What makes medical homes different from traditional care?

Today's care		Medical home care
My patients are those who make appointments to see me	→	Our patients are those who are registered in our medical home
Patients' chief complaints or reasons for visit determine care	→	We systematically assess all our patients' health needs to plan care
Care is determined by today's problem and time available today	→	Care is determined by a proactive plan to meet patient needs
Care varies by scheduled time and memory or skill of the doctor	→	Care is standardized according to evidence-based guidelines
Patients are responsible for coordinating their own care	→	A prepared team of professionals coordinates all patients' care
I know I deliver high-quality care because I'm well trained	→	We measure our quality and make rapid changes to improve it
Acute care needs are met through next available visit and walk-ins	→	Acute care needs met through today's visit or non-visit contacts
It's up to the patient to tell us what happened to them	→	We track tests results and consults and follow-up after ED and hospital
Clinic operations center on meeting the doctors needs	→	A multidisciplinary team works at the top of our licenses to serve patients

This graphic provided courtesy of Dan Duffy, M. D., School of Community Medicine, Tulsa, OK. http://www.health-teamworks.org/medical-home/todayvspcc.html

health care needs under Medicaid (Catalyst Center for Improving Financing of Care for Children and Youth with Special Health Care Needs, 2009).

Differing origins and foci of the medical home in pediatrics and adult medicine suggest that, even with a common definition, the medical home will look different for children and adults. Adult health is often categorized by mortality rates and measures of functional status. In their report, *Children's Health, The Nation's Wealth* (National Research Council & Institute of Medicine, 2004), the Institute of Medicine (IOM) redefined children's health in this way:

> Recommendation 1: Children's health should be defined as the extent to which individual children or groups of children are able or enabled to (a) develop and realize their potential, (b) satisfy their needs, and (c) develop the capacities that allow them to interact successfully with their biological, physical, and social environments. (p. 3)

Stille et al. (2010) reported that coordination of care for children included community agencies, especially schools, for which no adult equivalent exists. They also articulated the differences between the medical home approach for children and adults. Five dimensions stand out in relation to caring for children, including (a) the developmental needs of children, (b) the context of family dependency, (c) differences in chronic conditions, (d) disproportionate poverty among children, and (e) differences in economic impact. ECSE specialists and PCMH providers have these perspectives of children in common and frame their approaches to interventions for children in these contexts. Table 22.2 (Stille et al., 2010) describes these dimensions in greater detail.

Developmental change is addressed in the PCMH by conducting periodic developmental screenings and soliciting parental concerns in order to identify needs. ECSE specialists have honed their observational skills and are acutely aware of behaviors that signal developmental concerns in children within the early education environment and are trained to intervene. ECSE specialists and PCMH providers both are cognizant

Table 22.2 The five D's, highlighting unique differences between the adult versus child/adolescent medical home

The *five D's*	Adults	Children/adolescents
Developmental change	• Health maintenance prevention of adverse sequelae	• Enhance developmental progress
	• Rehabilitative	• Habilitative
Dependency	• Independent and autonomous	• Dependent on adults
		• Parents are essential partners
		• Team members: family, childcare providers, teachers, others
	• Patient-centered medical home	• Family-centered medical home
Differential epidemiology	• Large number of common chronic conditions (i.e., heart disease, diabetes, hypertension)	• Predominantly healthy
		• Large number of relatively rare chronic conditions
	• Subspecialists in the community	• Subspecialists based in academic medical centers
Demographic patterns	• Poverty among elderly has declined in part due to Medicare	• Disproportionate rates of poverty
		• Disproportionate racial and ethnic diversity
Dollars	• Higher healthcare costs	• Overall costs small
	• Private insurers and Medicare	• Private insurers, state Medicaid, CHIP[a]
	• Focus on return on investment on secondary and tertiary prevention	• Return on investment over long-term life course

[a]*CHIP* Children's Health Insurance Program
http://www.nihcm.org/pdf/Attachment_B_-_APA_Article_FCMH.pdf

of the family context and include the parents/guardians of children as partners in major aspects of diagnosis and treatment plans. Finally, professionals in both disciplines recognize and appreciate the importance of early intervention in altering the trajectory of development and accomplishment, effects of which shape the individual well into adulthood. As noted in *Birth to 5: Watch Me Thrive!* "The short time it takes to conduct a developmental and behavioral screen can change the trajectory of a child's life forever" (U.S. Department of Health & Human Services & U.S. Department of Education [DOE], 2014).

When looking at the effects of early interventions on life trajectories, some background is necessary. Elder (1998) informs us that early longitudinal studies of human development began in the 1920s and 1930s, in which researchers followed individual lives into middle adulthood and even into later life. By the 1960s, these researchers recognized that human development is influenced by many dynamic factors that had not yet been studied. Life course models for health were first developed to understand and address chronic illness care in the 1980s (Halfon, Larson, Lu, Tullis, & Russ, 2014). In this century, ongoing research in life course trajectories has revealed connections between genetic, lifestyle, social, psychological, and environmental factors in early life that influence a child's trajectory of development, health, and personal achievement (Halfon et al., 2014). Early childhood interventions play a vital role in the alteration of life course trajectories. A RAND research brief (Karoly, Kilburn, & Cannon, 2005) highlights the benefits of early childhood interventions that include behavior, educational progression, academic achievement, and job success, among other domains. A growing body of research suggests that early and incremental improved outcomes in health, education, and development often translate to lower utilization of expensive special education services at higher grade levels and lower lifetime utilization of the healthcare system. The effects of intervening early represent considerable long-term cost savings to society and improvements in social welfare of individuals.

The Patient-Centered Primary Care Collaborative (PCPCC) produced a framework (Fig. 22.3) that explains in greater detail how and why the medical home model works to improve healthcare and other outcomes for children. One of the most important components within the PCMH for children with special needs is the coordination function of medical home with early education and school systems.

As stated in the introduction, the medical home is only one model that has been introduced to improve healthcare. Because improving healthcare is an evolutionary process, the medical home model, while increasing in implementation across the country, will continue to change. EI and ECSE personnel should be alert to these evolutionary processes and adapt as needed to interact with the clinicians who are coordinating the child's medical care, regardless of the model used for care coordination.

One emerging iteration of the medical home is the concept of integrated care, which in its simplest definition is a model in which mental health services are integrated with general health services either on-site or are made more convenient for patients with close coordination between mental health and medical clinicians (SAMHSA-HRSA Center for Integrated Health Solutions, n.d.). This model is also sometimes referred to as the system of care. The use of this model could aid coordination between ECSE personnel and the PCMH by also improving coordination with mental health providers, who sometimes participate in the IFSP or IEP process for CSHCN.

Accountable Care Organizations (ACOs), sometimes referred to as managed care, are already in use in many parts of the country and are similar to medical homes, but on a larger scale. ACOs take responsibility for improving health outcomes and reducing healthcare costs for a population of individuals. They achieve this goal partially by instituting more efficient programs of preventive and chronic care (Centers for Medicare and Medicaid Services, 2013). Chronic conditions in CSHCN may be managed through an ACO, in which case the coordination of care extending to the school environment would likely be centralized in a manner similar to that in the medical home model.

Another model that is beginning to be utilized in some circumstances where children have very

Feature	Definition	Sample Strategies
Patient-Centered	**Supports patients and families** to manage & organize their care and participate as **fully informed partners** in health system transformation at the **practice, community, & policy** levels	• **Dedicated staff help patients navigate system** and create plans • **Focus on strong, trusting relationships** with physicians & care team, open communication about decisions and health status • Compassionate and culturally sensitive care
Comprehensive	**A team of care providers** is wholly accountable for patients **physical and mental health** care needs – includes prevention and wellness acute care, chronic care	• Care team focuses on **'whole person'** and **population health** • Primary care could **co– locate** with behavioral and/or oral health, vision, OB/ GYN, pharmacy • Special attention is paid to **chronic disease** and complex patients
Coordinated	Insurers care is **organized across all elements** of broader health care system, including specialty care, hospitals, home health care, community services & supports & public health	• Care is **documented and communicated** across providers and institutions, including patients, specialists, hospitals, home health, and public health/social supports • Communication and connectedness is enhanced by **health information technology**
Accessible	Delivers **consumer-friendly services** with shorter wait-times, extended hours, 24/7 electronic or telephone access, and strong communication to health IT innovations	• More efficient appointment systems offer **same-day or 24/7 access** to care team • Use of **e- communications and telemedicine** provide alternatives for face-to-face visits and allow for after-hours care
Commitment to quality and safety	Demonstrates commitment to quality improvement through use of the **health IT** and other tools to ensure patients and families make informed decisions	• **EHRs, clinical decision support, medication management** improve treatment & diagnosis • Clinicians/staff monitor **quality improvement** goals and use data to track populations and their quality and cost outcomes

Potential Impacts

Patients are more likely to seek the right care, in the right place, and at the right time

Patients are less likely to seek care from emergency room or hospital, and delay or leave conditions untreated

Providers are less likely to order duplicate tests, labs, or procedures

Better management of chronic diseases and other illness improves health outcomes

Focus on wellness and prevention reduces incidence/ severity of chronic disease and illness

Cost savings results from

- Appropriate use of medicine
- Fewer avoidable ER visits, hospitalizations, & readmissions

Fig. 22.3 Why the medical home works: A framework (The Patient Centered Primary Care Collaborative, n.d.)

complex needs is the wraparound model. Wraparound is an intensive and individualized care management approach that is highly structured, holistic, and efficient (National Wraparound Initiative, 2014). Care coordination for medical and educational needs under this model would be expected to be arranged and monitored in a more intense manner than any of the other models.

Medical Home as an Entry Point to Early Intervention/Special Education

There are many avenues by which a child may be identified and referred to receive early intervention or special education. The two primary avenues are through the primary care provider within the PCMH and from within the early intervention/ Child Find program in a local community. Developmental surveillance and screening by medical home providers begins before birth and continues throughout childhood at specified intervals for all children. According to Colyar (2003), the recommended schedule of well-child exams for young children includes visits as newborns then 2, 6, 9, 12, 15, and 18 months and 2, 3, 4, and 5 years. Within this schedule, standardized developmental screenings are recommended at 9 months, 18 months, 2½ years, and any time that a concern is identified or voiced (Hagan, Shaw, & Duncan, 2008). Screening tools are designed to identify variances in several developmental domains: physical, motor, cognitive, communication, and social-

emotional. It is the standard of care for pediatric primary care providers (PCPs) to examine and observe children for attainment of physical and developmental milestones at every well-child encounter. Developmental milestones vary by both age and ethnicity. It is important to take cultural differences and ethnicity into account when interpreting or gauging the attainment of developmental milestones (Hagan et al., 2008). Guidelines from the AAP state that developmental monitoring should entail:

- Eliciting and attending to the parents' concerns
- Maintaining a developmental history
- Making accurate and informed observations of the child
- Identifying the presence of risk and protective factors
- Periodically using screening tests
- Documenting the process and findings (Hagan et al., 2008, p. 40)

When variances are identified by report, exam, or screening, it is the responsibility of the PCP to initiate further evaluations and interventions. Depending on the age of the child and screening and exam results, these evaluations may involve medical tests, referrals to medical specialists, and/or recommendations to parents to seek early intervention through Child Find or to go to the local education agency (LEA). Another duty of the PCMH is to provide relevant medical records to the child's early intervention coordinator, childcare facility, or preschool. These records should include growth and health assessments, special healthcare needs, and developmental concerns (American Academy of Pediatrics, American Public Health, & National Resource Center for Health and Safety in Child Care & Early Education, 2011).

In addition to child exams and screening, PCPs provide parents with anticipatory guidance at every well-child visit. This guidance informs parents of what they should expect their child to achieve in each of the developmental domains in the interval between well-child exams. This guidance helps parents to identify when their child meets, exceeds, or lags behind in expected development and gives parents an opportunity to ask questions and discuss the child's developmental trajectory with the PCP. When a child is already receiving early intervention or special education, this provider interaction presents a ready opportunity for parents to report back to the PCP on the child's progress.

Some factors that increase a child's risk for developmental delays and disabilities are prematurity, prenatal exposures, genetic anomalies, and trauma. Many of these conditions are diagnosed before or shortly after birth. In these cases, the parents are often connected to evaluations and services without the need for additional screening. Many of these children are categorized as children with special health-care needs (CSHCN) because of the ongoing medical needs that accompany their underlying or concurrent conditions. Examples of CSHCN are children who have cerebral palsy, epilepsy, muscular dystrophy, type 1 diabetes, chronic asthma, Down syndrome, or fragile X syndrome. This list is only a small sample of possible diagnoses, not all of which are accompanied by learning difficulties or developmental delays.

Childcare or Preschool as an Entry Point to Early Intervention/Special Education

It is becoming more common for early care and education providers to administer some developmental screening tools while children are in their care. This is partially due to the fact that educators and childcare providers frequently spend more waking time with young children than even parents do and thus are in a position to observe and compare the behaviors and abilities of children. Keep in mind that performance of screenings in early education or childcare settings should be preceded by parental consent (AAP, APHA, & NRC, Standard 2.1.1.4, 2011). After screenings are performed and any time when made aware of a concern, childcare providers and ECSE professionals have both an opportunity and an obligation to convey developmental and health concerns to parents. This communication may be direct or conveyed through a childcare

health consultant (AAP, APHA, & NRC, Standard 1.6.0.1, 2011). PCMH providers and those providing healthcare coordination generally expect and appreciate receiving copies of screening results and written documentation of observations made in these settings. Resources are available to explain the collaborative process. *Birth to 5: Watch Me Thrive!* (U.S. Department of Health and Human Services and U.S. Department of Education, 2014) provides a guideline for EI/ECSE providers, explaining their roles and responsibilities in early identification, referral, and support of children with developmental deficits. Their challenge to EI/ECSE providers is to work collaboratively with one's own community network of early childhood services. Parents play a critical role in this collaboration, as they can serve as mediators of this information exchange between the ECSE professionals, childcare providers, and the PCMH providers.

Upon being informed of developmental or learning concerns by someone in the childcare or educational system, parents may opt to take their children directly to intervention services for further evaluation. This is not uncommon. However, it is important for parents to relay this information to their medical home provider, who can initiate further medical evaluations of the child if they are warranted. There is generally no harm in beginning early intervention without a diagnosis, as it is common for there to be waiting lists or appointments that may be difficult to obtain. It is crucial for the long-term benefit of the child that the healthcare provider be included in the process. Many developmental or learning difficulties have their root cause in genetic or medical conditions. A thorough medical evaluation is necessary to either rule out or diagnose these underlying causes. For example, a child who has fallen off their expected trajectory in speech and social-emotional domains between the ages of 2 and 3 may be suspected of having autism spectrum disorder (ASD). Before such a diagnosis is considered, however, there are other diagnoses to rule out that could have serious consequences if not promptly treated, such as hearing loss or one of the many metabolic or neurologic conditions (Tervo, 2009).

Early Special Education and Early Intervention Related to the Patient-Centered Medical Home

A close collaboration among the PCMH, family, and EI service team members helps to ensure that both medical and EI services are provided for children who are most at risk (American Academy of Pediatrics Council on Children with Disabilities, 2007). In a position statement on their website, The National Association of Special Education Teachers (www.naset.org) fully supports this collaboration in stating:

> It is difficult to discuss early intervention and early childhood development in the absence of discussing health care concerns. Health issues, health care, the role of the pediatrician in diagnosing developmental delays or disabilities, how to address health costs…

Primary pediatric healthcare providers are frequently the first professionals to have contact with children who have or are at risk for developmental delays and special healthcare needs. The AAP (Medical Home Initiatives for Children with Special Needs, n.d., p. 1) begins their booklet *The Medical Home and Early Intervention Programs* as follows:

> Increasingly, the benefits of early identification and treatment on child health outcomes are being proven. With this knowledge comes the responsibility to identify children with special health care needs (CSHCN) as early as possible so that treatment and intervention can begin promptly. The pediatric clinician that provides the medical home is the ideal person to identify these children through early and continuous screening that is performed in the context of routine, well-child care.

The PCMH and the Individuals with Disabilities Education Act (IDEA) Part C have many components in common (Adams, Tapia, & The Council on Children with Disabilities, 2013). Four purposes in creating Part C were (1) to address developmental delays of infants and toddlers; (2) to reduce lifetime costs of special education and interventions by intervening earlier; (3) to reduce the need for institutionalizing children with special needs, thus increasing the capacity for independent living; and (4) to support families in their abilities to meet needs of

infants and toddlers with special needs (Early Childhood Technical Assistance Center (http://ectacenter.org, 2014)). Key in the list of commonalities between IDEA Part C and PCMH is the focus on the child and family. Table 22.3 illustrates commonalities between the PCMH and IDEA Part C.

Ideally, in the context of the PCMH, an at-risk infant or toddler is screened at well-child visits and identified as possibly qualifying for Part C services. Depending on the potential for physiological/medical causes or concurrent medical conditions, the child/family is then referred either to specialty providers for further medical and psychological workups or to the appropriate local Child Find agency where more in-depth developmental evaluations are conducted, and the Individualized Family Service Plan (IFSP) process is begun. In the spirit of family centeredness, the child's unique needs and family input are central to the development of the IFSP. Although primary care clinicians are often the providers who

Table 22.3 Commonalities between IDEA Part C and PCMH models

Component	PCMH	IDEA, Part C
Screening	Routine developmental screening performed at specific ages, especially 9-, 18-, and 30-month well-child visits and any time when concerns are raised (Colyar, 2003; Hagan et al., 2008, and American Academy of Pediatrics Council on Children with Disabilities, 2007)	Post-referral screening may be performed by Child Find with parental consent or initial screenings may be performed by lead agencies (e.g., child protective services) or EIS provider and in some circumstances without parental consent (Department of Education 34 CFR Part 303 RIN 1820-AB59 §303. 310(b)(2))
Assessment/evaluation	PCMH may perform developmental assessments or evaluations with or without prior screening if clinically warranted. PCMH may also refer to specialists or to Early Childhood Services (e.g., Child Find) for assessments (Hagan et al., 2008, and American Academy of Pediatrics Council on Children with Disabilities, 2007)	IDEA makes distinction between assessment and evaluation and initial versus subsequent. Evaluations are used to determine eligibility under Part C, whereas assessments are used to assess child's and family's strengths and needs prior to IFSP meeting (Department of Education 34 CFR Part 303 RIN 1820-AB59 §303. 321(a)(2)(i–ii)). Time limitations apply
Individualized plan	The "PC" in PCMH stands for patient centered. The foundation of PCMH clinical practice is individualized care. The developmental care plan of the clinician in most cases will be to refer the child for early intervention services, which will then develop an individualized plan (IFSP) based on assessments of the child and family (American Academy of Pediatrics Council on Children with Disabilities, 2007)	The IFSP is the Individualized Family Service Plan and is based on the assessment of the child's and family's strengths and needs (Department of Education 34 CFR Part 303 RIN 1820-AB59 §303. 321(a)(2)(i–ii))
Care coordination	The initial purpose of the AAP's medical home model was to create a central location for medical records for CSHCN, thereby improving coordination of care. Care coordination is one of the pillars of the current medical home model (https://www.aap.org/en-us/about-the-aap/aap-facts/AAP-Agenda-for-Children-Strategic-Plan/Pages/AAP-Agenda-for-Children-Strategic-Plan-Medical-Home.aspx.	IDEA requires care to be coordinated among a multidisciplinary IFSP team, which includes parents (Department of Education 34 CFR Part 303 RIN 1820-AB59 §303. 343, §§303. 24(b), and §303. 340)

make the initial referral to the state's EI program, a number of other professionals in healthcare, education, and social work may also make these referrals—often without notifying the PCMH. This practice of immediate referral, while beneficial for the child and family in the short term, may lead to fragmentation, duplications, and gaps in care (National Center for Medical Home Implementation: State partners, n.d.). Early intervention may be provided as needed by a multidisciplinary or transdisciplinary team of providers (e.g., early childhood special educators, physical therapists, occupational therapists, and speech therapists). When children receive the benefit of medical home coordination with early interventionists and early childhood special educators, outcomes are improved, both in the short term and over the life course (Adams et al., 2013).

Unfortunately, not all learning or developmental disabilities are discovered before a child's third birthday, at which time children are no longer eligible for Part C services. For children 3 years and older about whom there is concern for previously unidentified developmental or learning disabilities, children may be referred either by parents or educators to their local education agency (LEA) for evaluation and possible special education services under Part B of IDEA (Gibbs, Timothy, Ward, Romeo, & Ferdinand, 2012). It is important that for children receiving evaluation apart from their PCMH providers and who qualify for Part B services, the child's PCMH be notified of their evaluations and status. Medical causes for disabilities may be discovered and treated that would improve the child's outcome. Collaboration between the PCMH and educational system can and should begin even before the school develops the Individual Education Plan (IEP). This collaboration is to ensure addressing both the learning and medical needs of the child. In addition to coverage by Part B, a child's eligibility to be included and accommodated relies on information from both the PCMH and the LEA. Results of medical testing and evaluations performed as directed by clinicians at the PCMH or by specialty healthcare providers are essential elements in determining a child's eligibility for services.

Regardless of whether the child is participating in Part B or Part C of IDEA, continued collaboration and coordination among providers in the PCMH and the child's environment help to ensure medical and developmental issues are addressed in a timely and coordinated way that contributes to more positive outcomes for the child and family (Carter, Heffron, Pola-Money, Romeo, & Ward, 2013). The PCMH has been tasked with the responsibility to ensure that special needs of children are addressed by interacting with early childhood education, childcare programs, early intervention programs, and schools (AAP, 2002). It is therefore generally agreed that collaboration between the PCMH and intervention practitioners requires communication at a level that keeps providers within medical, educational, and therapeutic domains informed about the child's needs and progress.

Early Special Education and Early Intervention Communication with the Patient-Centered Medical Home

Because evidence for the link between health and development is strong, partnerships between healthcare practitioners, educators, and families are of critical importance in the first 5 years of life (Fisher, Hanson, & Raden, 2014). In AAP's book, *Managing Chronic Health Needs in Child Care and Schools* (Donoghue & Kraft, 2009), the authors emphasize the importance of the three-way communication among parents, schools, and healthcare/therapy providers in order to provide the best outcomes for a child. When the child is first found eligible for special education services, the PCMH and the EI Service Coordinator or school should collaborate (with the family's permission) and establish the frequency, content, and method of ongoing communication. Establishing this bidirectional and minimum

effort communication "reassures the family of coordinated, family-centered care; relieves the family of the burden of having to interpret and transport the information" (Adams et al., 2013). *Birth to 5: Watch Me Thrive!* guidelines encourage this communication by recommending that EI/ECSE providers build rapport with and provide information to primary referral sources, such as physicians and other early intervention professionals (U.S. Department of Health and Human Services and U.S. Department of Education, 2014). The PCMH or other primary referral source bears the responsibility for ensuring children actually receive the services for which they were referred and to receive records of results of those services. EI/ECSE providers can facilitate feedback to those primary referral sources. As the healthcare system makes progress toward interoperability among electronic health record systems (EHRs) and as EI systems, schools, and other agencies adopt electronic record keeping, this communication process is expected to become simplified, allowing a more convenient flow of client information among providers. The content of communications should be limited to what is essential to best serve the interests of the child and family. In answer to the question "What needs to be included in communication with the PCMH?" Table 22.4 lists content that should be communicated between the PCMH and the EI or school team.

A proposed communications packet for child-care/school from/to PCMH interactions would include a minimum of:

- Well-child exam form
- Letter explaining child's needs or noted concerns
- Parental release of information for HIPAA and FERPA
- Developmental screening results
- Extra notes as needed to address specific issues

The *IEP Success Kit* (www.specialeducationadvisor.com) lists steps in creating an IEP for a child. The second step is to provide documents, which include the child's medical records. For the benefit of the child, it is important that the medical records be complete and up to date. Because medical information outside of the educational system is protected under the Health

Table 22.4 Suggested content of communications between PCMH and EI or school team (what to communicate)

From PCMH to EI or school team	From EI or school team to PCMH
• Any concerns the pediatric clinician may have regarding the child's medical condition, limitations, medications, family dynamics, etc.	• Acknowledgment that the early intervention program received the referral
• Major changes in medical services or health conditions that have direct implications for services provided by early intervention service providers	• Inability or difficulty in contacting the family
• Child's progress on health-related outcomes included in the IFSP (if applicable)	• Initiation date/s of services/treatments
• Whether or not families frequently miss scheduled appointments	• Progress or lack of progress in treatment/s and IFSP/IEP updates
	• Disposition (program eligibility, discharge from services, change in program participation)
	• Contact information for the early intervention service coordinator and those providing direct services through the early intervention program
	• Bulleted list of services received by the child and/or family (summary statement)
	• Findings of the early intervention assessments and evaluations
	• Medical concerns noted by early intervention program staff

(Directly) From *The Medical Home and Early Intervention Programs* (AAP, available at http://www.tapartnership.org/docs/200808_linkingAligning.pdf)

Insurance Portability and Accountability Act (HIPAA), and health-related and other information inside the educational system is protected under the Family Educational Rights and Privacy Act (FERPA), it is necessary to secure written permissions from the family for exchanges of the child or family's personal and/or health information between health-related providers and educational providers (Gibbs et al., 2012). All communications among EI/ECSE and other providers should follow the guidelines of HIPAA and FERPA as applicable. A partial listing of forms available online is provided in the Resources section at the end of this chapter.

The new federal interagency initiative *Birth to 5: Watch Me Thrive!* (U.S. Department of Health and Human Services and U.S. Department of Education, 2014) emphasizes using a systematic approach to communication. Many communities have formalized their approach to inter-provider communications by creating systems, either electronic or paper to enhance the team approach to supporting health, social, and educational needs of children. The *Birth to 5: Watch Me Thrive! Toolkit* provides practical steps to improve consistency of care across professions (U.S. Department of Health and Human Services and U.S. Department of Education, 2014). Although the infrastructure for effective electronic communications is still developing, there are other communication strategies that may be useful in the interim. Borrowing inspiration from the Integrated Health Care Model (Tierney, Leigh, & Strickland, n.d.), some strategies and principles for communication that apply also to the collaboration among EI/ECSE providers and PCMH providers are listed in Table 22.5.

Parents can play a vital role in communicating between and among various health, developmental, and early education providers. When parents are mediating the communication between EI/ECES and PCMH, there are some helpful strategies for families to use. The following suggestions were derived from a series of articles that *E-Parent Magazine* produced in 2007–2008, which were reprinted by the Pennsylvania Medical Home Initiative. The ESP monograph containing all the articles can be downloaded from.

Table 22.5 Communication strategies and principles (how to communicate)

Principle or strategy	Rationale
Make communication family centered	Maintain an atmosphere of mutual respect and active listening to needs of family
Ensure confidentiality is observed	It is important for the child's and family's trust that all partners follow HIPAA and FERPA guidelines and not allow false barriers to be erected
Create structures/ infrastructures for exchange of information	Efficiency can be improved by having systems and expectations in place
Be timely in communicating important information	Potentially critical issues should receive timely attention, so that a child's health or welfare is not compromised by delays
Use technology	Using the highest common level of technology may facilitate migration to improve systems of communication in the future

- Use IEP meeting as an opportunity to determine best communication methods.
- Take note of your child's needs and concerns and include in communications with school or childcare personnel.
- Help your child understand health issues and how those influence his/her school performance and social interactions.
- Prepare yourself and teachers to answer your child's questions about themselves compared to typical peers.
- Learn from your healthcare provider what information is needed to share with the school or childcare.
- Be sure your child's healthcare provider shares appropriate information with school or EI services, including a plan for emergency care.
- Be sure childcare or school staff know signs and symptoms in your child that require medical care.

- If possible, collaborate with your medical home provider to produce a one-page information sheet with important facts and resources in case of medical need for the school or childcare to keep.
- Keep and organize copies of all important documents for your child's medical and school/childcare to include evaluations and plans.
- Be part of a support group or team up with another parent who has similar experiences with disabilities.

Examples of EI, ECSE, and PCMH Collaboration

Across the nation, new initiatives are being created and implemented to improve the communication between healthcare providers and early education specialists. Examples of various strategies and systems that are new or under development are presented in this section.

The National Academy for State Health Policy reported on healthcare system transformation and education policy reform in the state of Oregon. The report *Bridging Health Care and Early Education System Transformations to Achieve Kindergarten Readiness in Oregon* (Hanlon & Heider, 2014) highlights how the alignment of improvements in both healthcare and early education improves the outcomes for children. From the foundations of medical homes, Oregon created a network of Coordinated Care Organizations (CCOs) to enhance quality and contain costs for Medicaid beneficiaries. These are Oregon's version of accountable care organizations. CCOs are charged with and rewarded for reducing health disparities and improving health equity while meeting standards of care developed by Oregon's Pediatric Standards Advisory Committee.

Oregon also created regional Early Learning Hubs that place all children in the state under the guidance of an Early Learning Council. These hubs are funded to increase kindergarten readiness for all children. Hubs also include a health equity component. CCOs and Hubs are aligned to coordinate with each other to promote statewide developmental screening, care coordination, and data collection. The state is working toward a system for online screening and information sharing.

Oregon's Yamhill County is an example of coordination of physical and behavioral health, dental care, and early learning services all by a wellness coordinator. The improved coordination is accomplished by creation of a universal referral form to be used by the medical home for medical follow-up and early learning or community-based referrals. Developmental screening tools have been adopted by and standardized across medical home practices and early learning providers to avoid duplication and ensure coordinated screening and referrals.

In most states, pediatricians, nurse practitioners, physician assistants, and nurses serve as childcare health consultants (CCHC) who work hand in hand with childcare and early education facilities to ensure health and safety practices are in place. These professionals often refer to *Caring for Our Children*, Third Edition, 2011 (*CFOC3)*, for guidance in coordination of care (CFOC3, Standard 1. 6. 0. 1, 2011). Another role of CCHCs is to promote communication between early education specialists and PCMH providers. The implementation of this collaborative approach is exemplified in the following story, provided by a pediatrician in Washington state. Although the focus of this story is not education, it demonstrates how communications among the various disciplines can result in improvements in the well-being of children.

> I have a baby in my practice getting ready to go to childcare at a very well respected center. Unfortunately they do not require their teachers to be up-to-date on their immunizations, and a survey revealed that half did not have pertussis vaccines, and they had no idea about flu. The parents of this fragile child were horrified, but they recruited other parents to contribute money to a fund so that our practice was able to purchase vaccines for the teachers. One of my nurses and I went over and gave vaccines to all who needed/wanted them. Prior to our "on-site shot clinic" we also were able to have a childcare health consultant give an in-service about the importance of pertussis and flu vaccinations for child care providers and gave them credit for their state continuing education

requirements. In the end there was only 1 hold out who did not have the shots. (D. Glassy, personal communication, November 28, 2014).

Resources for Professionals and Parents

The resources in the Appendix A have been selected for each of the three stakeholder types: ECSE and EI providers, healthcare professionals, and parents. The resources were selected for their applicability to implementation of medical home principles. The primary content areas of the resources are identified in the first column of the resource table for quick reference. All the websites given are current as of 2016. Please search on the title or organization mentioned if the provided link has become inoperative.

Conclusion

Early Childhood Special Education providers have the opportunity to improve the life course outcomes of children they serve by practicing early and ongoing collaboration with the child's medical/healthcare home. The medical/healthcare home model promotes the delivery of primary care that is accessible, continuous, comprehensive, family centered, coordinated, compassionate, and culturally effective (American Academy of Pediatrics, 2014). Medical/healthcare home providers are prepared to screen, assess, refer, and coordinate care for children with special healthcare needs, including those with developmental disabilities or delays. Effective coordination of care and interventions for this special population will be inclusive of all providers whether inside the medical/healthcare home, early intervention services, the preschool/childcare center, or the school. We recommend that ECSE providers engage in community collaboration to establish regular communication with medical home partners so that early childhood programs become part of medical home neighborhoods.

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Appendix A: Resources

Content area	Resource	Description
Resources for ECSE and EI providers		
Individualized plan	Regional Resource Center Program (Key principles of early intervention and effective practices: A crosswalk with statements from discipline-specific literature) ectacenter.org/topics/eiservices/natenv_position.asp	A collection of crosswalks in which effective practices in early intervention are supported by statements from discipline-specific literature. Organizations quoted include American Association on Intellectual and Developmental Disabilities (AAIDD), American Academy of Pediatrics (AAP), Division of Early Childhood of the Council for Exceptional Children (DEC), National Association for the Education of Young Children (NAEYC), National Association of School Psychologists (NASP), American Speech-Language-Hearing Association (ASHA), American Occupational Therapy Association (AOTA), and American Physical Therapy Association (APTA). An example of an effective practice in this document is "2. All families, with the necessary supports and resources, can enhance their children's learning and development"
Screening	*Birth to 5: Watch Me Thrive! An early care and education provider's guide for developmental and behavioral screening* https://www.acf.hhs.gov/sites/default/files/ecd/ece_providers_guide_march2014.pdf	This guide walks the ECSE through the rationale and process for developmental screening in children, including choice of screening tools, how to talk to families about screening results, and how to make referrals
Screening	*Birth to 5: Watch Me Thrive! A compendium of screening measures for young children* https://www.acf.hhs.gov/sites/default/files/ecd/screening_compendium_march2014.pdf	This downloadable document discusses the purpose of developmental screening and helps early childhood providers make informed choices on developmental screening tools
Coordination	*Birth to 5: Watch Me Thrive! An early intervention service and early childhood special education provider's guide to support developmental and behavioral screening initiatives* https://www.acf.hhs.gov/sites/default/files/ecd/early_intervention_guide_march2014.pdf	This guide helps ECSE and EI providers in establishing communication and partnerships with healthcare professionals and other specialists
Coordination	http://www.ecels-healthychildcarepa.org/tools/forms	This website, maintained by the Pennsylvania Chapter of the American Academy of Pediatrics, contains forms that are useful for coordinating care and creating care plans for CSHCN in early care and education settings
Coordination	*The early intervention guidebook for families and professionals: Partnering for success* by Bonnie Keilty http://tinyurl.com/q6lwlvt	This link takes you to an excerpt from the book, which expounds upon formation of partnerships between medical home and early intervention providers
Resources for pediatric primary care clinicians		
As early childhood special educator, the resources listed in this section are some you could recommend to the healthcare providers of the children you serve		

(continued)

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Content area	Resource	Description
Individualized plan coordination	*Managing chronic health needs in child care and schools: A quick reference* guide (American Academy of Pediatrics) Spiral-bound—October 1, 2009 or E-book at http://ebooks.aappublications.org/content/managing-chronic-health-needs-in-child-care-and-schools	Resources and strategies for children with special healthcare needs in school and community settings, emphasizing care plans and coordination
Coordination	*Medical home care coordination workbook* http://www.medicalhomeimprovement.org/pdf/MHPracticeBasedCC-Workbook_7-16-07.pdf	Defines and provides a framework, tips, and strategies for family-centered care coordination. Includes quality improvement examples
Screening assessment individualized plan coordination	*Tip sheet—What docs should know about…Part C early intervention program* http://nashp.org/sites/default/files/abcd/abcd.ut.early.intervention.pdf	Briefly explains Part C early interventions and the physician role in identifying children who are eligible
Screening coordination	*Birth to 5: Watch Me Thrive! A primary care provider's guide for developmental and behavioral screening* https://www.acf.hhs.gov/sites/default/files/ecd/pcp_screening_guide_march2014.pdf	Addresses many questions providers may have about screening, selection of tools, informing parents, and surveillance and builds on *Bright Futures* content
Coordination	The medical home and Head Start working together *http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/health/docs/medical-home-hs-working-together.pdf*	This document promotes the idea that school readiness begins with health and encourages medical home professionals to be involved with Head Start and Early Head Start, providing suggestions for provider involvement
Screening assessment individualized plan coordination	The pediatrician's role in development and implementation of an individual education plan (IEP) and/or an Individual family service plan (IFSP) http://pediatrics.aappublications.org/content/104/1/124.full.pdf+html	This article addresses all the functions in the primary care provider's role with children who have developmental delays
Screening assessment individualized plan coordination	*Role of the pediatrician in family-centered early intervention services* http://pediatrics.aappublications.org/content/107/5/1155.full.pdf+html	The AAP's Committee on Children With Disabilities explains the rationale and recommendations for the pediatrician role described in this article
Screening assessment coordination	*Free online training* (Enhancing developmentally oriented primary care (EDOPC)) http://edopc.net/registration.aspx	A website where free instruction on validated screening programs is available, along with related trainings for CME credit. Registration is required
Individualized plan coordination	*Care coordination* (Medical Home Portal) http://www.medicalhomeportal.org/clinical-practice/building-a-medical-home/care-coordination	AAP webpage describing various aspects of care coordination for CSHCN with practical tips
Coordination	*Education & schools (*Medical Home Portal) http://www.medicalhomeportal.org/clinical-practice/education-and-schools	AAP web page developed in collaboration with educators that outlines the communication process between medical home and schools
Coordination	*The early intervention guidebook for families and professionals: Partnering for success* by Bonnie Keilty http://tinyurl.com/q6lwlvt	This link takes you to an excerpt from the book, which expounds upon formation of partnerships between medical home and early intervention providers
Resources for families of children who require special education		

Content area	Resource	Description
Screening coordination	*Birth to 5: Watch Me Thrive—Families* http://www.acf.hhs.gov/programs/ecd/child-health-development/watch-me-thrive/families	Explains the purpose of screening to parents and includes information on an online "developmental screening passport"—a method of tracking and documenting screenings for both parent information and coordination
Screening assessment individualized plan coordination	*The early childhood technical assistance center—For families* (ECTA) http://ectacenter.org/families.sp	Site has multiple resources to help families understand their rights under IDEA and what IDEA actually is. Includes Spanish versions
Parent support (not a category in Table 22.3)	*P2P—parent to parent USA:* http://www.p2pusa.org/p2pusa/sitepages/p2p-home.aspx	Provides peer support for parents of children with special healthcare needs
Finance (not a category in Table 22.3)	*Financing strategies for CYSHCN* (Catalyst Center) http://www.hdwg.org/catalyst/	Helpful financial information for families of children with special healthcare needs
Assessment individualized plan coordination	The IEP Team (Center for Parent Information and Resources) http://www.parentcenterhub.org/repository/iep-team/	Explains IEP team concepts with a special section for parents
Assessment individualized plan coordination	The IEP Success Kit http://www.examiner.com/review/the-iep-success-kit-special-needs-resource-review	Complete resource kit for parents preparing for IEP and beyond. Includes questions to ask, forms, and sample letters among many other useful tools
Finance (not a category in Table 22.3)	Early periodic screening diagnosis and treatment (EPSDT) http://mchb.hrsa.gov/epsdt/overview.html	Maternal and child health, under the US Department of Health and Human Services, explains how mandated health-care costs for EPSDT are covered under Medicaid
Coordination	*The early intervention guidebook for families and professionals: Partnering for success* by Bonnie Keilty http://tinyurl.com/q6lwlvt	This link takes you to an excerpt from the book, which expounds upon formation of partnerships between medical home and early intervention providers
Finance (not a category in Table 22.3)	Insurance and waivers information: http://www.hdwg.org/catalyst/	Site explains Medicaid, CHIP, waivers, and other ways of financing costs of care for children with special healthcare needs. Some content is available in Spanish

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Early Childhood Special Education in the Context of School Psychology

23

Laura Lee McIntyre and S. Andrew Garbacz

Introduction

School psychologists promote the academic, social, emotional, and behavioral adjustment of students through collaboration with educators and other professionals, families, and community stakeholders (Merrell, Ervin, & Peackock, 2012). For example, school psychologists may work with individual students or small groups of students to deliver evidence-based instructional supports to promote academic skill development (e.g., Powers, Hagans, & Busse, 2008), social skill acquisition (e.g., Bellini, Peters, Benner, & Hopf, 2007), and social-emotional competence (e.g., Elias & Haynes, 2008). School psychologists may consult with teachers and parents surrounding reducing child problem behavior and enhancing family-school partnerships (e.g., Garbacz et al., 2008) and consult with teachers on meeting students' individualized education program objectives (e.g., Ruble, Dalrymple, & McGrew, 2011). School psychologists might work with teachers to design and implement progress monitoring systems to track important student educational outcomes (e.g., McConnell & Missall, 2008; Shapiro, 2008). School psychologists might even function like case managers and coordinate services for students across home, school, and community settings (NASP, 2008).

Indeed, school psychologists are well versed in a number of intervention approaches to promote positive educational and developmental outcomes for students. School psychologists intervene both at the student level and systems level to promote positive change in student educational outcomes. Such change comes through the assessment, intervention implementation, and progress monitoring of important outcomes for students, schools, and other systems (e.g., Sugai & Horner, 2006). School psychologists might work with individual children, families, or teachers or may take more of a school-wide systems approach of prevention whereby they assist with the implementation of universal/Tier I, targeted/Tier II, and intensive/Tier III interventions for students (e.g., VanDerHeyden & Snyder, 2006).

Although school psychologists work to enhance important educational outcomes for students, their scope of practice is often limited to K-12 settings. Within the last decade, however, the role of school psychologists has been expanding to include early childhood contexts, including early childhood special education (Hojnoski & Missall, 2006; NASP, 2009). Below we describe roles and functions of school psychologists within early childhood contexts. In particular, we describe a tiered systems framework to

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enhance the service delivery of school psychological services followed by a description of assessment, consultation, intervention, family support, and kindergarten transition activities school psychologists may play a central role in within early childhood education contexts.

Tiered Systems of Support

Applying a public health model (Biglan, 1995) to school-based prevention and intervention programs (Dishion & Kavanagh, 2003; Metzler, Biglan, Rusby, & Sprague, 2001) can increase the relevance and efficiency of early childhood services by tailoring services to children and families based on their individual needs (Sugai & Horner, 2002). In school psychology, tiered models of service delivery based on a public health approach are increasingly common (Horner, 2013). Tiered academic and behavior support frameworks are predicated on the notion that a child's performance must be considered in terms of the environmental ecologies that support (or do not support) their success (Gutkin, 2012). When tiered school-based frameworks are implemented to criterion, academic achievement increases (Horner et al., 2009), suspensions and office discipline referrals decrease (Bradshaw, Mitchell, & Leaf, 2010), and organizational health improves (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008; Horner et al., 2009).

A public health approach to early childhood service delivery is frequently operationalized across a three-tier framework. Tier I services are available to all children and families in a community and might include systems-level approaches to support positive parenting and children's language development, school readiness, and social-emotional well-being (e.g., access to parenting materials, clear expectations for student behavior; Horner et al., 2009; Stormshak & Dishion, 2009). At Tier II, specialized services are delivered to children and families who may benefit from targeted support in specific areas (e.g., workshops focused on enhancing caregiver-child interactions). Tier III services are provided to children and families who are in need of individualized supports. Tier III approaches may include conjoint meetings with an early childhood professional, caregiver, and school psychologist to identify specific areas of need and develop and implement strategies to address those needs (McIntyre & Phaneuf, 2007; Sheridan & Kratochwill, 2008).

School psychologists are involved in designing, implementing, and monitoring tiered frameworks in early childhood. At Tier I, a school psychologist may serve on an administrative leadership team tasked with (a) developing and monitoring program-wide policies and (b) screening all children in an early childhood program to identify those who have unmet needs. School psychologists' skills in data-based decision-making will facilitate their use of screening data to link children and families with specialized services based on their level of need. Within Tier II, school psychologists may provide training and ongoing coaching to early childhood professionals who are delivering empirically supported group-based interventions. School psychologists will facilitate monitoring child and family progress in Tier II services to make decisions about future programming. For children and families in need of individualized support, at Tier III school psychologists may serve as consultants to families to conduct thorough assessments of environmental ecologies and provide tailored intervention options based on their strengths and needs (Dishion et al., 2008).

Assessment

A primary role of school psychologists is assessment of students, both for special education eligibility determination (e.g., Merrell, Ervin, & Peackock, 2012) and in a problem-solving context for intervention development and progress monitoring purposes (e.g., VanDerHeyden & Snyder, 2006). In terms of eligibility determination, school psychologists play a central role in selecting culturally and developmentally appropriate assessment tools for use with young children with or at risk for disabilities. School psychologists are trained in the appropriate use

of standardized instruments for assessing a range of developmental domains (e.g., cognitive skills, language, motor, social-emotional skills, adaptive behavior), academic skills, and school readiness (NASP, 2009). Further, school psychologists work with other professionals and family and community members to gather information relevant to consider for eligibility decisions. School psychologists in early childhood special education work closely with early intervention professionals to evaluate a toddler who is transitioning from Part C early intervention services to early childhood special education. School psychologists in early childhood settings will work with multidisciplinary team members to screen and conduct evaluations for young children with or at risk for developmental delays and disabilities. School psychologists select assessment instruments that have sound psychometric properties and are developmentally appropriate and culturally relevant. In identifying assessment tools, school psychologists partner with families and other professionals to identify family priorities and goals to target for interventions (NASP, 2009).

Beyond assessment for special education eligibility determination, school psychologists conduct assessments that can directly inform intervention development. Such assessments are said to have treatment utility (Hayes, Nelson, & Jarrett, 1987). For example, school psychologists conduct functional behavioral assessments (FBAs) to better understand the contextual variables influencing the occurrence of a young child's problem behavior. Assessing behavior problems in early childhood is important, given how common challenging behavior is among preschool-aged children with and without disabilities (McIntyre, Blacher, & Baker, 2006). Although prevalence estimates vary, it is suggested that approximately 1 in 5 young children experiences significant emotional or behavioral problems during early childhood (Brauner & Stephens, 2006; Egger & Angold, 2006; Gardner & Shaw, 2008). While many children seemingly outgrow these difficulties, some go on to exhibit severe behavior disorders or mental health problems, suggesting a high level of continuity of behaviors (Dodge, Greenberg, & Malone, 2008). It is estimated that half of children exhibiting heightened disruptive behavior at preschool continue to show these problems at school age (Campbell, Shaw, & Gilliom, 2000). Given that young children may exhibit a number of behavior problems making them at risk for later academic adjustment issues, early assessment and prevention-focused intervention are crucial.

School psychologists use FBAs to consider information from a variety of sources in an effort to determine the purpose of the problem behavior and develop a behavior support plan. FBA is a process of understanding behavior in the context in which it is observed. In so doing, FBAs guide the development of positive behavioral interventions that are relevant, effective, and efficient (Sugai et al., 2000). FBA is a systematic approach for obtaining information about the variables that set the occasion for the occurrence (or nonoccurrence) of problem behaviors and the consequences that maintain those behaviors (O'Neill et al., 1997). This information can be used to determine the function or purpose of the problem behavior(s). A major implication in extending FBA to early childhood is to have a better understanding of the relevant ecological contexts in which the child functions (Neilsen & McEvoy, 2004). In early childhood, these contexts primarily include homes, childcare programs, and preschools. Parent input is critical given their knowledge of their child's functioning across time and across situations. Further, parents may play important roles in the assessment and positive behavioral supports for their children (e.g., Fox, Clarke, & Dunlap, 2013). School psychologists might lead the FBA efforts and work to partner with school-based professionals and family members to develop interventions that are sensitive to stakeholder priorities and promote positive outcomes for children and caregivers. School psychologists use assessment data to guide the intervention development efforts and then monitor progress on key outcomes to ensure that adequate progress is being made (e.g., Barnett et al., 2006).

Consultation

To promote young children's social-emotional capacities, language development, and school readiness, it is critical to establish synergistic, cross-system programs that actively engage key stakeholders in children's lives. Such programs are firmly rooted in ecological theory (Bronfenbrenner, 1977) by integrating not only a child's key microsystems (e.g., home, school) but also the interactions and transactions among those microsystems. Procedurally, this approach has been operationalized in two early childhood consultation models: conjoint behavioral consultation (CBC; Sheridan & Kratochwill, 2008) and the Getting Ready intervention (Sheridan, Knoche, Kupzyk, Edwards, & Marvin, 2011). Each approach has unique strengths, with a shared goal of supporting young children's success by building capacities within their caregivers and teachers. School psychologists can serve as CBC consultants or Getting Ready coaches. In the sections that follow, we describe CBC and the Getting Ready intervention, research findings for each model, and the roles school psychologists may embody within each approach.

Conjoint behavioral consultation. CBC is a strength-based, partnership-centered (Garbacz et al., 2008) model based on ecological and behavioral theories. CBC consultants bring a child's primary caregiver(s) together with the child's early childhood professional/teacher to address concerns and promote social-emotional capacities. CBC has been identified as an exemplar model of early childhood consultation (Sheridan, Clarke, & Ihlo, 2012). Whereas other models of early childhood consultation may focus consultation on either the caregiver (McCollum & Yates, 1994) or teacher (Pianta, Mashburn, Downer, Hamre, & Justice, 2008), CBC brings both parties together to collaboratively build a strong foundation to support a child's success. CBC is operationalized through a series of conjoint meetings wherein a consultant meets together with a caregiver and teacher to (a) identify strengths and needs, (b) create and implement cross-system intervention plans to support children, and (c) examine the effectiveness of the intervention plans to determine next steps. In CBC, caregivers and teachers are primarily responsible for implementing the collaboratively developed intervention plans in homes and schools. However, CBC consultants serve as coaches in homes and schools to support caregivers and teachers as they implement intervention plans.

Research support for CBC is derived from single-case experimental studies (Colton & Sheridan, 1998; Sheridan, Kratochwill, & Elliott, 1990), randomized controlled trials (Power et al., 2012; Sheridan et al., 2012; Sheridan, Ryoo, Garbacz, Kunz, & Chumney, 2013) with school-age populations, and quasi-experimental studies, including in early childhood settings (Sheridan, Clarke, Knoche, & Edwards, 2006). Findings consistently reveal positive outcomes for children, caregivers, and teachers. In particular, participation in CBC is associated with increases in child adaptive skills and social-emotional competencies (Sheridan, Bovaird et al., 2012) and decreases in problem behavior (Sheridan et al., 2013). School psychologists, parents, and teachers frequently rate CBC as highly acceptable (Freer & Watson, 1999; Sheridan & Steck, 1995).

School psychologists bring an important set of skills and competencies to their role as a CBC consultant. School psychologists have foundational competencies in ecological and behavioral approaches, as well as skills in data-based decision-making within tiered service delivery paradigms. As CBC consultants, school psychologists work with caregivers and teachers to assess the family and school system ecologies to develop and evaluate robust intervention plans that simultaneously (a) build caregiver and teacher problem-solving capacities and (b) promote children's academic success and social-emotional well-being (Sheridan, Clarke et al., 2012).

The Getting Ready intervention. Similar to CBC, the Getting Ready intervention (Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010) is strength based, grounded in ecological theory, and integrative. The Getting Ready intervention is built on strengths of CBC (Sheridan & Kratochwill, 2008) and triadic consultation

(McCollum & Yates, 1994) that are particularly relevant for families of children birth to 5 years (Knoche et al., 2012). CBC brings a collaborative style and focus; triadic consultation sets the stage for caregiver-child-professional interactions aimed at enhancing caregiver warmth and supporting child autonomy (McCollum, Gooler, Appl, & Yates, 2001; Sheridan et al., 2011). The Getting Ready intervention is designed to be integrated in early childhood programs, such as Early Head Start and Head Start. Early childhood professionals use several Getting Ready intervention strategies during home visits and regular family activities at community agencies. Thus, the Getting Ready intervention is a lens through which early childhood professionals provide services to families (Knoche et al., 2012). During home visits, early childhood professionals and caregivers share information about the child gleaned through direct observations, identify shared developmental expectations for the child, and determine ways to help the child meet expectations. In addition, early childhood professionals provide caregivers feedback based on caregiver-child interactions observed during the home visit. The Getting Ready intervention also includes ongoing monitoring of the child's development to determine future programming.

Evidence in support of the Getting Ready intervention is strong. Evaluations of the Getting Ready intervention have primarily included randomized controlled trials (Knoche et al., 2012; Sheridan et al., 2010, 2011). Relative to a business-as-usual control group across 2 academic years, children of families in the Getting Ready intervention demonstrate a higher rate of language use, reading, and writing (Sheridan et al., 2011) and improved social-emotional competencies (Sheridan et al., 2010). In addition to positive effects for children, caregivers who participate in the Getting Ready intervention have higher-quality interactions with their child, are more warm and sensitive, and demonstrate better autonomy supportive behaviors (Knoche et al., 2012).

In the Getting Ready intervention, an early childhood professional works directly with caregivers. School psychologists have an important role in training and providing ongoing coaching and feedback in Getting Ready strategies for early childhood professionals. Despite the historical prominence of stand-alone in-service training programs, training alone does not consistently lead to uptake of practices (Garbacz, Lannie, Jeffrey-Pearsall, & Truckenmiller, 2015; Joyce & Showers, 2002). Thus, school psychologists interested in coaching early childhood professionals in the Getting Ready intervention should provide scoped and sequenced face-to-face training with ongoing and consistent formal coaching. Similar to CBC consultants, school psychologists serving as Getting Ready coaches will rely on their training in ecological assessment, data-based decision-making, and collaborative coaching skills to build capacities for caregivers to engage in future problem-solving with their child.

Intervention

Context for intervention in early childhood. Setting the stage for instructional and behavioral interventions in early childhood requires a consideration of three primary factors. First, children's early environments have a substantial influence on their development of academic competencies and social and emotional capacities (Bronfenbrenner, 1977; Hart & Risley, 1995; Rimm-Kaufman & Wanless, 2012). In fact, cross-setting environmental continuity is associated with improved academic outcomes (Crosnoe, Leventhal, Wirth, Pierce, & Pianta, 2010). Thus, a program's prevention or intervention initiatives should acknowledge the influence of these systemic influences by integrating multiple key stakeholders from a child's life and building cross-setting supportive connections to promote their success. The second main factor in setting the stage for intervention is a tiered service delivery framework. The cornerstone of effective instructional and behavioral interventions within a tiered framework is a set of strong Tier I systems (Sugai & Horner, 2002). To maximize the potency of Tier II and III programs, Tier I procedures must be empirically supported and implemented as

designed. Finally, Tier II and III interventions should be derived from multi-method/multisource assessments that yield data, which are used to inform intervention selection and implementation. Then, progress monitoring assessments should be conducted to facilitate data-driven decisions about next steps after initial implementation. In the following sections, we describe key intervention considerations in promoting (a) early literacy and language development and (b) social and emotional learning. We end the section on interventions by describing how school psychologists may be involved in intervention planning within early childhood programs.

Early literacy and language development. The development of early literacy skills and language in young children within a tiered framework focuses first on empirically supported Tier I explicit instruction programs. Explicit instruction is scoped and sequenced, follows a logical order, and is delivered in a consistent fashion (i.e., model, practice, feedback; Archer & Hughes, 2011). Explicit instruction relies on modeling skills, affording opportunities for guided practice, and providing tailored feedback. This procedure may be implemented as part of Tier I systems in Tier II or III interventions.

When designing instructional programs (e.g., explicit instruction) in early childhood, two key areas important to consider are phonological awareness and oral language skills (e.g., vocabulary; Powell & Diamond, 2012). Phonological awareness includes identifying and using word sounds (Phillips, Clancy-Menchetti, & Lonigan, 2008). To develop phonological awareness, children should be provided targeted explicit instruction in phonological skills (Justice, Chow, Capellini, Flanigan, & Colton, 2003; Phillips et al., 2008). Oral language includes understanding and assimilating a set of complex skills, including vocabulary and syntax (Powell & Diamond, 2012). Correct use of vocabulary and modeling of syntax with structured practice opportunities are critical to promote young children's accurate use of those skills (e.g., Huttenlocher, Vasilyeva, & Shimpi, 2004). One curriculum that focuses on the phonological awareness and oral language of preschool and kindergarten children is Ladders to Literacy (Notari-Syverson, O'Connor, & Vadasy, 2007). Ladders to Literacy has been empirically examined and found to produce favorable outcomes in kindergarten children immediately after participation in the intervention (O'Connor, Notari-Syverson, & Vadasy, 1996) and at a 1-year follow-up (O'Connor, Notari-Syverson, & Vadasy, 1998).

Soci al and emotional learning. Social and emotional learning (SEL) programs help children learn basic skills needed to interact appropriately with others and effectively negotiate emotions and challenging situations (Merrell, 2010). Thus, SEL programs build capacities in children for lifelong learning (Zins, Bloodworth, Weissberg, & Walberg, 2004) and have great potential for prevention and early intervention (Merrell, 2010). Interventions that incorporate SEL frequently target several social and emotional capacities, including self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Collaborative for Academic & Social, Emotional Learning [CASEL], 2012). SEL programs may be implemented as a Tier I program-wide approach to service delivery or at Tier II or III as targeted or individualized interventions (Garbacz, Swanger-Gagné, & Sheridan, 2015). By targeting several important capacities in young children, SEL programs build a strong foundation in early childhood by infusing SEL within the core curriculum (Domitrovich, Moore, Thompson, & (with the CASEL Preschool to Elementary School Social & Emotional Learning Assessment Workgroup), 2012) to promote social and emotional capacities as well as early language and literacy (Bierman et al., 2008).

Empirical support for several SEL intervention programs in early childhood is strong (CASEL, 2012; Domitrovich et al., 2012). One early childhood Tier I SEL program with a proven record of improving children's SEL is Preschool PATHS (Promoting Alternative Thinking Strategies; Domitrovich, Greenberg, Kusche, & Cortes, 2005). Preschool PATHS is a teacher-led curriculum that was origi-

nally designed to improve children's social competence and reduce problem behavior (Domitrovich, Cortes, & Greenberg, 2007). The first randomized controlled trial of Preschool PATHS revealed improvements in children's social competence, based on parent and teacher report, and reductions in socially withdrawn behaviors, based on teacher report (Domitrovich et al., 2007). Preschool PATHS has been integrated into a larger intervention, Head Start REDI (Research-based, Developmentally Informed; Bierman et al., 2008). Head Start REDI includes the teacher-led Preschool PATHS curriculum as well as early literacy skills training and materials delivered to families (with the Preschool PATHS caregiver handouts) about strategies to practice with their children. Findings from a randomized controlled trial of Head Start REDI revealed improvements for children in early literacy skills and social-emotional capacities (Bierman et al., 2008).

School psychologists in intervention planning. School psychologists can serve several roles in intervention planning, including selecting, delivering, and monitoring interventions. School psychologists have well-developed research evaluation and assessment skills. Through assessing children's needs and the program's environmental ecologies and partnering with families, school psychologists can assist program staff in selecting an appropriate academic or SEL intervention. Academic and SEL interventions frequently involve multicomponent procedures that are delivered in a scoped and sequenced fashion. School psychologists can provide training and ongoing coaching to teachers who implement the interventions. While implementing interventions, it is critical that the degree to which the intervention is being implemented as designed is closely monitored. Similarly, children's progress should be consistently assessed to determine their responsiveness to the intervention. School psychologists have skills in data-based decision-making that allow them to work with program staff to make decisions about next steps based on (a) how the intervention is implemented and (b) children's progress.

Family Support

School psychologists work with families of young children with disabilities to promote positive outcomes for children. Parents are children's first teachers and, as such, have a powerful influence on the growth and development of their children through sensitive, responsive parent–child interactions (Landry, Smith, & Swank, 2006; Warren & Brady, 2007). School psychologists may support caregivers in the use of developmentally appropriate practices to promote language, emotional and behavioral adjustment, and school readiness. Such parent education may be informal, through individual meetings with parents, or may consist of more formal parent education programs that are offered in family homes, community settings, or early childhood settings. Below we describe two different evidence-based models of parent education that are relevant to the role and function of school psychologists.

Play and Learning Strategies (PALS; Landry et al., 2006). The PALS program is a manualized parent education curriculum delivered by trained parent coaches during 10–12 home visits with primary caregivers and their young children. The program uses video modeling and feedback to teach parents to respond sensitively and contingently to their child's cues. The PALS curriculum emphasizes teaching parents specific parenting target behaviors that are linked to four aspects of responsiveness supported by the literature (i.e., contingent responsiveness, emotional-affective support, support for infant foci of attention, and quality of language input). During weekly home visits, the parent coach (a) asks caregivers to review their experiences across the previous week related to the specific parenting target behavior, (b) introduces the current week's target behavior, (c) watches and discusses a short educational video that depicts a range of caregivers performing the target behavior, (d) videotapes the parent during a childcare situation (e.g., playing, feeding), (e) coaches the parent to critique her behavior and her child's responses during the videotaped sessions, and (f) assists the caregiver to plan ways that she plans to use the target behavior over the coming week (see Landry

et al., 2006; Landry, Smith, Swank, & Guttentag, 2008). Findings from a number of published studies demonstrate the effects of PALS in the promotion of parental responsiveness and young children's development (e.g., social-emotional competence, communication, cognitive competence; Kong & Carta, 2011; Landry et al., 2006, 2008).

Incredible Years parent training (IYPT; Webster-Stratton, 2001). IYPT is an evidence-based parent training program based on principles of operant and social learning theories designed to promote children's social and behavioral competence and reduce problem behavior (Webster-Stratton, 2000). IYPT is designed to be delivered in approximately 12 weekly sessions with a group of 8–12 caregivers. Group leaders use discussion, video modeling, role-playing, and didactics to cover topics in five main areas: use of developmentally appropriate play, praise, rewards, limit setting, and handling challenging behavior. Challenging behavior is reduced through altering negative and coercive parent–child interactions, and developmental outcomes are promoted through the use of positive, responsive parenting practices (Webster-Stratton, 2001). Although IYPT was originally developed for use with typically developing children with or at risk for externalizing behavior problems, the curriculum has been modified for use with families with preschool-aged children with developmental delay (IYPT-DD; McIntyre, 2008a, 2008b). DD modifications include discussing the unique challenges and blessings associated with raising a child with a developmental delay or disability, understanding children's developmental levels and support needs, conducting descriptive FBAs, and developing behavior support plans based on the hypothesized function of the child's challenging behavior (McIntyre, 2008a). A three-tiered model of parent education intervention that increases in intensity based on parental need and responsiveness to intervention has been discussed by McIntyre and Phaneuf (McIntyre & Phaneuf, 2007; Phaneuf & McIntyre, 2011) and shows particular promise for use by school psychologists partnering with families and early childhood educators to promote positive child adjustment. The three tiers of intervention evaluated by Phaneuf and McIntyre (2011) included universally available self-administered reading materials (based on the *Incredible Years: A Trouble-Shooting Guide for Parents of Children Aged 2–8 Years*; Webster-Stratton, 2005), group-based parenting training based on the Incredible Years with DD modifications (IYPT-DD), and individualized video feedback based on the behavioral skills training literature (e.g., Himle, Miltenberger, Gatheridge, & Flessner, 2004) with content covering the IYPT-DD (see also Phaneuf & McIntyre, 2007). Evidence supporting the use of IYPT in children with developmental delay includes reduction of negative parent–child interactions and problem behavior (Kleve et al., 2010; McIntyre, 2008a, 2008b; Phaneuf & McIntyre, 2007, 2011). School psychologists play a critical role as parent educators in promoting positive child and family outcomes.

Kindergarten Transition

The transition to kindergarten is recognized as an important developmental milestone in early childhood (Eckert et al., 2008) particularly given that successful early school experiences have important implications for later school adjustment and achievement (LaParo, Kraft-Sayre, & Pianta, 2003; Rimm-Kaufman & Pianta, 2000; Rimm-Kaufman, Pianta, & Cox, 2000). There are significant changes in kindergarten relative to early education, including the beginning of formalized instruction (Rimm-Kaufman et al., 2000), a de-emphasis on developmental and play-based approaches (Carta, Atwater, Schwartz, & Miller, 1990), and many new social and behavioral demands (Pianta & Kraft-Sayre, 2003; Rimm-Kaufman & Pianta, 2000) that make the transition to kindergarten both an exciting and challenging period of change for children and families. The kindergarten transition has been found to be challenging for children with disabilities given deficits in important adaptive and socio-behavioral competencies (McIntyre et al., 2006).

School psychologists can adopt an ecological and dynamic model of transition (Dynamic Effects Model; Rimm-Kaufman & Pianta,

2000) in which students' transition success is understood to be influenced by a number of child and contextual factors. A key assumption of the dynamic effect model of transition is that within-child variables do not fully explain transition outcomes. The dynamic effect model instead underscores changing contexts and relationships during the transition process. This model describes how connections among the child and various contexts create a dynamic network of relationships that impact children's transition to school in a transactional, reciprocal fashion over time (Rimm-Kaufman & Pianta, 2000). Thus, school psychologists may assist parents and teachers in transition preparation activities to strengthen connections and create flexibility among the social contexts that support the child, often through high-quality communication and contact among families, preschools, and elementary schools. Indeed, best practice recommendations for kindergarten transition programming are characterized by strategies to increase communication between home, preschool, and kindergarten contexts and bring discrepant environments into alignment (e.g., Pianta, Cox, Taylor, & Early, 1999; Pianta & Kraft-Sayre, 2003; Pianta, Kraft-Sayre, Rimm-Kaufman, Gercke, & Higgins, 2001). Beyond conducting assessments necessary for special education eligibility determination in kindergarten, school psychologists may be uniquely positioned to assist early childhood and elementary school staff in developing strategies to enhance kindergarten transition outcomes. Strategies that include communication across systems, using data to inform decisions about interventions for students with disabilities, and monitoring outcomes may be especially beneficial (McIntyre, Eckert, Arbolino, DiGennaro Reed, & Fiese, 2014). Further, school psychologists may be able to assist parents in engaging in practices that promote school readiness for their children and encourage partnerships with educational professionals (McIntyre, Eckert, Fiese, DiGennaro, & Wildenger, 2010).

Summary

In sum, school psychologists are uniquely suited to work with families and educational professionals across early childhood and elementary school contexts to promote the academic, social, emotional, and behavioral adjustment of students. School psychologists are trained in assessment, consultation, intervention development, research methods, and designs to evaluate outcomes and are skilled at working across systems. There is growing evidence that a tiered system of support has promise for early childhood contexts and school psychologists are well positioned to lead the efforts in universal/Tier I, targeted/Tier II, and intensive/Tier III interventions for students. School psychologists possess skills in working with educational professionals and family stakeholders and can implement parent education programs and kindergarten transition supports to promote family engagement and optimal outcomes for students.

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Culture, Ethnicity, and Linguistic Diversity: Implications for Early Childhood Special Education

24

Marci Hanson and Linda Espinosa

Envision five young children in a preschool class, all of whom have similar diagnoses of developmental difficulties that include delays in language, difficulties in self-regulation, and lack of social interaction. Michael attends his Head Start preschool class and also receives home visits from an early childhood specialist who helps his parents develop a structured program at home to enhance his speech and language development and address behavior challenges. The family of Quang does not understand why the recommendation was made for their child to go to "school" (Head Start preschool class), as they believe that *young* children belong at home with their families. The early educators are having difficulty scheduling a meeting with the family of Lupe because the family members do not speak English and work several jobs; their child attends the program but does not appear to understand any of the spoken language and seems to mostly follow others around the classroom and mimic their behaviors. In the case of Kamala, a challenging situation has occurred regarding home visits by the program teachers. When the male early educator went to the family home, he was turned away. Through other service providers, he learns that the family considers it inappropriate for a man to be alone with the mother and grandmother in the home while the father is away at work. The parents of Alma are upset that the early educators require children in the classroom to verbalize and ask for food during snack and lunchtime. They do not feel that young children should be expected to verbally ask for items and have demands made on them to serve themselves at mealtime; at home the parents typically feed the child themselves.

The early educators/early interventionists who work with these children and their families may have extensive training and clinical experiences in the field of developmental disabilities, but they may be unable to effectively implement the evidence-based practices they have been taught. They are in a quandary when they attempt to work with some of these children and their families because of the differences in cultural practices, linguistic preferences, values, and beliefs between the family and those espoused and practiced by the service agency and the educators/interventionists.

Culturally and linguistically sensitive and individually tailored services are essential to the effective delivery of human services. Recognition and respect for the influences of cultural, ethnic, and linguistic diversity across families are important underpinnings for intervention services. In the field of early childhood special education

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(ECSE), these components are particularly crucial given the emphasis on early identification and treatment for the very youngest in our population and the provision of services and support for children within their families' homes and communities. While these values may be widely embraced and even adopted, putting them into practice in ECSE settings demands planned, well-informed, and reflective approaches.

Awareness, appreciation, and adaptation of services to show cultural respect for the diversity of children and families are more important than ever before in human services. The most recent US census in 2010 documented the shifting demographics in the United States, a change also reflected in many parts of the world. Projections for the US population indicate increasing diversity with the non-Hispanic White population expected to peak in numbers by 2024, while the Hispanic and Asian populations are expected to more than double by 2060 (US Census Bureau, 2012). Similarly, the Black population is anticipated to increase over the same period. The use of the term "minority" with respect to racial and ethnic groups is becoming meaningless since no single group will represent a major group in the country by 2043 (US Census Bureau, 2012; Cooper, 2012). This is true in many parts of the country already. For instance, California became the first state in 1989 to have a "majority-minority" school population.

These demographic shifts present both challenges and opportunities for service providers to adapt their practices in order to meet and effectively support the breadth of needs of children and their families. It is the purpose of this chapter to describe considerations related to the diversity of children and families being served and to identify strategies and recommendations for effectively meeting the range of child and family needs.

Diversity of Children and Families in the United States

Children and families differ on many dimensions including cultural, ethnic, and racial identification, immigration status, languages spoken, spiritual beliefs and practices, socioeconomic background, family structures or arrangements, and ability levels to name a few. While individuals may be grouped according to some of these categorizations in order to understand their priorities and needs, it is essential to recognize that there is great variation *within* any categorical grouping of people. All children and families must be included in considerations of "diversity" and not just particular categorical groups such as people of color.

Several dimensions are selected in the discussion that follows to highlight the potential role of these characteristics in service implementation. These dimensions include population demographics of cultural, ethnic, racial, and linguistic characteristics. Differences in families in terms of structure and living arrangements also are considered, as well as the influence of social economic circumstances on families and service delivery.

Cultural, Ethnic, and Linguistic Diversity

The current US population stands at nearly 318 million, and children under age 5 years constitute approximately 6 % of the population (US Census Bureau, 2014). By the most recent 2010 census data (US Census Bureau, 2014), the ethnic/racial distribution of the population is 77.9 % White alone or 63 % White alone not Hispanic/Latino, 13.1 % Black or African-American alone, 5.1 % Asian alone, 1.2 % American Indian/Alaska Native alone, and 0.2 % Native Hawaiian/Pacific Islander alone and 2.4 % identified as two or more races. Nearly 17 % of the population identifies as Hispanic/Latino; for some states, these figures are much higher as in California, for example, over 39 % of population is Latino. Nearly 13 % of the population is foreign born, and in over 20 % of the home individuals over age 5 speak a language other than English at home. Again, in some states, these figures are much higher. In California, for instance, over 27 % are foreign born and over 43 % of families speak a language other than English at home.

According to the latest data reported by the census bureau, nearly 37 % of the population is from an ethnic or racial group identified as a minority. Yet, in five states including the District of Columbia, Hawaii, California, New Mexico, and Texas, the population is a "majority-minority" meaning that greater than 50 % of the population is Black, Latino, Asian, or mixed race. In addition, in 2011, for the first time in American history, non-White newborns rose to over 50 % of births and outnumbered White births (Muskal, 2012).

Children from birth to 17 years accounted for nearly 24 % of the population or 73.7 million in 2012 (Federal Interagency Forum on Child and Family Statistics, 2013). By 2050, about half of the child population is expected to be Hispanic, Asian, or of two or more races. The percentage of children living with at least one foreign-born parent rose to 24 % in 2012 (Federal Interagency Forum on Child and Family Statistics, 2013).

These changing demographic characteristics have implications for education, health care, and social service needs and delivery systems nationwide and underscore the need for services that are culturally and linguistically responsive. Early education/intervention service providers increasingly will need to tailor their services to a range of families whose needs may vary widely from one another.

Family Structure and Living Arrangements

Just as shifts have been noted in the overall population demographics, so too have family living arrangements and structures changed over time with marked regional trends. US census reports using data from the 2012 Current Population Survey and 2011 American Community Survey have noted that the size (average number of people) per American family household has decreased to 2.6 people per household on average (Vespa, Lewis, & Kreider, 2013). Further, the number of *family* households declined and now represents about 66 % of all households. The percentage of stay-at-home mothers also declined during the last recession. The number of families where the householder was living with children but no spouse was at present increased to 18 %. Married couples represented the majority (63 %) of family groups with children under 18 (by ethnic group: 81 % Asian, 80 % White non-Hispanic, 62 % Hispanic, 44 % Black). Approximately 27 % of families are mother-only and 5 % are father-only households. Multigenerational household families consisting of three or more generations make up about 5 % of households (by ethnic group: 3 % White non-Hispanic, 6 % Asian, and 8 % Black or Hispanic). The most common type of multigenerational household included a householder with a child and grandchild. Multigenerational families are more likely (19 %) to be living in poverty. Further, households with at least one unemployed parent rose between 2005 and 2011 to 33 % of households with children who are under 18 years.

Married families were more economically advantaged of all the family groups with children who are under 18 years, and marked regional variations are noted around the country. The economic situation for families and children is affected by family structure, and educators/interventionists must appreciate the stresses and adaptations that families must make to meet family needs.

Economic Circumstances

The economic welfare of children and families has been deteriorating over the last decade. This is of great importance because of the association between vulnerabilities presented by growing up in poverty and affects on child development with respect to health, environmental, educational, and safety factors (Federal Interagency Forum on Child and Family Statistics, 2013; Hanson, 2013; Jiang, Ekono, & Skinner, 2014). Compared with their peers, children living in poverty are more likely to have cognitive, behavioral, and socio-emotional difficulties (Federal Interagency Forum on Child and Family Statistics). Among all

children, approximately 45 % live in low-income families (Jiang et al., 2014). Approximately 22 % of all children ages birth to 17 were living in poverty in 2011, and the poverty rates were much higher for both Black non-Hispanic (39 %) and for Hispanic children (34 %) than they were for White, non-Hispanic children (13 %) (Federal Interagency Forum on Child and Family Statistics). Further, children under age 5 were the most likely to be living in families below the poverty line, and 10 % of children's families had income less than 50 % of the poverty line. Considering that the poverty threshold was $22,811 for a two-parent, two-child family at this time these data were analyzed, the lack of resources for families is startling.

Millions of children also grow up in food-insecure households. The 2011 data revealed that approximately 22 % of all children were living in households classified as food insecure. This food insecurity was particularly true for Black non-Hispanic (46 %) and Hispanic (35 %) households.

Other environmental factors contribute to the exposure to risk for children and their families living in poverty. These include factors such as lack of health care, housing, potential for injury, exposure to violence, and exposure to environmental hazards or contaminants (e.g., lead) in food, water, or the quality of the air. Children are particularly prone to these risks at this crucial time of early development (Federal Interagency Forum on Child and Family Statistics, 2013).

The well-being of children and families, thus, is greatly affected by their economic circumstances. Families are quite diverse with respect to their degree of economic well-being, and this will influence their openness and desire for services as well as the priorities that they place on various services and their abilities to participate. All aspects of a child's development, as well as their future success in school and life, can be influenced by growing up under impoverished conditions (Duncan & Magnuson, 2011; Hanson, 2013). Given the disproportionate representation of children of color in communities living in poverty, these children may face a full gamut of challenges to their health, education, and emotional well-being.

Implications of Diversity for Working with Young Children and Their Families

Individuals differ along many dimensions. These characteristics of diversity may exert a powerful influence upon families' choices and priorities, as well as their abilities to marshal resources to support their family members. If family members are grappling with urgent needs such as finding a job, housing, or adequate food for sustenance, they may be less able to concentrate on implementing activities such as educational programs for the children. Family characteristics and living circumstances will play a pivotal role in determining their availability and responsiveness to intervention services. Practitioners are reminded to look at the whole child within the family context and to consider the range of family circumstances such as their environment, housing, immigration status, and nutrition status when working with families (Doran & Mazur, 2012).

Influence of Cultural Background

Child development theorists have long acknowledged the importance of ecological context in examining and understanding child development (Bronfenbrenner, 1979, 1986, 1999). The concept of the child's "developmental niche" was described by Super and Harkness (1986, 2002); it includes all components of children's "culturally constructed" environments such as the physical and social settings in which children grow and learn, the customs and practices in the care settings, and the parents'/caregivers' views (or ethnotheories) of the child and of child development. Parental cultural beliefs or models or "parental ethnotheories," as termed by Harkness et al. (2010), are manifest implicitly, and though often subtle and taken for granted, they influence how parents raise their children and become members of the family's community. Individual child and family member attributes also, along with other environmental characteristics, play a role in families' goals and expectations for their children, but cultural beliefs or models can exert a powerful influence.

The influence of culture on early child development also has received attention in the developmental research literature. ZERO TO THREE conducted an extensive literature search examining some of these influences (Maschinot, 2008). Studies included those that examined the cultural niches of ethnicity and class. Variables such as parent–child interactional styles and expectations were described as well as the influence of culture on language and cognitive development in young children. Implications for training of early childhood practitioners were discussed in particular because these professionals are often among the first to work with families who are new immigrants or new recipients of services due to risk conditions their children may be experiencing.

A case in point for the impact of culture is the variation in developmental milestones and expectations for young children's development. These factors were studied by Spicer (2010) who employed survey methodology to examine racial and ethnic differences in families' parenting beliefs, understandings of children's milestones, school readiness expectations, and influences on parenting. Survey findings revealed variations among White, African-American, Hispanic/Latino groups, as well as first-time and repeat parents. Different perspectives were noted with respect to parenting behavior such as enforcing rules, comforting the child in distress, talking about feelings, understanding child emotions, and encouraging child persistence. Likewise, differences were found with respect to the skills parents believed were necessary for school readiness (e.g., the ability to play well with others and share, respect for adults, and the ability to sit still and pay attention). Findings, such as these, highlight how culturally laden expectations and assumptions regarding child development can be. Similarly, other studies have noted the differences among family groups with respect to a focus on individualist vs. interdependent belief systems (Trumbull, Rothstein-Fisch, Greenfield, & Quiroz, 2001). For many years, the dominant culture in the United States has emphasized an individualist perspective; early childhood curricula and assessments too have reflected these values in their focus on teaching early independence and "self-help" skills to youngsters (Hanson & Lynch, 2014). This emphasis may be at odds with some cultural groups whose focus is more on the interrelationships among family members, which may foster more dependence than independence in the young child.

The family's cultural and community contexts may affect their abilities to support their child and address challenges that may arise from the child's health or disability concerns. The very nature and understanding of intervention is influenced by cultural values and beliefs. Hanson (2011) identified a number of ways intervention may be influenced by cultural factors; these include attitudes regarding intervention, the intervention methods used and service locations, notions of who provides the services, and the style and communication practices that govern how services are provided. These issues discussed by Hanson are briefly reviewed.

Notions and attitudes about intervention: the "why" of intervention. Different cultures will place different meanings on the presence of a health or disabling condition. For some, this will be viewed as a random event that is accepted; these families may seek or institute interventions to remediate the condition or actively enhance the person's capabilities. For others, the condition could be viewed a neutral event that requires no intervention or notions of change but rather an acceptance of one's fate. Still for others, blame and ill fortune may be associated with the condition; the condition may be understood as a punishment for the behavior of parents or past actions of ancestors. These views about the disability or health condition will affect the family's willingness to seek or participate in educational, health, and other services. Some may actively seek to participate, and for others, the act of being diagnosed or identified and notified about services will be a shaming event.

Intervention methods and location: the "what" of intervention. In the field of ECSE, many services are provided in close partnership with children's parents and family members, and services often occur in the home setting. Again, persons with different cultural backgrounds will vary, based upon

that background, in terms of their comfort and desire for working directly and closely with professionals and having professionals come to their home settings. Some families may see "teaching" as the role of the professional and not that of the parent. They may not understand or expect to work toward a young child's independence in areas like feeding or toileting or speaking up, since those goals are not stressed in their native countries or their own personal families. The potential for clashes exists between the agenda of most educational service providers and that of the family. This will necessitate that both parties learn about the other's concerns and priorities. For families that are new immigrants to the country, many of the services and supports that are offered in the United States can be mysterious and foreign, and these families may face a steep learning curve when their children are referred or immersed in educational, health, and social services.

Service providers: the "who" of intervention. A range of professional disciplines provides services in early intervention/ECSE. Specially trained service providers may include early special educators, psychologists, occupational and physical therapists, speech and language pathologists, and so on. In many cultures, parents and family members will turn to elders and spiritual leaders in their group for questions and support regarding the condition of a young child rather than to the more formal services of a professional who is outside the family. Hence, when they are faced with this service delivery system, they do not feel comfortable seeking help outside their family or community group. Gender also may play a role in service delivery. Especially for home visits, gender roles may influence service practices. Family members, for instance, may deem it inappropriate for male staff members to be alone in the home with the child's mother; likewise some cultural groups may feel that it is inadvisable for females to venture forth into family homes alone or unaccompanied in their roles as EI/ECSE providers. Gender roles vary considerably by culture and may influence how the service delivery should be implemented and by whom to meet the preferences of families.

Styles of interaction and communication: the "how" of intervention. The most crucial variable is likely to be the way in which services are provided. Cultural prerogatives are heavily embedded in communication and interaction customs and preferences. Expectations and preferences may vary widely across cultures from family members that prefer direct and verbal communications to those that feel more comfortable with indirect communication that occurs only after a trusting relationship has been established with the service provider.

Information exchange may need to be provided in many different forms and with the assistance of an interpreter, translator, or cultural guide to ensure that the verbal, e-mail, or written communication is appropriate and accessible. Some family members want frequent and direct contact, whereas others will need time to mull over recommendations or findings and prefer not to talk about it directly. Language skills and reading levels of family members must be considered in all intervention services. Family members may not understand or be able to access information due to language or literacy levels, but they may be reluctant to admit to these difficulties. Communication issues encompass the style of greeting, type of dress, seating arrangement, ways in which information is gathered (i.e., conversation vs. questionnaire or interview), and how goals are established. Effective working relationships between service providers and family members must take into account these many issues long before specific teaching or intervention practices are discussed.

Our cultural perspectives are ingrained in everything we do. Though our cultural background shapes our beliefs and practices, we may not be conscious of this influence. Rather certain goals and ways of interacting will be considered more or less "correct" or "comfortable" than others. Most service providers in early childhood special education, as well as other professions, are taught prescribed methods for implementing educational and intervention techniques based on evidence-based practices. In order to be culturally responsive and respectful, procedures may have to be individually tailored to address the

specific child and family needs including the routines, practices, and goals that the family deems most appropriate. These factors all are highly influenced by cultural perspectives and living experiences.

Recommendations and Strategies to Enhance Practice: Becoming a Reflective, Responsive Practitioner

All work in human services requires careful tailoring of interventions to address the specific needs of the individual for whom the services are provided. ECSE/EI is no exception and may be especially challenging because of the range of individuals (children and families) being served, the variation in service environments (such as home, clinic, school, child care), and the vast array of needs children may have in the education, health, and social service realms. The following discussion highlights some strategies to help practitioners become more responsive to child and family needs.

Self-Awareness and Reflection

It all starts with self-awareness and self-reflection. Service providers are encouraged to reflect on their own personal style of interaction and be conscious of their own cultural values and beliefs. They might ponder questions such as: What were the expectations in your family for how children were raised? For instance, do you believe that young children should develop self-help and independence skills early on or do you think this comes later only after a prolonged period of dependence on their family and caregivers? Should young children "speak up" and participate in family decisions or is it more appropriate for them to be "seen and not heard?" It can be useful to pose questions such as these and make notations in a diary or journal to reflect on cultural values and determine if the service provider's goals and perspectives are different from those of the family with whom they are working.

Getting to Know Family Members' Individual Perspectives and Beliefs

Early educators/interventionists will find it useful to ask the family members to tell about their child and describe a typical day in the life of the child and family. Questions and conversations that include the following questions may be useful: What are family members' hopes and dreams for their child? What are the child's strengths? What do they consider the most pressing issue or major goal for the child? What are their expectations and concerns, as well as their priorities? Do they have suggestions or resources (like grandparents, neighbors, spiritual groups) that could be helpful to them? Getting to know families will be enhanced when Educators/interventionists are communicating a genuine interest in the family's perspective and respect for their choices and values.

Gathering Information on the Family Members' Values, Beliefs, and Expectations

Being culturally responsive entails being flexible and respectful of the different preferences for sharing information and communicating that families have. For some families, an informal interview may be the best method, and they may appreciate being asked directly to describe their concerns and priorities regarding their child. For other families, a more indirect style will be more effective and they may choose to convey their issues by telling stories about their family or community. Oftentimes a cultural guide, such as a visiting nurse, healer, spiritual leader, elder, and community leader who knows the family well and works within their community, may help bridge the communication between the educator or interventionist and the family; these "guides" may be able to translate service concepts and practices not just words. It is often constructive for professionals to ask families to walk through a "typical day in the life of their child" and also describe their hopes and dreams for their child. It is also crucial to learn what expectations families have for young children this age and for children

with disabilities (e.g., to be able to feed themselves, independently toilet, be polite, socialize, and rely mainly on their caregivers).

Useful strategies for communicating with families who come from diverse backgrounds and perspectives can be found in Barrera, Kramer, and Macpherson (2012) and Halgunseth, Jia, and Barbarin (2013). Practitioners also may wish to learn about the customs and beliefs of the diverse cultural groups that they serve. Lynch (2011) suggests a variety of methods for enhancing one's cross-cultural knowledge base such as learning from books, the arts, and technology, talking and socializing with other individuals from that culture that can guide and mediate your learning, participating in the daily life practices of individuals from another culture, and learning the language of another culture. Family members too may help identify people in their communities that can provide assistance and information. Note that these suggestions move far beyond having an individual who is able to interpret or translate what the family is saying. It requires truly developing an understanding and appreciation for cultural differences in perspectives, values, and beliefs.

Establishing Collaborative Relationships and Partnerships with Family Members

The relationship between a professional and the family begins at the first point of contact and continues throughout the identification, assessment, and intervention processes in early education/intervention. These are times often fraught with anxiety for families as they learn about developmental difficulties or identify concerns about their children. For many families, the practice of special education or early intervention will represent a new concept especially for a very young child. Suggestions for establishing meaningful communication and collaboration with families are provided in Hanson (2013). Culturally respectful and sensitive communication will require that families have access to information and can understand what the educator/interventionist is trying to convey. This will necessitate the effective and respectful use of interpreters and translators. It will also involve using methods that are culturally comfortable for families (e.g., interviews, observations, meeting with other families who are in a similar position) and allowing families the time they need to process and understand the information such as screenings and assessments. Families must be active participants in identifying their concerns and priorities for their children and setting the goals.

Specific concerns and goals related to the assessment processes also are discussed in detail in Hanson and Lynch (2014).

In some instances, cultural or style differences may mean that a clash comes to the fore between the goals of the service provider and that of the family. In these circumstances, it will be useful to "bring alternative perspectives to the table" and encourage an open dialogue. For instance, some families may not feel that it is important for very young children to go into group care or preschool settings; they may not think that young children need to learn to sit still or learn their letters. On the other hand, some families may insist that their children master academic skills early on to enable them to do well in school. Regardless, the goals of the family and service provider may not always be in sync. It will require careful negotiation, listening skills, and effective communication on all sides. Educators will need to provide information to families on service options, curricular goals, and services available and why those are being offered. They must also listen carefully to families to identify family priorities for their children and why this is important to their family and community. Some families will have experienced a long history of discrimination or lack of resources that may have an impact on their willingness and abilities to participate in services. The *power* in the interaction is often imbalanced in that service providers hold the keys to services the family needs for their children and they often call the meetings and articulate the goals. Early educators and interventionists must recognize these power issues and strive to acknowledge families' contributions by ensuring

their comfort and access to participation. These approaches will help family members to experience more personal efficacy and control or empowerment in the early intervention process.

Recognizing the Continuum of Values and Beliefs and Changing Nature of Culture

While it can be useful to identify and learn about the ethnic or cultural group with which the family member identifies, it is important not to rely on stereotypes or generalizations. While particular groups of people may hold many customs, preferences, and practices in common, it is also true that wide variation exists. Radical differences in perspective may be found even among family members regarding the young child's development and priorities. Particularly when families are new immigrants, the family is undergoing rapid change and learning experiences. The elders may be more tied to traditional notions of caregiving in their country of origin, for instance. This may contrast with the experiences and views of the children as they enter the school system and participate in American culture and life.

Likewise these cultural beliefs and values are best understood as a continuum of orientations rather than a rigid set of notions. As previously discussed, some families place priorities on their children achieving independence, whereas others prefer a prolonged period of dependence where the parents feed the child, sleep with the child, and provide close and daily nurturance. Some families may choose the latest technological advance for their child in terms of educational experiences or health treatments, while others may rely on more traditional sources of support. Family members also may emphasize more traditional approaches in one facet of life but opt for new experiences in another aspect. For instance, a family might rely on more traditional approaches to health and healing such as the use of herbs and spiritual healers as opposed to Western approaches to medicine. However, they may openly embrace opportunities for the children to participate in group care and early education programs. When service providers can appreciate the range of possibilities and not view family preferences as "right" or "wrong," a more effective working relationship can be achieved in the early education/intervention setting.

Growth of Linguistic Diversity in Early Childhood Special Education

In addition to cultural, ethnic, and economic diversity, linguistic diversity has become quite common in ECSE programs. Children growing up in households where a language other than English is spoken and are acquiring English as a second language make up the fastest-growing segment of the US population nationwide. In 2012, more than 25 % of all young children under the age of six had a parent who speaks a language other than English, and approximately 15 % have at least one parent who is limited English proficient (Castro & Espinosa, 2014). The number of these children in public schools has increased to 150 % in the last 20 years, while the student population has increased by only 20 % (Goldenberg & Coleman, 2010). Preschoolers with a home language other than English have unique learning needs, since they are still developing the basics of oral language in their home language even as they begin to learn a second language, English. Therefore, many ECSE programs choose to use the term dual language learners (DLLs) to describe young children who are learning English while also developing proficiency in their native language (Severns, 2012).

In 2011, 59 % of the children served in Head Start programs were from racial or ethnic minority families; 37 % of them were of Hispanic/Latino origin and around 30 % were dual language learners (Office of Head Start, 2011). Among the youngest DLLs, 26 % of children in Early Head Start in 2009 came from homes in which a language other than English was spoken (Administration for Children and Families [ACF], 2013). Despite great diversity of language backgrounds for families speaking a language(s) other than English in the home (more than 140 distinct

language groups are represented in Head Start programs), the vast majority of DLL infants and toddlers come from a home where Spanish is spoken. For instance, among DLL 1-year-olds served in Early Head Start programs in 2009, 91 % were from Spanish-speaking homes (ACF, 2013).

Screening, Identification, and Assessment of Young Dual Language Learners

An important question for ECSE service providers is whether they are accurately identifying all those young DLLs who have special needs and would benefit from early intervention services. Current demographics when compared with service rates suggest that young Latinos with disabilities frequently are not identified, while those older English learners (ELs; this term is commonly used in the K–12 grades for children who speak a language other than English at home and are not fully proficient in English) are overrepresented in special education (National Center for Education Statistics, 2007; Rueda & Windmueller, 2006). While Latinos' ages birth to five represent more than 15 % of the total population, among the birth-to-three population, only about 2 % of Latinos receive intervention services; the percentage increases to almost 9 % for preschoolers which is still short of the estimated need. Conversely, by fifth grade, ELs are more likely than the general population to be identified as needing special services, and this trend continues throughout the school years (Rueda & Windmueller, 2006). These uneven and fluctuating service rates demonstrate a need for more consistent definitions and eligibility criteria of DLLs and ELs across the grades, as well as improved methods for identifying those DLLs who may need special services.

Typically, the initial identification process includes brief standardized developmental screenings that are administered to large numbers of children to determine if there is a potential problem and if referral for more in-depth assessment is warranted. The use of culturally and linguistically appropriate screening tools and procedures is a challenge when screenings are conducted with young DLLs. Most standardized screening tools have not been designed or normed for young bilingual children and have serious limitations when used with young DLLs. Most teachers and assessment professionals have not been trained to conduct unbiased assessments with children from culturally and linguistically diverse backgrounds; many of them do not speak the child's native language and are not familiar with the home culture; and many teachers lack knowledge of the psychometric characteristics of tests and therefore cannot make informed judgments about the appropriateness of specific tests when their students are from linguistically diverse backgrounds (Espinosa & Garcia, 2013; Sanchez & Brisk, 2004).

In addition, it is critical for ECSE service providers to understand DLLs' level of proficiency and progress over time in both of their languages. Becoming proficient in a language is a complex and challenging process that takes many years for children of all ages (Hakuta, Bialystok, & Wiley, 2003). As with any type of learning, children will vary enormously in the rate at which they learn languages. The speed of language acquisition depends on factors both within the child and in the child's learning environment. The child's personality, aptitude for languages, interest, and motivation interact with the quantity and quality of language inputs and opportunities for use to influence the rate and eventual fluency levels. As children acquire a second language, one language may be more dominant because they use that language more often than the other at a particular point in time. If children are assessed only in their least proficient language, their abilities will be underestimated.

Frequently, children demonstrate a language imbalance as they progress toward bilingualism. Most DLLs will have different skills in each language. By conducting assessments in both languages, information about what the child knows and is able to do in each language will be needed to make crucial educational decisions. If a child has a language delay/disorder, it will show up in each language. Depending on experiences and learning opportunities, children may not perform

as well as native speakers of each language in all domains. This is a normal and, most often, a temporary phase of emergent bilingualism (Paradis, Genesee, & Crago, 2011). It is possible to misinterpret normal aspects of dual language development with language delays. Therefore, ECSE assessors need to be able to distinguish between language differences attributable to growing up with two languages and language delays, which may require specialized language interventions (Espinosa & Lopez, 2007). For all of these reasons, it is important for assessors to employ multiple measures and sources of information, consult with a multidisciplinary team that includes bilingual experts, collect information over time, and include family members as informants when screening and identifying young DLLs who may need special services (Barrueco, López, Ong, & Lozano, 2012; Espinosa & Lopez, 2007).

Research on Young DLLs with Special Needs

Although current empirical studies focused on young DLLs with special needs are not plentiful and extremely heterogeneous given differences in target populations, research designs, and focus of investigations, there are some crosscutting findings that can help to guide ECSE service providers who work with DLLs. For example, there is no evidence that children who are learning two languages take twice as long to achieve language benchmarks when compared to children learning one language. In learning the second language, children apply universal language learning skills that they acquire from learning their home language. In other words, the findings of the available studies suggest that when a young child learns a second language, linguistic knowledge gained from the first language facilitates acquisition of the second language and the two languages interact; the second language is not learned in isolation or separately from the first language (Chen & Gutierrez-Clellan, 2013).

Across multiple categories of disabilities, young DLLs in the United States have been shown to benefit when intervention services support the development of both their languages. The most recent research on DLL children with language disorders, autism spectrum disorders (ASD), intellectual disabilities, and cochlear implants has found that DLL children with special needs are fully capable of learning two languages during the early childhood years and that many aspects of their development are enhanced when bilingualism is supported (Chen & Gutierrez-Clellan, 2013).

Despite concern that dual language input will confuse or delay the language acquisition of young children with special needs, emerging research indicates that these children can successfully learn more than one language. Although many ECSE professionals mistakenly recommend that DLL children with special needs should be exposed to a single language—English—to promote English proficiency and later academic success, there is no evidence that limiting these children to one language will decrease language difficulties or that dual language learning will increase language delays (Kohnert & Medina, 2009). In fact, the available evidence consistently provides support for home language maintenance and bilingual development of young children with special needs.

Spanish-speaking DLL children with language disorders have been shown to learn English at comparable rates as monolingual native English speakers (Gutiérrez-Clellen, Simon-Cereijido, & Wagner, 2008); the fact that they were speaking two languages did not delay their progress in English language development (ELD). Across multiple studies that have included different language pairings (i.e., Spanish-English, French-English, Dutch-Turkish), there is no evidence that being bilingual is related to delays in second language acquisition. The different rates in second language acquisition are better explained by the amount and quality of second language exposure as well as opportunities to use and practice the second language in meaningful contexts rather than the fact that these children with language delay disorders are dual language learners (Chen & Gutierrez-Clellan, 2013).

Young DLL children diagnosed with ASD have a variety of social, speech, and language delays. For these children as well, being bilingual does not appear to negatively impact their language acquisition or impede their overall development (Ohashi et al., 2012). Across many studies of young DLLs with ASD, researchers have emphasized the importance of considering family culture and values and identifying ways for the child to be included in the family and community. Findings also suggest that children with ASD and severe language and cognitive delays can learn two or more languages successfully. Further, family members have expressed that they more frequently interact with their young children when they are encouraged to continue to use their home language. Therefore, research findings suggest that speaking the home language facilitates social interactions and in turn language and social development. Children's participation in everyday interactions with their families provides them with various social situations that build understanding of how to interact with others and how to practice communication skills (Hambly & Fombonne, 2012). On the other hand, limiting the home language may have negative influences on the social and language development of children with ASD.

Similarly, studies of DLL children with intellectual disabilities, although limited in number, consistently show that they can learn two languages and that the language development of bilingual children in their dominant language will be similar to monolingual children with intellectual disabilities when matched for developmental level (Feltmate & Kay-Raining Bird, 2008). In US and Canadian studies, findings indicate that bilingual children with Down syndrome developed syntactically and semantically in both languages equally, although they also exhibited challenges especially in expressive language skills in both languages (Chen & Gutierrez-Clellan, 2013). These findings suggest that dual language learning does not affect the process of English language acquisition of children with intellectual disabilities in English-dominant or balanced bilingual children.

DLL children with cochlear implants have been studied in the United States, Australia, Germany, and Canada. Most of the children included in these investigations were profoundly deaf, and many were exposed to more than one language in the home; all received implants before 36–38 months of age. Although the findings have been somewhat mixed, most have found that children with cochlear implants can develop two spoken languages when the home language is different from the language used by teachers and therapists (Guiberson, 2005; Thomas, El-Kashlan, & Zwolan, 2008). Thus, families of children who are deaf and who attend oral programs should be advised to continue to use their native language in the home even when the language of intervention is English.

In addition, findings of these studies consistently indicate the positive benefits of using a bilingual intervention approach to facilitate children's language development. For example, research with 5- and 6-year-olds showed that Latino children made more gains in their learning of novel English words when these words were first introduced in the home language (Spanish) compared to when the words were directly presented in the second language (English) (Kiernan & Swisher, 1990; Perozzi, 1985; Perozzi & Sanchez, 1992). Further, current research with preschool Latino children with language disorders, particularly those with more severe language delays, indicates that a bilingual intervention may induce a faster rate of acquisition of the second language. In a recent randomized controlled trial (Gutiérrez-Clellen, Simon-Cereijido, & Sweet, 2012), 188 Latino preschoolers with specific language impairment (SLI) and minimal or limited English skills were sampled from 60 preschool classrooms in 14 schools in southern California and Arizona. For the children with severe language disorders, the bilingual intervention was more beneficial than the English-only intervention. These children showed faster growth in English than their peers with severe delays in the English-only program. This finding is in direct contrast with a recommendation that children who have severe language disabilities

should receive interventions only in English. Children with severe delays are capable of learning two languages. In fact, they learn a second language faster when the intervention is provided in both languages compared to only in English.

Thus, recent research findings indicate the positive effects of a bilingual intervention approach for children who have limited English language development. In addition, based on this research, a bilingual approach is recommended for children with severe disabilities. Furthermore, the need to support the home language for these children is critical when one considers that for many DLL children, the home language, and not English, is the only language in which the families can communicate fluently.

Children with language disorders may not be able to maintain or develop their home language skills unless that language is specifically targeted in intervention. Simon-Cereijido, Gutiérrez-Clellen, and Sweet (2013) found similar patterns in a recent longitudinal analysis based on the outcomes of an intervention study with preschool 4-year-olds with language disorders. Specifically, children who attended a bilingual intervention program that emphasized English acquisition and who had greater language delays were not able to maintain their rate of growth during the follow-up testing after the intervention ended. These children appeared to be more vulnerable to loss of home language than children with milder language impairments. The child's English use in the classroom also had a significant effect on the child's potential for growth in Spanish. The study found that as children used more English in the classroom, they made smaller gains in Spanish. It is important to note that children in the bilingual program received only 45 min of Spanish intervention twice a week. The other 2 days were conducted in English. This amount of exposure and practice may not be sufficient to accelerate growth in the home language in children with more severe language disorders. In sum, to help young DLLs communicate in the home language with their families and participate in everyday social activities, children with language delays may need bilingual interventions of greater intensity and duration.

As Chen and Gutierrez-Clellan (2013) have summarized in their review of the literature of intervention with DLLs with special needs, the available research indicates the following:

(a) The use of the home language in ECSE intervention does not slow the acquisition of the second language.
(b) Children with language disorders can apply their home language skills when learning a second language, and in many cases, this results in a greater rate of English development.
(c) Children with a range of special needs, including autism spectrum disorders (ASD) or intellectual disabilities and deaf children with cochlear implants, can learn more than one language.
(d) When the first language is not supported, DLL children with language disorders are likely to experience decreased growth of the home language. Overall, current research provides support for home language maintenance and bilingual development of young children with special needs.

While not all ECSE interventionists can instruct or communicate in all the languages of the children and families, it is possible for all ECSE educators to learn and implement a range of targeted strategies that support the maintenance of home languages. Several recent publications have outlined a set of program practices and instructional strategies designed specifically for monolingual ECSE educators that bring the home language(s) into the educational setting and promote a balanced approach to early bilingualism (Espinosa, 2014; Goldenberg, Nemeth, Hicks, Zepeda, & Cardona, 2013).

Communicating with Families of DLL Children

Families with DLL children are likely to be recent immigrants and often include extended family members such as grandparents and aunts or uncles, all of whom can make important con-

tributions to the early intervention team. When ECSE programs partner effectively with DLL families, children experience a range of important developmental benefits including early language and literacy skills as well as improved academic achievement (Durand, 2011; Jeynes, 2012). Families have also been shown to serve a critical role in the preservation of their home language and culture (Schwartz, 2010). However, most studies have found that DLL families participate in their children's educational programs at lower rates than non-DLL families (McWayne, Campos, & Owsianik, 2008).

Many DLL families have reported barriers that hinder their ability to partner effectively with program staff (Arias & Morillo-Campbell, 2008). One unique barrier among DLL families is their lack of English proficiency. Although DLL families from many different language backgrounds report difficulty when communicating with ECSE teachers, Hispanic Spanish-speaking parents have reported the lowest levels of communication with schools as well as confusion about their role in their children's education (Sohn & Wang, 2006). If the ECSE program does not have trained bilingual staff who can communicate with DLL families with limited English skills, the families often feel discouraged and unwelcome (Durand, 2011; Ramirez, 2003) which may help explain their lower participation rates. Immigrant and DLL families are often unfamiliar with American school norms for participation and may have difficulty understanding teachers' expectations due to limited English skills.

To promote more effective partnerships with DLL families, ECSE programs can implement several practices to reduce the language barriers that often discourage these families from participating in their children's education. These practices include hiring bilingual staff and translating information into the home language of families (Halgunseth, Peterson, Stark, Moodie, 2009; Ramirez, 2003) and helping family members recognize that their language and culture are strengths that should be maintained in the home and shared in the ECSE program. Because of the mixed messages DLL families may receive about their home language, some DLL family members may believe the misconception that their children should replace their home language with English. In such cases, programs should clarify to DLL families that their home language is a strength, not a deficit, and that it is an important foundation for their children to use in learning English and succeeding in school. To further this message and communicate a respect for the family's language, all staff can learn a few common and functional phrases in the DLLs' languages and as described above learn about the families' cultures and values.

Programs can also include offering family and adult education classes in the family's preferred language on how families can navigate the complex ECSE channels and become advocates for their children's best interests. Programs too may provide DLL families with social networking opportunities (e.g., in person or online) so that families of similar language and cultural backgrounds can share resources and information with each other. Together, these strategies build the knowledge, skills, and confidence that DLL families need, so they can guide their children's education and learning experiences. Ultimately, the goal is to foster strong and mutually respectful relationships between ECSE staff and DLL family members.

Conclusion

The population is becoming increasingly diverse which offers early interventionists and early childhood educators the opportunity to closely interact with children and their families from a wide range of cultural and linguistic groups, as well as class and economic backgrounds. While this diversity may present challenges to practitioners when their beliefs and values diverge from those of the families with whom they work, they also open opportunities for personal and professional growth. Support for children with the context of their families and those families' unique cultural and linguistic context is the framework for all EI/ECSE services. Culturally and linguistically responsive and sensitive services, thus, are essential to providing appropriate and effective

services to these children and families (DEC, 2010; Lynch & Hanson, 2011). The preparation and training of professionals must address acquiring skills and knowledge in cultural/linguistic diversity, as well as support professionals to reflect deeply about service practices and collaborate in order to truly meet the varied needs of children and their families.

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Inclusive Education and Autism Spectrum Disorders: The Working Practice of Supporting Teachers in Argentina

25

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Educational Inclusion and Autism Spectrum Disorders: The Working Practice of Support Teachers in Argentina

Argentina is on track toward inclusive education. To achieve this, it is necessary to change practices so as to overcome the exclusion or segregation of students with disabilities. In that sense, in recent years, and in line with the guidelines of the Convention on the Rights of Persons with Disabilities (United Nations, 2006/2008), state policies promoted inclusive practices in schools, providing financial support to families to cope with the necessary tools including children in mainstream schools. Currently one of the resources used for this purpose is "support teachers." This chapter provides an example and a description of the consideration of inclusive education for young children with autism spectrum disorders (ASDs) in a South American country, Argentina, by analyzing the experience of inclusive education of children with ASD with assistance of support teachers in mainstream schools in different regions of Argentina.

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The Challenge of Educational Inclusion

The construction of inclusive schools constitutes a complex challenge. Schools today should restructure and reorganize themselves to respond to student diversity and to provide appropriate educational responses, seeing the individual differences as opportunities to enrich learning. Schools should guarantee access, full participation, and learning for all students regardless of their personal conditions and their social and cultural background (Booth, Ainscow, Black-Hawkins, Vaughan, & Shaw, 2000). The processes of teaching and learning imply a permanent *negotiation* and *renegotiation* of meaning and sense between students and teachers in which intersubjective implication, affective links, mental abilities, and motivational grammars constitute essential factors. The various forms of communication, the use of different kinds of language, and the speech of teachers and students are all instruments of semiotic mediation that serve to construct shared meaning (Vigotsky, 1996). The diversity of the special and the personal needs of each student and of each teacher

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will demand creativity, flexibility, and the need to deploy a variety of tools that include the individuals in the educational process.

Proposed in this way, the challenge of diversity should not form part of the mere rhetoric of educational management. We should instead consider it in the light of the very permanent, interactive, and interpersonal process of teaching and learning with students that shows such great variety. Diversity challenges teachers to use varied, creative, diverse, original, and, on occasions, hitherto unknown semiotic instruments, at the service of communication, mutual enhancement, and shared understanding (Valdez, 2000).

Having defined special needs in relation to a physical and social context, an effort is made to avoid the reductionism that places the "problem" in *an* individual, to go on to analyze the phenomena in an intersubjective dimension, in the broader context of the appropriation of curricular content. Diversity is the stuff of life in schools. In this sense, the illusion of uniformity is eclipsed by life in the classroom, the difficulties of living together, teaching problems, learning problems, and the very different trajectories of students in the educational process. Teachers are the first to perceive that the same tools used with different students give absolutely different results. There are tools for intervention, modes of communicating, types of affective links, and learning activities, which work marvelously with some students and appear to have no effect or quite the reverse in others.

In some of his works on pedagogy and the school of differences, Perrenoud (1995, 2004, 2005) underlined that the school can generate resources, strategies, and plans to respond to differences and to stimulate learning, as easily as it can contribute to the fabrication of the failed student. For the author:

> the concern over adjusting teaching to individual characteristics not only arises from respect towards people and from common sense teaching, but it also forms part of a demand for equality: *indifference towards differences*, as Bourdieu has shown, *transforms initial cultural inequalities into learning inequalities* and, later on, into success at school. In effect, it would be enough to ignore the differences, for the same teaching: a) to support the success of those with cultural and linguistic cultural background; the codes; the level of development; the interests; and the support that allows them to take full advantage of the classes and to be ready for the exam; b) inversely, to provoke the failure of those that do not have those resources, and under such conditions learn in essence that they are unable to learn, convincing themselves in addition that this situation signals their incapability more than the failure of the school to adjust. (…) *How can we explain the persistence of a pedagogy that remains indifferent in the face of differences or that, in the best of cases, only takes them into account marginally, in proportions that are quite ridiculous in relation to their scope?* (authors' emphasis, Perrenoud, 2004, pp. 46–48)

We know that the school is a complex system, the precedents to which are not alien to the social networks from which they arise and to which they belong. The culture of school and a number of its rituals have not undergone so many changes throughout its short life, linked to the appearance of national states. The school appears to be an expert system at self-preservation and one that *insists on invariance*. The selfsame process of historic conformation of the school is no stranger in this panorama, as an "invention" of culture, with its politico-institutional characteristics—its mass, graduate, compulsory nature. We might ask ourselves what the reason is for this insistence in grouping children by age, by grade, and by year. What is the reason for the conservation of teaching from the front of the class (that in some institutions has certainly given way to current experiences of working in small groups around a table)? This spatial arrangement—that some cultural analysts highlight as characteristic of the school at different ages and in different places (see Trilla, 2002)—is shared with the arrangement of other social assemblies: cinemas, theaters, buses, and trains. People are seated one behind the other in spatial distributions that do nothing to facilitate communication, shared body language, and cooperative work.

An interesting phenomenon in relation to these specific characteristics of arrangements at school is their process of naturalization. It is "natural" at school "to come to the front," to form queues, to work in silence, to group children of the same age together, and to enter the corresponding fourth- or

seventh-grade classroom everyday. What would happen if a child, according to the topic being taught and the child's specific motivation, were to choose a day on which to enter the fifth-grade classroom, because they were making robots out of cardboard boxes, or on another day the fourth-grade classroom, because they were solving geometry problems that the child found very interesting, and on another day, in the third-grade classroom, because they were narrating what the child thought was a marvelous story?

We are not proposing in these paragraphs to provide a detailed characterization of the cultural construct of school, its peculiar characteristics, the fabrication of failure and of success, the competencies of teachers, the precedents to the role of student, or the flexibility of curricular design. We are simply trying to contextualize the topic of educational inclusion in a more complex framework than that of schooling systems as arrangements created by culture and intersected by government policies. Is it utopian to speak of "schools for all?" Can school—the educational system, its policies, the teachers, the students, and the families—having entered the twenty-first century, advance toward inclusive educational formats in which the difference is recognized, no longer for its negation or its exclusion but in effect to reduce the barriers to both learning and participation?

From Integrated to Inclusive Education at School

Special education has undergone profound transformations over recent decades, progressively entering the ordinary educational system in Argentina, in the search for ways to facilitate the inclusion of all students. The movement known as *integrated education* is based on a model that fosters equal educational opportunities for all students and that establishes the regular classroom as an acceptable space in which to achieve those ends (Ainscow, 2007). However, it is not enough to think of a school that "integrates" and "normalizes" children, with the underlying view that "we are all equal." Such an approach could imply that the system proposes very few changes or none at all, with regard to proper educational practices, values, teaching modes, and ways of sharing knowledge. It would be enough to "assimilate" those who are different, without affecting the institutional dynamic.

On the contrary, the idea of *inclusion*, from the very beginning in our view, implies that "we are all different" and sets a challenge for schools to fix objectives, contents, and teaching and evaluation systems, fully accepting that diversity and seeking to include everybody in the educational project of the community. It is clear that this proposal requires a profound change of mentality and values that go beyond the school and that interplay with all of society. The movement toward inclusive education implies the restructuring of schools to respond to the needs of all children (Ainscow, 2007). A series of methodological and organizational changes are required that include training for the teachers themselves, for attention to diversity while reorganizing the educational institutions themselves with a view to guaranteeing quality education.

The *Index for Inclusion* (Booth et al., 2000)—conducted by the UK Centre for Studies on Inclusion in Education and the UNESCO Regional Office of Education for Latin America and the Caribbean—offers the following summary of the characteristics of inclusive education:

(a) Inclusion in education involves increasing the participation of students in, and reducing their exclusion from, the cultures, curricula, and communities of local schools.
(b) Inclusion implies restructuring the cultures, policies, and practices in schools so that they respond to the diversity of students in the locality.
(c) Inclusion involves reducing barriers to learning and participation for all students, not only those with impairments or those who are categorized as "having special educational needs."
(d) Inclusion refers to improving schools for both staff and students.
(e) Learning from attempts to overcome barriers to the access and participation of particular

students to make changes for the benefit of students more widely.

(f) Acknowledging the right of students to an education in their locality.
(g) Viewing the difference between students as resources to support learning, rather than problems to be overcome.
(h) Inclusion refers to fostering mutually sustaining relationships between schools and communities.
(i) Recognizing that inclusion in education is one aspect of inclusion in society.

In the aforementioned document, the concept of "special educational needs" is replaced by the term "barriers to learning and participation." In that context, inclusion implies identifying and minimizing the barriers to learning and participation, mobilizing all necessary resources to support both processes. *Barriers*, *as much as the resources to reduce them*, *can be found in all elements and structures of the system*: *within schools*, *in the community*, *and in local and national policies*. The term special educational needs has been replaced because it is considered that centering on these group categories (special education needs associated with physical and intellectual disability, etc.) involves a risk of perceiving that the source of learning difficulties is found within that group of students, in such a way that little may be done to provide varied educational opportunities for those students (Booth et al., 2000). At times, use of the label "special educational needs" leads to the analysis of educational difficulties that are fundamentally couched in terms of "deficiencies" or "pathologies" and can deflect attention from other contextual aspects that might be the source of the barriers to learning and participation among students.

The use of the concept "barriers to learning and participation," in order to define the difficulties that the students might experience, implies a social model with regard to the difficulties of learning and disability. In this model, the barriers to learning and participation

> arise through an interaction between students and their contexts; the people, policies, institutions, cultures, and social and economic circumstances that affect their lives. Disabilities are barriers to participation for students with impairments or chronic illnesses. Disabilities may be created in the environment or by the interaction of discriminatory attitudes, actions, cultures, policies, and institutional practices with impairments, pain, or chronic illness.

In this sense, schools would have the great challenge of considerably reducing disabilities due to the barriers to access and to physical, personal, social, and institutional participation.

So, when we talk about inclusion in school, we refer to the school that is prepared to include all students, recognizing the differences and the particularities of each one and considering diversity as a norm and the differences as part of the differing landscape that each school has to offer. Children assist in a place that is prepared for everybody, where a plural variety of ingredients for a rainbow of possible diets is on offer, rather than a "one-course" menu. The school in this sense is defined as a place that is open to diversity or a *school for all*. There is no need to think whether a student is "appropriate" for a certain school but rather whether schools are appropriate for each and every student (See Echeita, 2007; Marchesi, 2004; Valdez, 2009). It was expressed at the European Disability Forum (2009) as follows:

> Inclusion (…) requires adapting the system to meet the needs of the pupil/student with disabilities. The environment, teaching and learning and organization of the school and education system are systematically to be changed in order to remove barriers to pupils/students with disabilities, so that they can maximize their academic and social achievements.

Special education in Argentina is understood as a modality that intersects the interventions in support of inclusion in education (*Ley de Educación Nacional* [Law on National Education] 26.206, 2006). It is considered as the set of educational proposals and specialized and complementary supporting resources that make integral itineraries possible for people with disability (Ministerio de Educación. Resolución 1269, 2011). The design of these itineraries requires reliance on support mechanisms, which are understood as a scaffolding structure planned

through the educational system to enable the inclusion of students with disability. These support systems along with teaching strategies accompany people with disability to perform in the educational and community context with the least degree of dependency and the highest degree of self-sufficiency. Among these modalities, we find the support teacher (officially referred to as the *maestro de apoyo a la integración* [support teacher for integration]), whose aim is to support the inclusion of students in school who for some reason require this type of support for their continued presence in the ordinary educational system (Ministerio de Educación de la Nación, Argentina, 2009).

In that sense, we know that the process of inclusion is a progressive and complex process that demands teamwork. The preparation of the *Proyecto Pedagógico Individual* (PPI) [Individual Pedagogic Project] will be grounded in the *observation* of both the support teacher and the *classroom teacher* that will be stated in a descriptive report of the situation with a proposal for curricular specification and individual and group strategies in accordance with the possibilities and needs of the student. Likewise, they should conduct an analysis, definition, and specification of support mechanisms (curricular, technical, technological, relating to materials and resources, contextual, and grouping, among others). The regulations establish that the support teacher has the task of:

- *Bringing both the support teacher and the classroom teacher responsible for a grade or a group closer to information and tools that contribute to a complete picture of the characteristics, possibilities, and needs of the student through an integral view, on the basis of which individual pedagogic strategies may be planned.*
- *The reorganization of contents: the time needed to achieve them within the same cycle may be modified. If required, significant modifications may be introduced such as the elimination of nodal contents, modification of evaluation criteria, and accreditation, promotion, and certification corresponding to a given level.*

According to the aforementioned regulations of some regions under study in Argentina, there are various roles and functions that the support teacher has to perform in the development of their practices. She is an educator who should work not only with the student but with all the educational actors that play a part in the processes of inclusion, as well as possessing a training that will enable her to confront the challenges involved in student diversity and to provide educational responses in line with stated needs. In the requirements contemplated by the *Ley Nacional de Discapacidad* [National Law on Disability] in Argentina, a qualification as a *teacher of special education* or *educational psychologist* is required to take up the post, although psychologists also perform the task.

Assistance for Learning and to Reduce Barriers

In this context, proposing the problem of educational inclusion and the need to have "schools for all" implies a challenge of great complexity. Different international declarations, forums, and bodies have emphasized both the difficulty of the endeavor and the urgent need for proposals for change: to create inclusive cultures, to prepare inclusive policies, and to develop inclusive practices (Booth et al., 2000; the World Education Forum in Dakar, 2000; the Lisbon Declaration, 2007; the International Conference of Education, Geneva, 2008; the European Forum of Disability, 2009).

The use of the concept "barriers to learning and to participation," to define the difficulties that students experience, implies a social and contextual model with regard to teaching and learning models (Booth et al., 2000). These barriers that can limit the possibilities of learning and the participation of students or lead to exclusion and discrimination can vary. They are related to the curricular offer, school management, and learning strategies that are used in the classroom, among other factors that can help or complicate student development and learning in the educational process (Booth et al., 2000). It is a question

of *breaking the indifference to differences and of favoring the least favored in an active, legitimate, and explicit way, in the name of equal opportunities* (Perrenoud, 2004).

From this perspective, the support teacher[1] should help to break this indifference to difference, seeking to eliminate or to minimize the barriers that can arise in each particular case for students, facilitating the process of inclusion. The support devices or support for learning consist of people that guide us in learning; they are teaching strategies to create significant educational environments and shared understanding; they are scaffolding in support of self-sufficiency and processes of self-regulation. Support for learning is, in short, a toolbox for reducing barriers to learning and participation. They are instruments to improve our quality of life and to contribute to the construction of an inclusive school (see Valdez, 2009).

This *assistance* not only has to eliminate or minimize the barriers that can limit student learning and participation but also those that affect teachers and the other people who partake and participate in the life of a school (Echeita, 2007).

In different areas and regions, we have found the following labels: "celador [monitor]" (even less consistent with the inclusive proposal) for a support teacher that attends two or three times a week for an hour, which is not consistent with the working patterns needed by a child with autism; "maestro/a sombra [shadow teacher]," used especially in Ecuador, Paraguay, and Peru (that appears to suggest something very different from the objectives that we uphold of student self-sufficiency); "personal de apoyo a la integración escolar [support personnel for academic integration]" (perhaps conceptually more appropriate but less practical because of its length); and "acompañante terapéutico [therapeutic companion]" (which appears to be a term borrowed from clinical practice in an educational context and is inappropriate for the purposes that we are proposing here). A description of each of these terms and corresponding responsibilities is shown in Table 25.1.

The myths that endure within educational institutions on the practice of support teachers are also barriers that complicate not only the help that the support teacher can lend the student but also the possibility of constructing cooperative working spaces with the ordinary teacher, in which experiences and strategies are exchanged, as well as different ways of approaching each particular situation that the students present in the teaching and learning processes (Valdez, 2009).

Research About Support Teachers in Argentina

Sample

In our research, we have specifically proposed to explore the roles of the support teacher and the development of their practice in the process of inclusion at school: what scopes and limitations does the role have, which are its strategies and resources, and how should the support actions be linked to classroom teacher and the institution? In this first exploratory phase, we prepared a sample of 230 support teachers from different regions grouped into the autonomous city of Buenos Aires (46 %), the province of Buenos Aires (39 %), and the region of Patagonia (15 %). Access to real data on these support units is essential to delve deeper into the discussion and to prepare proposals linked to the educational context in which the inclusion programs are developed. Ninety-eight percent of the respondents were women who ranged in age from 20 to 53 years old. Their experience fluctuated between 1 and 15 years of service, with a relevant percentage of support teachers who had acquired between 1 and 3 years of experience (68 %) and a smaller percentage of support teachers with over 3 years of experience. With regard to the academic training of the sample of support teachers, they were, in the first place, educational psychologists (41 %); in the second place, teachers of special education (30 %); and in the third

[1] In Argentina, the support teacher may be a teacher of special education or an educational psychologist or "psicopedagoga."

Table 25.1 Labels about support teachers

ETIQUETAS	TRADUCCIÓN	DEFINICIÓN
CELADOR	Monitor	A support teacher that attends two or three times a week for an hour, which is not consistent with the working patterns needed by a child with autism
MAESTRO SOMBRA	Shadow teacher	*Used especially in Ecuador, Paraguay, and Peru* (*that appears to suggest something very different from the objectives that we uphold of student self-sufficiency*)
PERSONAL DE APOYO A LA INTEGRACIÓN ESCOLAR	Support personnel for academic integration	Perhaps conceptually more appropriate but less practical because of its length
ACOMPAÑANTE TERAPÉUTICO	Therapeutic companion	*Which appears to be a term borrowed from clinical practice in an educational context and is inappropriate for the purposes that we are proposing here*

place, psychologists (20 %). The others came from other academic backgrounds or were students. The age of the students in the sample ranged from 3 years old, included in the initial level, up to 15 years in age, who were in the first years of secondary education.

A total of 72 % of the support teachers in the sample worked in privately managed schools, while 28 % worked in public sector schools. In relation to the variable diagnostic labels of the students with which the teachers in the sample were working, the terms used in their respective institutions were followed. The aspects into which we have inquired are related to academic training, type of training received, intervention modalities, adjustments introduced, strategies and resources used, time and mode of intervention with the students, relation with the institution, and obstacles encountered in the tasks, among other variables under study. Our data showed that 94 % of the support teachers who were interviewed (over a total of 230 participants) thought that the classroom teachers have insufficient training to respond to diversity, 73 % believed that the schools did not have adequate mechanisms and resources for inclusion, and 48 % expressed feelings of discomfort at work in their educational institutions.

The support teachers reported the "diagnostic labels" that appeared in the reports or in the records of the students with whom they worked: students with ASD (36 %, including PDD, PDD-NOS, autism, and Asperger's), with delayed maturity (17 %), with Down syndrome (10 %), with mental retardation (6 %), and with other disabilities (31 %) including cerebral paralysis, hypoacusis, speech and language disorders, and attention deficits.

According to the support teachers who were interviewed, 57 % worked with students for 4 h, 5 days a week, on the days that the student attended school; 18 % worked for 3 days a week; 16 % worked for 2 days a week; 2 % worked for 4 days a week; and 7 % worked for 1 day a week. Sixty percent of the respondents indicated that they worked solely in the classroom with the student, while 39 % indicated that they provided support to the student inside and outside the classroom. In the analysis of how they work, 45 % answered that they only worked with the student, 28 % with the group, and 27 % pointed to both working modalities—only with the student and with the classroom group. With regard to the time that they spent with the student, 82 % sometimes left the student alone to encourage self-sufficiency, and 18 % worked all the time with the same student. In the qualitative description that the support teachers submitted on the situations in which they could leave the students alone, the majority agreed that they did so during playtime, music class, physical education, and other activities in special areas. Among the professionals who were interviewed, 75 % responded that they performed their role as a support teacher with 1 student, and 25 % supported between 2 and 7 students. In this last case, they explained that the time dedicated to their work consisted in 1 or 2 days per week, between 1 and 3 h, allowing

them to lend support to more than one student. A total of 74 % of support teachers supervised the task with specialist professionals contracted outside the institution.

The support teachers in the sample selected a broad range of the tasks that they performed, which are shown in Table 25.2. On the basis of these results on the tasks that they performed, the support teachers prioritized them from 1 to 5, in the following order: (1) intervening with specific support in the learning activities, (2) preparing strategies and activities, (3) promoting the relation with the teacher in charge of the class, (4) supporting the relations with peers, and (5) providing support and guidance to principals and teachers. The labels that the support teachers used in their work were also used for the variable "most required adaptations." Adaptations for the work of inclusion required more than any others, in order of relevance, were methodological (66 %), pace and time (65 %), content (63 %), and communication (40 %). The materials and resources mentioned as the most frequently used by all the support teachers were photocopies (67 %), teaching games (49 %), flashcards (33 %), visual agendas (24 %), and visual communicators (22 %). The support teachers also mentioned construction games (20 %), computers (19 %), larger-sized objects for motor development (12 %), adapted scissors (8 %), and educational software (2 %). The majority of the support teachers also designed evaluations adapted to the needs of the student.

Table 25.2 Task performed by support teachers

Task performed	%
Preparing strategies and activities	99
Supporting the relations with peers	94
Intervening with specific support	90
Promoting the relation with the teacher in charge of the class	82
Providing help and guidance to principals and parents	76
Preparing adapted evaluations	64
Supporting personalized learning	62
Promoting participation in organized games	57
Organizing meetings between school and family	54
Promoting participation in sports activities	38
Providing support to extracurricular activities	34

In relation to the planning of support teachers with other educators, 81 % of the total sample of support teachers completed a planning task in the institution with the classroom teacher. The percentages found with other educational actors that had a role were 22 % with the school committee, also referred to as the "equipo de orientación escolar [teaching guidance team]," and 20 % with the principal, while 16 % said that they planned without any collaboration.

With regard to the factors that the support teachers considered, these might affect the educational inclusion process; each variable mentioned in the interviews was individually analyzed. Considering the factors selected by all the support teachers in the sample, the results pointed to: (a) a lack of training for staff at the school (83 %), (b) no designs for inclusive educational programs (72 %), (c) a lack of specific support systems for students with barriers to learning and participation (49 %), and (d) the difficulties of students that are included in their adaptation to the school environment (22 %). The results indicated that 73 % of the support teachers considered that their schools did not have the necessary resources to include students with barriers to both learning and participation. With regard to the responses of the support teachers on uncomfortable feelings in the inclusion process in the ordinary school, 52 % of support teachers said they felt no discomfort, and 48 % said they felt uncomfortable because they had no means or resources to work toward the inclusion of some students. The responses of the support teachers regarding inclusion and whether it modifies the classroom dynamic gave the following results: sometimes (42 %) and always (36 %). The qualitative explanations were detailed and were repeated in the survey: the presence of support teachers in the classroom as in "another" outside the group, inconvenience and resistance to inclusion expressed by the classroom teacher, behavioral problems of the student seeking inclusion, and specific support that is used such as personal frequency modulation systems in the case of hypoacusis that affects the entire peer group, among others.

Ninety-four percent of the support teachers considered that the classroom teachers that assisted them with the inclusion processes at school had received no training, while only a mere 6 % of the sample thought that they were trained in this area. Thirty-two percent reported that they had not received training on specialized training courses, while 61 % of support teachers from the sample thought that teachers and universities were not preparing trained professionals for inclusion.

Beyond the varied interpretations that may be drawn from these data, we consider that they represent a first step in the exploration of the practices of support teachers, providing a picture of the general situation in Argentina that shows the complexity of the task, the problems that the support teachers themselves experience to be "included" in the schools, the scant training that the classroom teachers are perceived to possess for participation in inclusion projects, and the difficulties to work cooperatively with the school committees, principals, and teachers. These results will without a doubt help to understand the scope and the limitations of the work of the support teacher and the real needs in relation to intervention, in order to improve the mechanisms in support of inclusion in schools.

Educating Children with Autism Spectrum Disorders in Argentina

If there is one case in which the diversity of paths that subjective development follows is surprisingly multiple, it is the case of ASDs. The notion of *autism spectrum* leads us precisely to a continuum in which the qualitative alterations of subjective development present a level of diversity and uniformity that raises questions about the educational decisions and the schooling criteria that we have to follow with each child that presents the symptoms.

In recent years, the experience of inclusion of children with ASD in mainstream schools in Argentina has increased. Between 2006 (16 cases of children with ASD included in mainstream schools recorded) and 2014 (400 cases registered), the number of children with ASD included in mainstream schools in the city and province of Buenos Aires increased 25-fold. Of the total cases, 17 % are included in public schools and 83 % in private management schools (FADEA—Federación Argentina de Autismo- Newspaper: La Nación, Buenos Aires, 10-29-2014).

However, with this increase in the number of students being educated in mainstream schools comes a need for school personnel to better understand autism and how to work with these children. All teachers who try to understand the problem of the autism spectrum have to begin with an evolutionary perspective. We cannot comprehend autism, if it is not understood as a developmental disorder. This approach, which appears so basic, is one of the most important keys to psychoeducational evaluation and intervention. The development of children with ASD has had development, but this development has followed other paths. The way such different forms of the standard sociocultural human biotype manifest themselves, to paraphrase Vygotskian terms, challenges us. We find different levels of qualitative "alteration" in the autism spectrum in communication and language, in social relations, in the development of intersubjective and mental abilities, in the development of anticipatory capabilities and flexibility, and in the development of a general capability to symbolize.

The concept of attention to the diversity of the student with and without disability has been changing over time, and educational practice has been modified as a consequence. There is no need to demand that the student adapts to the system, but it is the system that should make the necessary modifications, giving different modalities for educational support and comprehending this support as *all the activities that increase the capability of a school to respond to diversity* (Booth et al., 2000). Among these modalities, great importance has been attributed to the figure of the support teacher[2] as part of a specialist support unit in schools that share inclusion pro-

[2] Note that, in the research that we conducted with support teachers, out of the 230 cases under study, 98 % were women; for this reason, we refer to "support teachers" in the singular as she in this paper (Gómez and Valdez, 2013).

grams. This kind of teaching professional should design interventions to strengthen the capabilities of students and to minimize the different types of "barriers to learning and participation" that arise in the process of inclusive schooling.

In Argentina, the changes in the law relating to rights of people with disability call for the implementation of new policies that contemplate the educational inclusion of children with ASD (National Law 24901, 1997; National Law 26378, 2008). These new realities, in accordance with international conventions and agreements (e.g., the Convention on the Rights of Persons with Disabilities and its Optional Protocol), imply a significant challenge to the educational system and to public policies linked to attention to diversity.

Some of the needs and expectations of the Latin-American region were voiced at the *Primera Conferencia Latinoamericana de Autismo* [First Latin-American Conference on Autism] held in Chile in September 2013. Autism Speaks, Columbia University, and RedeAmericas organized this conference. With the participation of professionals, therapists, teachers, researchers, and various nongovernmental organizations (NGOs) and parent-teacher associations, it centered on the current state of autism, public policies, detection and diagnosis, treatment, research, and educational inclusion in Argentina, Brazil, and Chile (Revista Chilena de Psiquiatría y Neurología de la Infancia y Adolescencia, Vol 24, N° 3, Diciembre 2013). From this conference, it became evident that:

- There are no epidemiological studies in the region that describe the prevalence of ASD (Elsabbagh et al., 2012); the last international epidemiological reference was given by the Centers for Disease Control and Prevention of the United States, which records one case of ASD for every 68 births (Centers for Disease Control and Prevention, 2014).
- University programs linked to health and education courses fail to include sufficient up-to-date information on autism, on a systematic basis, in their curricular programs.
- The teaching programs—teacher training—have no ASD-related topics that describe the needs of children and support systems for inclusive education.
- Progressively, the commitment of universities has been sought, together with the promotion of conventions with other academic institutions, NGOs, and parent-teacher associations, to support research, conferences, publications, and the development of theses on the topic of ASD.
- Virtual learning environments have notably widened the possibilities of training in different cities of the region, shortening distances, and supporting the training of teachers and therapists in the specific area. In this way, the creation of networks has been promoted, aimed at consolidating teams of professionals in each local community, in different regions of Argentina.
- Over recent years, academic proposals have emerged for postgraduate, diploma, and specialist courses with university accreditation.
- University training placements have been consolidated on courses that have existed for over 10 years, arriving at agreements with international universities and promoting exchanges and quality practices with a scientific foundation (Valdez, 2013).

In this particular Latin-American context, the need is proposed to create support units for the educational inclusion of students with ASD.

The panorama of interaction with the schooling context, in the case of children with ASD, implies taking into account and anticipating some difficulties that might become evident. These difficulties have to be considered, in order to design an inclusion program in schools centered on the individual (Valdez, 2007). Among others, the program would have to respond to the following possible needs of support for:

(a) Adaptation to the rhythms and organization of tasks at school.
(b) Sharing free time and group activities at school with other colleagues.
(c) Participation in group activities and exchanges with colleagues, whether in conversations or with visual or gestural prompts.

(d) The development of an understanding of social subtleties in case of possible naivety toward mischief or pranks that fellow students share between each other. Otherwise, these jokes could contribute to the isolation of the child against the lack of "complicity" with fellow students in different everyday situations.
(e) Situations in which the students with ASD may imagine that others see them as "strange" people, who are only interested in their things or in very specific topics about which they repeatedly ask questions, or their comments are always focused on the same topic.
(f) Understanding social conventions relating to power hierarchies in the school context (a student does not approach a fellow student in the same way as a teacher or a principal).
(g) Promoting flexibility in the face of unforeseen changes (programs, working hours, place of work, cancelation of an excursion, etc.).
(h) Dealing with possible inopportune reactions (anger, tantrums) when facing very complex or poorly structured tasks that are given to the students or very poorly adjusted to their possibilities.
(i) Stimulating the initiative for communication and relations with peers or other shortcomings and/or failed attempts to establish social links.
(j) Adjusting to the school timetable, above all when there is excessive and rigid perfectionism that leads the student to center on the details of each task in a painstaking and slow manner.
(k) Favoring motivation in reaction to school-related tasks in general. These are some of the support programs that could be required, among others. It is therefore necessary, in so far as possible, to anticipate and to propose systematic working strategies to facilitate inclusive schooling and to prevent situations of failure.

It is said in various schools that inclusion is not possible because the teachers are not "prepared." It is convenient to reiterate that these actors find themselves immersed in educational policies and provincial and national laws. In any case, the lack of training could be described in other ways: if I am the principal and the teachers at my school are not prepared to respond to diversity, what can I do as the manager of the school board? If I am the inspector and the principals of the schools that I inspect are not prepared to teach children that do not appear as "prototypes" of the "good teachable student," what can I do? And if I am the "manager" of the inspectors …? We could continue by looking at the *micro* and the *macro* or vice versa from different directions. And in short, this exercise would show us that inclusive policies do not depend on isolated people or on a teacher with goodwill and a good predisposition. *Inclusive educational policies are necessary* that give leading roles to each actor and give collaboration, training, and support to all those involved.

Research in the practices of support teachers as a mechanism in support of inclusion is an interesting and necessary theme: there are practically no publications in Argentina on the professional practice of the support teacher nor is there theoretical reflection on the scope and the limitations of the construction of this "role." What does a support teacher do, how does she do it, and when does she do it? Does she target all children or only the child that is integrating? Does she sit with the child or in another place? Does she always stay next to the student or does she leave the classroom to generate self-sufficiency in the student to be able to act in the classroom without her? Does she introduce communicative adaptations? Does she adapt the contents? Does she prepare adapted evaluations? If the support teacher gives class to the student alongside the everyday teacher, why does she not do so in another place? Or is it a question of linking the child to the class teacher, so that the child follows the instructions and the proposed tasks? The idea of a support mechanism, a sort of *scaffolding* that is gradually removed, which could be done intermittently, on a case-by-case basis, underpins the figure of a teaching professional who favors the process of educational inclusion, supporting the student at the same time as the classroom teacher. We have opted for a name that exists in the Argentinean

context, which is "maestro/a integrador/a [support teacher]"; however it is perhaps not the term that best reflects the conception of their practice (we have not found any use of the term "maestra/o inclusiva/o [*inclusive teacher*]"). We insist that the support teacher should at least work at three levels of intervention: (a) intervention that promotes the relation of the teacher in charge of the class with the child (promote communication between the child and the classroom teacher: the child should be asked questions, like the other children in the class; the child should be set limits, if necessary, like the others, and should be encouraged to participate like any other), (b) interventions that favor peer relations (encourage classroom and playtime activities: the child's relations with one or two fellow classmates initially and then expanding those relations as far as possible, in shared activities and games), and (c) interventions related to tasks in the classroom (adaptations of contents, if necessary, and communicative adaptations using the total communication philosophy as a framework (photos, drawings, pictograms, written and spoken language)).

Besides, we would argue the specificity of knowledge in the area. Working with children with ASD requires knowledge of their styles of learning, their functional cognitive profiles, the areas in which they need either more help or lower levels of support, and the use of augmentative and alternative communication (AAC) systems, anticipation agendas, visual keys, social histories, etc. In that case, we believe that many of the teachers' opinions can be consistent with the way in which inclusion is understood and put in practice by the support teacher on a day-to-day basis. If they have observed that the support teacher acts in a way like the "shadow" of the child, it is understandable that they see the child-support teacher partnership as an island within the school. But that is in no way the idea that we uphold as favoring learning. If we speak about barriers to learning and participation that prevent educational inclusion, the support teacher should form part of the support mechanisms (both for the student and for the classroom teacher), the strategies, and the formats that find alternative forms of mediation that precisely reduce those barriers. In that sense, the work of the support teacher should be consistent with the characteristics and formats of the scaffolding structure. The supporting structure is gradually removed, encouraging not only the transfer to contents and strategies but also of self-sufficiency. The intervention of the support teacher should gradually diminish insofar as the student learns to make use of the tools that favor their inclusion at the three aforementioned levels: relation with their classroom teacher, relation with their peers, and relation with the teaching task, the contents, and the most appropriate semiotic formats.

One of the keys for the development of inclusive education is teamwork. Hence, it is important that all the actors in the educational community involve themselves and participate actively in a collaborative way. It is important that they manage to overcome solitary and individual labors that each one of them might separately experience in their functions. The professional practices of support teachers and especially their functions have awakened the interest of researchers in the relevance of their actions for the success of inclusive programs in ordinary schools. Practically no research has been found in Argentina on the theme, making it necessary to contribute to the construction of knowledge to confront the present reality of the Argentinean education system. We might ask ourselves whether the work of the support teacher is the only possible way of supporting inclusion. The answer is *no*. In a school for all, it should be possible to offer each student the study path needed to achieve the learning goals of that student. There could be different formats that successfully contribute to educational inclusion, which would involve all the teachers. They could even be varied formats in schools (graded or nongraded), with "pedagogical partners" in classrooms for all, or smaller groups or relief teachers that support the classroom activities, according to their needs, at all times with committed teaching orientation teams or teacher committees that form part of the support mechanisms. But these proposals can in no way depend on isolated initiatives or the goodwill of teachers

and principals but on state policies that engage in a real transformation based on the rights of everyone to learn. Nowadays, the school resorts to the figure of the support teacher, because the conditions are not in place to ensure inclusive schools, if specific supports are not available to reduce the barriers to learning and to participation. The support teacher, without even proposing as much, implies a way of questioning the exclusive practices within the institutional system. Once within the school, the support teacher illuminates the institutional fault lines and paradoxically shows that her raison d'être within the school attempts to remedy a fault. Her presence shows the absence of an educational proposal for all. Schools appear only to be for "some." The role of the support teacher would appear to be signaling one of the possible ways of once again including the excluded from school.

Final Considerations

It is difficult now, in the twenty-first century, to explain the persistence of a school that tends to remain indifferent in the face of differences. As commented on earlier, for Philippe Perrenoud, *pedagogical differentiation* situates itself within the perspective of "positive discrimination," a rejection of indifference to differences and a policy of the democratization of access to knowledge and competences, giving priority to students with learning difficulties and development problems. In short, differentiation is for the authors a political rather than a pedagogical choice. Paulo Freire reminds us that if we consider the future something given beforehand, a horizon to which we have to "adapt ourselves," then there is neither space for utopia nor for dreams. And dreams are for him what drive history: "There is no change without a dream, and no dream without hope (…) The dream becomes a need, a necessity" (Freire, 1992, p. 127). Could school shelter the dream of inclusion, not as a discursive constructive of the politically correct but as a praxis to confront extreme situations and the logic of segregation and exclusion? In a certain sense, inclusive education could be considered a *viable unknown* (e.g., "inédito viable;" P. Freire *Pedagogía de la esperanza*, 1992), bearing in mind what was affirmed by Araujo Freire (in Freire, 1992, p. 240):

The "viable unprecedented" is in reality something that is unknown, still not known and clearly lived but already dreamed, and when it turns itself into something "clearly perceived" by those that think in a utopian way, then they know that the problem is no longer a dream and can become a reality.

In effect, the unprecedented is a new horizon, unknown; it is whatever is yet to happen; it is the path that has still not been followed. Walking along that path as it unfolds, in action, makes that new newness possible and makes it viable. The challenge consists of individualizing the training itineraries, supporting sociocognitive interactions, setting a goal of quality, membership, and the fertility of learning situations in each school day. Perrenoud affirms that the pedagogy of differences is not a method nor a particular mechanism but a concern that encompasses all the methods, all the disciplines, and all the levels of teaching. Professional commitment is therefore required, creativity, strategic teaching, mastery at teaching, teamwork, and a labor that involve families.

To do so, teachers should have sufficient institutional support, training in the area, and materials to support the curriculum that offer alternatives for action in the face of diversity. Management is converted into a key setting, so as to create educational spaces that engage a commitment to comprehend differences, rather than to negate or to exclude them. Educational research into mechanisms to support inclusion can likewise be a source of dialogue, growth, and a search for new forms of educating.

Often parents ask in Argentina: Why do I have to take my children to different schools? Why do not at the same school all brothers and sisters? In the name of what abilities or disabilities can discriminate against pupils or students, excluding them from the school they attend his brothers? And if we consider it from the point of view of the subject, the easiest question might be why I cannot go to the same school as my brother or sister? Why accept him or her and not me? How should it be to go to school around my house with my brothers and my neighbors on

the block? Of course these reflections generate debate inside and outside the education system. Changes and transformations require dialogue processes, training, and resource management. Creating cultures, practices, and policies of inclusion remains a challenge to be solved without haste, with the necessary time, and without delay or denial.

In recent years, we have witnessed a number of geographical metaphors used to develop the curriculum. Note that we speak of routes, itineraries, paths, ways, etc. Well, that seems to have highways, avenues, roads and dirt roads, gravel paths, and cornice coexisting in the same territory, which is the educational system. And some students seem to go through them in sophisticated SUV cars, others in bikes, and others by foot. The truth is that, in this vast territory, not all roads are previously outlined. Some are formed by the mere fact of walking them, as in the field. The work of the support teachers broke new ground to create possibilities for inclusive education in Argentina. Harnessing the sociopolitical context and changes in educational policies is a challenge faced by families, educators, and all those concerned about the right to a quality education for people with disabilities.

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Physical Activity and Preschool Children with and Without Developmental Delays: A National Health Challenge

26

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During the last several decades, public health professionals have recognized obesity as a major national health concern (American Academy of Pediatrics, American Public Health Association, & National Resource Center for Health and Safety in Child Care and Early Education, 2011; Center for Disease Control and Prevention, 2013), even among populations of young children (e.g., Krishnamoorthy, Hart, & Jelalian, 2006; Pate, O'Neill, Brown, McIver, et al., 2014; Story, Kaphingst, & French, 2006). National prevalence data have indicated that about 23 % of young children age 2 through 5 are overweight (>85 percentile) or obese (>95 percentile) (Ogden, Carroll, Kit, Flegal, 2014), and our own local samples of preschoolers in two independent studies have shown even slightly higher rates of weight problems for preschoolers in South Carolina.

Although not definitively known, public health researchers have noted that weight problems have been related to contemporary diets, which consist of increased calories with saturated and trans fats and sugars (cf. Nestle, 2002; Popkin, 2007) and physical activity, which is predominantly sedentary in community-based early care and education programs (cf. Oliver, Schofield, & Kolt, 2007; Pate, O'Neill, Brown, McIver, et al., 2014; Reilly, 2010). Some populations of children have been at higher risk for weight problems including African American, Latino, and low-income children (e.g., Haas et al., 2003; Sherry, Mei, Scanlon, Mokdad, & Grummer-Strawn, 2004). In addition, children's early problems with weight have been predictive of later obesity and significant health problems (Guo, Wu, Chumlea, & Roche, 2002). Specifically, obesity has been associated with coronary heart disease, hypertension, type II diabetes, osteoporosis, and several types of cancer (U. S. Department of Health and Human Services & Office of Disease Prevention and Health Promotion, 2008).

Millions of young children who are 3-, 4-, and 5-year olds not yet in kindergarten attend community-based early care and education programs (e.g., childcare centers, state-funded prekindergartens, Head Start Programs, faith-based preschools, early childhood special education

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programs; Annie E. Casey Foundation, 2014; National Institute for Early Education Research, 2013). Indeed, the majority of preschoolers spend significant portions of their waking hours in some type of early care and education program. Given the contemporary obesity rates and the amount of time young children spend in early care and education programs, national early childhood initiatives to address childhood obesity have been implemented such as Head Start's "I am Moving, I am Learning" (Fox, Hallgren, Boller, & Turner, 2010) and "Let's Move Child Care" (Obama, 2012).

Recently, the Institute of Medicine (IOM, 2011) established a US guideline for preschool children and recommended 15 min or more of total physical activity (i.e., total accumulated light, moderate, and vigorous activity) per hour or 3 h per day assuming 12 h of wake time. Nevertheless, researchers have found that many young children do not meet the proposed guideline in early care and education programs (e.g., Beets, Bornstein, Dowda, & Pate, 2011; Pate, O'Neill, Brown, McIver, et al., 2014; Reilly, 2010). For example, Pate, O'Neill, Brown, Pfeiffer, et al. (2014) in a recent analysis of two independent samples of preschoolers (i.e., Sample 1 $n=286$ and Sample 2 $n=337$) found that only 41.6 % and 50.2 % of preschoolers met the Institute for Medicine guideline of 15 min per hour of total physical activity. Moreover, across time researchers from different teams have determined that typically children's primary physical activity is sedentary in nature in early care and education programs (e.g., McKenzie et al., 1997; Pate, McIver, Dowda, Brown, & Addy, 2008; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004; see Oliver et al., 2007 and Reilly, 2010 for reviews), even during outdoor play periods when opportunities for moderate-to-vigorous physical activity are most likely (e.g., Brown, Pfeiffer, et al., 2009; Sallis, Patterson, McKenzie, & Nader, 1988). Hence, many public health and educational researchers have argued that community-based early care and education programs have been and will continue to be especially important preventive settings where young children's physical activity may be enhanced (e.g., Krishnamoorthy et al., 2006; McWilliams et al., 2009; Pate, O'Neill, Brown, McIver, et al., 2014; Story et al., 2006; Ward, Vaughn, McWilliams, & Hales, 2010). In spite of the extensive interests in preschoolers' physical activity and emerging descriptive and intervention investigations, much remains to be learned about young children's physical activity. Indeed, Pate, O'Neill, Brown, McIver, et al., 2014 have delineated ten critical research questions that remain to be answered empirically (see Table 26.1). Our purpose for this chapter is to selectively review the evidence of what we know about young children's physical activity and based on that emerging informational base make reasonable recommendations for practitio-

Table 26.1 Top ten research questions related to physical activity in preschool children[a]

1.	What are the health effects of physical activity in 3- to 5-year-old children?
2.	What are the effects of physical activity on the development of healthy weight in 3- to 5-year-old children?
3.	What are the effects of physical activity on learning in 3- to 5-year-old children?
4.	What are the health implications of sedentary behavior in 3- to 5-year-old children?
5.	What is the prevalence of meeting physical activity guidelines in children of preschool age?
6.	What social and physical environmental factors influence the physical activity of 3- to 5-year olds in the home, preschool, and community settings, and how can these influences be,modified to increase physical activity?
7.	How does physical activity in 3- to 5-year-old children track into later childhood, adolescence, and adulthood, and what are the health implications of different physical activity trajectories?
8.	What are the most effective strategies for promoting young children's physical activity in the childcare, home, and community settings?
9.	How can interventions to increase physical activity among 3- to 5-year-old children be effectively implemented and disseminated?
10.	How effective are national, state, local, and institutional policies in increasing physical activity of 3- to 5-year-old children?

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ners who are interested in enhancing preschool children's salubrious activity in community-based early care and education programs.

Evidence Concerning Preschoolers' Physical Activity

The physical activity of older children and adolescents has been studied more often than younger children, especially preschoolers under 5 years of age (Pate, O'Neill, Dowda, Saunders, & Brown, 2009). Nevertheless, during the last several decades, researchers have begun to systematically investigate physical activity in preschool-age children. Descriptive studies have been performed, most often, in community-based settings, and a limited number of intervention and evaluation investigations have been conducted. Observer rating scales, parent reports, accelerometry, and direct observation have been used to estimate children's physical activity (cf. Oliver et al., 2007). In recent years, however, accelerometry and direct observation have become the contemporary standards for objectively measured physical activity in community-based early care and education programs. Although the review of objective measures of physical activity such as accelerometry and direct observation is beyond the scope of our chapter, we will discuss some relevant examples of accelerometry and direct observation investigations.

Accelerometry assessment of physical activity. With respect to accelerometry, a number of small mechanical devices have been developed to measure children's movements and activity across time in community and home-based settings. These reliable devices yield movement counts that on occasion have been calibrated to children's energy expenditure to provide accurate levels of physical activity (e.g., Puhl, Greaves, Hoyt, & Baranowski, 1990). Although very accurate in assessing children's activity, accelerometry is open to interpretation with different researchers reducing data differently, assigning cut points differently, and thus defining physical activity levels differently (Beets et al., 2011). This makes cross study interpretations difficult, and Pate, O'Neill, Brown, McIver, et al., 2014 argued that the field should reach consensus about physical activity guidelines and data reduction methods for measuring physical activity with preschoolers. In addition, accelerometry alone has not yielded rich contextual and social information, and its estimates have most often been limited to large settings such as children's activity in classrooms, gymnasium, and playgrounds as opposed to moment-to-moment information within those larger preschool settings (cf. Brown et al., 2006).

As an example of accelerometry, Shen et al. (2012) employed accelerometers to record the physical activity levels of 158 preschoolers in six Head Start Programs. On average, the preschoolers wore their accelerometers for 2.3 h (SD = .6) for 3.9 days (SD = 1.0). The researchers' physical activity findings were similar to other descriptive studies of preschool children. Specifically, the Head Start children exhibited sedentary behavior for the overwhelming majority of time (M = 56.02 min per hour SD = 4.51), light activity for several minutes (M = 3.09 min per hour SD = 1.37), and rarely participated in moderate-to-vigorous physical activity (M = .89 min per hour SD = .11). The authors noted from their review of the morning and afternoon Head Start schedules that for the 3½-h programs only 10 min were dedicated to "inside/outside free play." Hence, it appears that the children in the six Head Start Programs had very limited time allocated for opportunities for more active types of physical activity in open spaces (e.g., running, jumping, climbing).

In another descriptive investigation, Pate et al. (2004) used accelerometers to record 281, 3- to 5-year-old children's physical activity in nine preschools. On average, they recorded children for 4.4 h (SD = 1.3) for 6.6 days (SD = 2.3). Although the amounts of time spent in sedentary, light, and moderate-to-vigorous activity were different from Shen et al. (2012), the overall patterns of preschoolers' physical activity were similar (i.e., majority of time spent in inactivity followed by light activity with the lowest activity level represented by moderate-to-vigorous physical activity). Specifically, Pate et al. (2004) found

preschool children spent the vast majority of their time in sedentary behavior (M=42.1 min per hour SD=5.8). Light activity was the next highest level (M=10.5 min per hour SD=3.2) and moderate-to-vigorous activity was the lowest level (M=7.7 min per hour SD 3.1). Moreover, recent analyses indicated that only 41.6 % of the preschoolers meet the 15-min per hour IOM guideline.

Summary of accelerometry evidence. Other researchers have used accelerometry and their studies have yielded similar findings to Shen et al. (2012) and Pate et al. (2004) with preschool children's physical activity characterized by inactivity with relatively limited moderate-to-vigorous physical activity (e.g., Alhassan, Sirard, & Robinson, 2007; Finn, Johannsen, & Specker, 2002; Reilly et al., 2004; see Oliver et al., 2007 and Reilly, 2010 for reviews). Another primary finding of Pate et al. (2004), which was also found by Finn et al. (2002), was that the early care and education program the children attended was the most significant predictor of preschoolers' vigorous and moderate-to-vigorous physical activity. This replicated finding has strongly suggested that yet to be known policy and practice characteristics within preschools were related to children's moderate-to-vigorous levels of physical activity.

Another important point from accelerometry studies has been that although investigations varied somewhat in estimates of activity (e.g., Shen et al., 2012, moderate-to-vigorous activity averaged .84 min per hour versus Pate et al., 2004, 7.7 min per hour), patterns of inactivity and activity were similar. Moreover, many preschoolers' physical activity measured with accelerometry has often not met the contemporary IOM guideline of 15 min per hour of physical activity.

Direct observation of physical activity. With respect to direct observation, researchers have developed observation tools (e.g., Children's Activity Rating Scale (CARS) Baranowski, Thompson, Durant, Baranowski, & Puhl, 1993; Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P) Brown et al., 2006) that afford researchers the opportunities to record both levels of physical activity and environmental and social circumstances related to children's observed activity levels. Indeed, direct observation of physical activity and its contextual circumstances may assist us in better understanding what moment-to-moment variables are closely associated with enhanced physical activity and unneeded bouts of sedentary behavior (cf. Brown et al., 2006). Nevertheless, direct observation of physical activity has been time and resource consuming, so fewer direct observation studies have been performed on preschoolers' activity levels, especially with large samples of children (Brown et al., 2006).

With respect to a descriptive direct observation investigation, Finn and Specker (2000) observed 40, 3- and 4-year-old children in a child care setting for 5–6 h with the CARS, while the children also wore accelerometers (M=355 min). With the CARS, trained observers record one of five physical activity levels with level 1 sedentary, level 2 sedentary with only slight movement of arms or torso, and the levels 3, 4, and 5 determined by the observed child's physical movements and the speed and repetition of the movements (see Table 26.2). Observers in Finn and Specker's (2000) investigation scored activity levels every 15 s during classroom activities between 9 am and 3 pm. Finn and Specker's (2000) analyses of the minute-by-minute CARS levels indicated that preschoolers were predominately inactive (i.e., M=1.6 level SD=0.2). In addition, during 66 % of the time samples, observers scored the activity level less than 2, which is sedentary. Observers scored moderate-to-vigorous physical activity during only 1 % of the intervals. Similar to many accelerometry investigations, Finn and Specker's (2000) direct observations clearly indicated patterns of significant inactivity in an early care and education program. Moreover, the CARS scores correlated well with the accelerometry estimates (r=.74).

With respect to another descriptive direct observation investigation, Pate et al. (2008) used the Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P) to record the behavior of 493, 3- to 5-year-old children in 24 early care and educa-

Table 26.2 Brief descriptions of children's levels of physical activity

Activity levels	Brief descriptions
1—Stationary or motionless	Stationary or motionless with no major limb movement or major joint movements (e.g., standing, sitting, riding passively in a wagon)
2—Stationary with limb or trunk movements	Stationary with easy movement of limb(s) or trunk without translocation (e.g., standing up, holding a moderately heavy object, hanging off of bars)
3—Slow easy movements	Translocation at a slow and easy pace (e.g., walking with translocation of both feet, slow and easy cycling, swinging without assistance and without leg kicks)
4—Moderate movements	Translocation at a moderate pace (e.g., walking uphill, two repetitions of skipping or jumping, climbing on monkey bars, handing from bar without leg swinging)
5—Fast movements	Translocation at a fast or very fast pace (e.g., running, walking up stairs, three repetitions of skipping or jumping, translocation across monkey bars with hands while hanging)

tion programs. With the Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P), the investigators integrated the five coding levels from the CARS along with activity types (e.g., walking, running, sitting, squatting, standing). In addition, several other contextual circumstances related to the preschoolers' physical activity were recorded including indoor activity contexts (e.g., large group, preacademic, large blocks) and outdoor activity context (e.g., fixed equipment, balls, open spaces, wheel toys). Finally, social variables related to preschoolers' physical activity were coded (i.e., activity initiator, group composition, physical activity prompts) (for description of Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P), see Brown et al., 2006).

In Pate et al. (2008), a minimum of 5 h of time sampling information was recorded (i.e., two observations per minute) for each child making this one of the largest direct observation data sets to date. On average, children engaged in moderate-to-vigorous physical activity (i.e., levels 4 and 5) for only 2.6 % (SD = 1.9) of the observation intervals and the preschoolers exhibited sedentary behavior (i.e., levels 1 and 2) during 87.3 % (SD = 5.5) of the observation intervals. Similar to Finn et al. (2002) and Pate et al. (2004), Pate et al. (2008) again determined that the early care and education program a child attended explained 27 % of the variance and was the best predictor of children's moderate-to-vigorous physical activity.

Summary of direct observation evidence. Similar to accelerometer-derived descriptive evidence, direct observations of preschoolers' physical activity in early care and education programs clearly indicate that children's inactivity is predominant. This is evident even during outdoor play periods when children presumably have the most opportunities to be more active relative to common indoor activities. For example, with 372 preschoolers observed in outdoor play, Brown and colleagues found that 56 % of their time on playgrounds was sedentary, 27 % light activity (e.g., walking slowly), and only 17 % moderate-to-vigorous activity. This outdoor finding replicates a previous study by Sallis et al. (1988) in which 33 preschoolers spent 58 % of their time in sedentary activity and only 11 % in vigorous activity.

Intervention evidence for enhancing physical activity. In recent years, researchers have investigated interventions to promote preschoolers' physical activity in early care and education settings. Although fewer in number, intervention studies do provide additional evidence about factors that may promote preschoolers' moderate-to-vigorous physical activity and decrease their inactivity.

An example of a potential intervention for preschoolers' playgrounds was a study by Hannon and Brown (2008). They used accelerometry to measure 64, 3-, 4-, and 5-year-old children's physical activity on a university preschool playground. During pre-intervention observations ("business as usual"), the children had

access to a sandbox and scooping toys, tricycles, hula hoops, and basketballs. The post-intervention playground included new play materials strategically placed in activity stations around the playground. Specifically, hurdles to jump over, hoops to jump through, tunnels to crawl in, balance beams to walk on, target tosses, and a wider variety of balls were made available. Interventionists placed playground materials in an irregular circle with sufficient space to support and promote children's running, jumping, and crawling between activity stations. The researchers collected 5 days of pre-intervention and 5 days of post-intervention data. They also used the Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P) coding category for prompts for physical activity to assess whether teacher prompts and encouragements were promoting children's physical activity during pre- and post-intervention play periods. The proportion of teacher prompts was similar with 10.7 % of intervals coded in pre-intervention and 11.4 % of intervals recorded during post-intervention. During pre-intervention play periods, children's outdoor activity was 57.17 % sedentary, 30.60 % light activity, 9.8 % moderate activity, and 2.31 % vigorous activity. These pre-intervention proportions are similar to outdoor playground results found by Brown, Pfeiffer, et al. (2009), and Sallis et al., 1988 in their descriptive nonintervention studies. Following intervention, however, children's sedentary activity decreased by 16 %. In addition, during intervention, moderate-to-vigorous physical activity increased by 12.42 %. Hence, the addition and strategic arrangement of materials that support children's running, jumping, throwing, and crawling may have modest albeit consistent positive effects on children's salubrious physical activity on playgrounds.

In another playground intervention investigation, Brown, Googe, McIver, and Rathel (2009) used single-case reversal and alternating treatment designs to assess the effectiveness of teacher-encouraged playground activities with five preschoolers (i.e., focal children for direct observations) and their classmates in two studies. Specifically, Brown, Googe, et al. (2009) employed two high-interest and vigorous activities (i.e., "track team" with running and "dance party" with high-energy movements) to increase children's moderate-to-vigorous activity on their playgrounds. The intervention package included: (a) teacher-guided discussion of physical activity, (b) a "plan, do, and review" process for pre- and post-playground discussions about healthy activity, (c) teacher "pep talk" immediately before "dance party" and "track team," and (d) teacher participation in and encouragement of children's moderate-to-vigorous physical activity.

Results recorded by the Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P) indicated the teacher planned and implemented activities were successful in enhancing children's moderate-to-vigorous physical activity. For example, in Study 2, using the Observation System for Recording Physical Activity in Children-Preschool Version (OSRAC-P), two girls enrolled in a Title I preschool for preschoolers at risk for school failure had clear and meaningful changes in their moderate-to-vigorous physical activity when teachers encouraged them to participate in "track team." Specifically, with an alternating treatment design, one girl's initial nonintervention baseline was low ($M = 10$ % range = 0–20 %). During the alternating treatment phase, her nonintervention days on the playground continued to be low ($M = 5$ % range 0–20 %). On days when the teacher implemented "track team," her moderate-to-vigorous physical activity was much higher ($M = 92$ % range = 80–100 %). A second girl in Study 2 had similar results for her initial nonintervention baseline ($M = 10$ % range = 0–30 %). During the alternating treatment phases, her physical activity for nonintervention playground periods continued to be relatively low ($M = 13$ % range = 0–30 %). In contrast, during intervention playground activities, her physical activity was enhanced ($M = 72$ % range = 50–90 %). Results for three preschoolers assessed with ABA designs were less dramatic. Nevertheless, similar to Study 2, during intervention the children's moderate-to-vigorous physical activity showed consistent increases over "business as usual" (i.e., baseline days).

In another study, DeMarco, Zeisel, and Odom (2014) developed and evaluated a "Be Active Kids" physical activity program for preschoolers. The investigators selected three early care and education centers with two classrooms per center participating (i.e., total of six classrooms). Activities with written guidelines to enhance preschoolers' physical activity were developed and piloted tested in classrooms of a university-affiliated preschool not included in the subsequent evaluation study.

Teachers and assistant teachers in the six evaluation classrooms participated in a 2-h in-service training led by project staff members. The training consisted of:

(a) Information on importance of increasing physical activity in early care and education programs
(b) Links between physical activity and other developmental areas
(c) Information about motor development in preschoolers
(d) Strategies about how to integrate physical activity into the daily schedule
(e) Tips about how to make sedentary activities more active
(f) Suggestions on how to modify physical activities for preschoolers with developmental delays
(g) Physical activity guidebooks with the opportunity to review selected activities and ask questions about them (DeMarco et al., 2014)

Given that the "Be Active Kids" program was instituted in inclusive early care and education programs across the state of North Carolina, the authors explicitly included accommodations for preschoolers with developmental delays. Nevertheless, in the article, the investigators did not delineate the accommodations used. Using a single-case multiple baseline design across three early care and education programs and two classrooms within each center, the investigators found that 4 out of 6 classrooms saw enhanced moderate-to-vigorous physical activity and 3 of 6 classrooms had increased light activity. In five classrooms, sedentary behavior was decreased. Moreover, increased physical activity was greatest during teacher-directed physical activity, in which 5 of 6 classrooms had both increases in moderate-to-vigorous and light physical activity and concurrent decreases in sedentary behavior. Unfortunately, the physical activity of children with developmental delays was not reported separately from their classmates.

In a well-controlled clinical trial, Reilly et al. (2006) implemented a physical activity intervention with nursery school children ($M = 4.2$ years of age SD = 0.2) in Scotland. A previous pilot investigation in four nursery schools with 60 preschoolers, which was part of the Movement and Activity Glasgow Intervention in Children (MAGIC) study, had indicated that preschool children's physical activity could be enhanced with a physical activity program (Reilly & McDowell, 2003). In the larger follow-up investigation, Reilly et al. (2006) employed a cluster randomized controlled single-blinded research trial over 12 months with 545 preschoolers. The investigators measured body mass index (BMI), physical activity with accelerometry, and motor skills with a fundamental movement skill tests. The intervention consisted of two components, a nursery element and a home element. The nursery school component was delivered by teachers and included an enhanced physical activity program with three 30-min physical activity periods each week for 24 consecutive weeks. The home component included a resource pack of materials to promote physical activity and written materials to encourage physical activity and decrease watching television. Reilly et al. (2006) were not able to replicate the previous positive results from a smaller sample (Reilly & McDowell, 2003) for physical activity but did achieve some changes in motor development. Hence, even within research groups, replications of interventions have not been consistent, and these mixed findings have indicated that much remains to be learned about how to best enhance preschoolers' physical activity.

Summary of selected intervention evidence for enhancing physical activity. Although the descriptive and intervention evidence has been limited to date and at times inconsistent (cf.

Reilly et al., 2006), information on preschoolers' physical activity has been emerging. Moreover, some existing strategies and tactics may be promising practices that might improve preschoolers' physical activity in early care and education programs. Specifically, access to indoor and outdoor open space (e.g., multiple play periods), thoughtful selection and placement of portable play equipment (e.g., balls, hula hoops), and teacher encouragement to participate in high-energy and high-interest activities (e.g., "track team," "dance party") may be employed to improve children's levels of moderate-to-vigorous physical activity. In spite of limited progress to date, much remains to be learned about young children's physical activity and how to improve healthy levels of activity (cf. Pate, O'Neill, Brown, McIver, et al., 2014). Unfortunately, to date, even less is known about the physical activity of preschoolers with developmental delays.

Physical Activity of Preschoolers with Developmental Delays

An important population of young children whose physical activity has rarely been investigated is preschoolers with developmental delays. For the purposes of our chapter, preschool children with developmental delays will include 3-, 4-, and 5-year-old children with an Individual Education Plan (IEP) who receive special education services (e.g., autism, intellectual disabilities, non-specified developmental delays). Preschoolers with various developmental delays constitute about 6 % of the general population. Data from the Office of Special Education Programs of the US Office of Education indicate that over 745,000 preschoolers are enrolled in early childhood special education services (Part B 619 Child Count, 2011).

As mentioned before, the IOM has established the recent guidelines for healthy physical activity for preschoolers without developmental delays. We believe young children with developmental delays need to participate in the similar amounts of physical activity as their peers without developmental delays, especially given that no evidence exists to the contrary. Indeed, almost a decade ago, the *US Surgeon General's 2005 Call to Action to Improve the Health and Wellness of Persons with Disabilities* noted the critical need to engage individuals with disabilities in health promotion and emphasized that optimal health is a goal for everyone (U. S. Department of Health and Human Services & Office of Disease Prevention and Health Promotion, 2005). The exception to this view will be children with special health-care needs that limit their participation in vigorous and moderate-to-vigorous physical activity.

By age three, preschool children with identified developmental delays are already at greater risk for obesity than their peers without developmental delays, and this risk increases between the ages of 3–5 years (Emerson, 2009). Moreover, certain conditions, such as autism spectrum disorders and Down syndrome, may place children at greater risk for overweight and obesity than peers without developmental delays or children with other developmental conditions and diagnoses (Krahn, Hammond, & Turner, 2006; Rimmer & Yamaki, 2006; Rimmer, Yamaki, Lowry, Wang, & Vogel, 2010). Similar to peers without disabilities, regular physical activity may provide health benefits and might reduce overweight and obesity among children with developmental delays.

Unfortunately, physical activity assessment among individuals with disabilities has rarely been performed, particularly among preschoolers with developmental delays (see Frey, Stanish, & Temple, 2008; Hinckson & Curtis, 2013; Lang et al., 2010 for reviews). In spite of the Surgeon General's call to action, the field of physical activity among individuals with developmental disabilities is still in its infancy, and most existing studies focus on physical activity of older children (i.e., 6 years of age through adulthood). Our review of the literature on physical activity of children with developmental disabilities has revealed that research in the area is much more limited than investigations of preschoolers without developmental delays. For example, of 19 studies reviewed by Frey et al. (2008), only several contained any preschool-aged participants. Similarly, Lang et al. (2010) reviewed 18 studies, and they revealed that

only five children less than 6 years of age were included among the study samples. Finally, Hinckson and Curtis (2013) found that objectively measured physical activity of young children with developmental delays has been extremely rare, especially with preschool-aged children.

Of the studies reviewed by Hinckson and Curtis (2013), a general consensus was reached that children and youth with developmental delays are less active than peers without developmental delays. For example, Whitt-Glover, O'Neill, and Stettler (2006) examined the physical activity patterns of children ages 3–10 years with Down syndrome ($M = 6.6$ years) as compared to a sibling without developmental delays ($M = 7.7$ years). Children with Down syndrome and their sibling wore an Actitrac activity monitor on the waist over the hip for 7 consecutive days to record daily inactivity, light physical activity, moderate physical activity, and vigorous physical activity. No significant differences between children with Down syndrome and their siblings without developmental delays were observed for activity levels except for vigorous physical activity. Children with Down syndrome participated in significantly less daily vigorous physical activity compared to their siblings without developmental delays, and the average bouts of vigorous physical activity were shorter among children with Down syndrome. Results of the Whitt-Glover et al. (2006) study complimented those of an earlier study on children with Down syndrome and their siblings without developmental delays (Sharav & Bowman, 1992). Thirty parents were asked to report perceived levels of activity among their children with Down syndrome (aged 2–11 years) in comparison to siblings without developmental delays (aged 2–14 years), and parents reported their children with Down syndrome were less active ($t = 2.9$; $p < 0.007$).

Some evidence exists, however, which suggests that young children with developmental delays may have similar levels of physical activity as children without developmental delays, but differences between groups become more apparent as children become older (Stevens, Holbrook, Fuller, & Morgan, 2010). Stevens et al. (2010) assessed daily step activity and percentage of active time among children with cerebral palsy ages 4–18 years ($n = 27$) as compared with age- and sex-matched children without developmental delays ($n = 27$). Orthocare SAM activity monitors were given to participants to be worn on the right ankle during 3 weekdays and 1 weekend day. No differences in daily step activity were noted among children with cerebral palsy under 10 years when compared to children without developmental delays; however, differences between groups were observed among the older children who were 10–18 years of age. Older children with cerebral palsy were more inactive than peers without developmental delays ($F = 18.94$, $p < 0.001$) as well as younger children with cerebral palsy ($F = 14.89$, $p = 0.001$). Age-related declines in physical activity have also been noted among children with autism spectrum disorders; however, these observational studies failed to include children younger than 7 years of age (e.g., MacDonald, Esposito, & Ulrich, 2011; Memari et al., 2013).

Physical Activity Interventions for Preschoolers with Developmental Disabilities

Existing physical activity interventions for preschool children with developmental delays have not assessed physical activity as a primary outcome. Rather, variables of interest have been the affect of physical activity on stereotypic behaviors, gross motor behaviors, and muscle strength (e.g., Lang et al., 2010; Verschuren, Ketelaar, Takken, Helders, & Gorter, 2008). To our knowledge, carefully performed descriptive and intervention investigations which use objective measures to assess physical activity as a primary outcome of modest to large samples of preschoolers with developmental delays are simply nonexistent in the literature. Given the paucity of information regarding the physical activity of preschool children with developmental delays, priority ought to be given to conducting careful descriptive investigations, which may inform the development of appropriate physical activity intervention strategies.

Evidence-Informed Recommendations for Preschoolers' Physical Activity

In recent years, professionals have frequently discussed evidence-based practices for the field of early childhood education (e.g., Buysse & Wesley, 2006; Winton, 2010). Nevertheless, all too often day-to-day practices have not met the rigorous guidelines required for determining evidence-based practices (cf. Odom et al., 2005). We believe that many practices related to young children's physical activity in early care and education programs, especially for preschoolers with developmental delays, will need to be based on existing albeit limited descriptive and intervention evidence for preschoolers without developmental delays. Moreover, until future well-crafted investigations with children with developmental delays are performed, the extant literature with children without developmental delays will have to inform our thinking about day-to-day physical activity practices in early care and education programs.

Promising practices. As mentioned above, to our knowledge, carefully performed intervention investigations with objective measures of physical activity as the primary outcome for preschoolers with developmental delays are nonexistent. Nevertheless, as we discussed above, a descriptive and intervention literature concerning preschoolers' physical activity has been emerging for children without developmental delays. In the remainder of our chapter, we will delineate several reasonable practice recommendations based on our understanding of the extant literature with children without developmental delays. We will employ a trifold framework, proposed by Bower et al. (2008) after they evaluated 20 North Carolina preschools. Specifically, they described three essential elements: (1) many opportunities for children's physical activity, (2) children's access to play equipment and materials that promoted their physical activity, and (3) teachers' professional development and intentional teaching to enhance children's physical activity (i.e., "supportive preschools" with children's enhanced physical activity). We believe these three elements form promising practices for reasonable recommendations that are feasible, acceptable, and useful for teachers' day-to-day practices in early care and education programs (cf. West, Brown, Grego, & Johnson, 2008).

Opportunities for physical activity. First and foremost among recommendations for promoting preschoolers' moderate-to-vigorous physical activity is to provide them with additional opportunities for physical activity in open spaces both indoors and outdoors. Given that young children are much more active during play periods, multiple outdoor, and indoor activity when space is available (e.g., gross motor activity room, gymnasium), may be critically important for children's increased opportunities for and participation in moderate-to-vigorous physical activity. Simply spending more time in open space has been associated with promoting children's moderate-to-vigorous physical activity (cf. Brown, Googe, et al. (2009)). In addition, two independent research groups have shown that preschoolers are more active during the first several minutes of recess than during the subsequent minutes of play on playgrounds (McKenzie et al., 1997; Pate, Dowda, Brown, Mitchell, & Addy, 2013). Hence, multiple recess periods in open spaces of shorter duration may be better than longer recess periods for enhancing young children's moderate-to-vigorous physical activity. For example, four 15-min play periods may be better than two 30-min recesses across the preschool day.

Access to and arrangement of activity-friendly equipment and materials. Second, as Hannon and Brown (2008) showed in their "activity-friendly" playground intervention and Brown, Googe, et al. (2009) in their descriptive study, some playground materials may promote children's moderate-to-vigorous physical activity. Specifically, providing a variety of playground balls, activity stations, and parachutes, scarves, flags, and hula hoops may encourage many preschoolers to engage in moderate-to-vigorous activity. For example, many children may be more likely to run if they have small flags or scarves to wave in the wind. Similarly, use of

balls for kicking or shooting at preschool-level basketball goals may promote more activity. Similar to selecting indoor toys, teachers' careful observation and selection of "activity-friendly materials" to promote preschoolers' moderate-to-vigorous physical activity is especially important (cf. Hannon & Brown, 2008).

Even with plentiful access to open spaces and activity-friendly equipment and materials, teachers' purposeful encouragement, acknowledgment, and involvement in physical activity may better promote and support children's moderate-to-vigorous physical activity. For example, even with a variety of balls, teachers will need to be prepared to teach specific skills (e.g., stop the soccer ball and then kick it, catch the ball with both hands) and basic rules (e.g., no pushing when running with other children, dance in your own space, run to the base) to minimize potential problems and to promote replacement behaviors among children who are learning basic motor and game skills.

Intentional teaching of physical activity. Early childhood educators have begun to advocate that teachers become more intentional and purposeful with their preschool activities (cf. Epstein, 2007). Intentional teaching of physical activity is similar to Bower et al.'s (2008) report of teacher professional development and engagement in preschool physical activity. With respect to preschoolers' physical activity, as suggested above, this can include increases in scheduled opportunities for moderate-to-vigorous physical activity with more time allocated to play in open spaces with activity-promoting materials and activities. In addition, as mentioned above, the judicious selection and use of play materials (e.g., portable play equipment) and group games (e.g., "track team") that promote moderate-to-vigorous physical activity can be especially helpful in supporting children's increased physical activity for brief periods throughout the day. Teachers monitoring how children play with materials during less-structured preschool activities may assist them in determining what materials, equipment, and spatial circumstances promote moderate-to-vigorous physical activity. Even during large group activities, and classrooms which are typically sedentary and related to general knowledge and preacademics, increased physical activity may be embedded with short 5-min activity breaks that are high-interest fun activities such as "dance party." In addition, preacademic lessons can be integrated with physical activity, while preschoolers practice in reciting or acting out information such as letters, rhyming, and counting (e.g., Howie et al., 2014; Trost, Fees, & Dzewaltowski, 2008).

Summary. In essence, intentional teaching related to preschoolers' physical activity incorporates all three essential elements advocated by Bower et al. (2008): (1) more opportunities for moderate-to-vigorous physical activity, (2) children's access to "activity-friendly" play materials and equipment, and (3) teachers' professional knowledge and engagement in promoting children's physical activity. Of course teacher monitoring and participation in activities may be helpful especially as preschool children are just beginning to learn appropriate uses of materials and how to participate meaningfully in new activities, especially small group activities or games. Finally, teachers' explicit encouragements (i.e., positive and clear verbal prompts to evoke children's physical activity) and acknowledgments (i.e., explicit praise for increased efforts associated with moderate-to-vigorous physical activity) should also be helpful in promoting and supporting children's physical activity during appropriate preschool circumstances (e.g., outdoor play, activity breaks during large group, high-energy and interest games with activity). Until a stronger evidence-based policy and practice literature is established and disseminated, these three essential elements may be feasible, acceptable, and useful to teachers who are interested in promoting young children's salubrious physical activity in early care and education programs.

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27 Expanding Frontiers in Research Designs, Methods, and Measurement in Support of Evidence-Based Practice in Early Childhood Special Education

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The use of rigorous group experimental designs, including randomized controlled trials (RCT) or randomized field trials (RFT), to evaluate interventions is not new, although enthusiasm for their use in early childhood special education (ECSE) has waxed and waned over the years (Snyder, 2011). For a number of years, the field debated the value and feasibility of conducting rigorous group design experiments in applied settings that involved young children with disabilities or their families (e.g., Bricker, Bailey, & Bruder, 1984; Snyder, 2006; White & Pezzino, 1986). We have evolved to understanding and appreciating these designs in the context of addressing second-generation research questions in the field (Guralnick, 1997), with recognition of their inherent strengths, limitations, and implementation challenges (Snyder, 2011; Wolery, 2011). In the context of evidence-based practice, RCTs or RFTs often are characterized as the "gold standard" of group experimental designs, particularly when interest centers on answering questions about whether *x* causes *y*, that is, if there is a systematic treatment effect (Mosteller & Boruch, 2002; Shavelson & Towne, 2002). These types of designs, when properly conceptualized and implemented, can help inform and advance practices in the field. They contribute to evidence-based practice, particularly activities focused on the identification of the best-available evidence and what works (on average) for particular groups under certain (controlled) conditions (Snyder, 2006, 2011).

As noted by Shavelson and Towne (2002), several conditions must be met when research designs focus on examining cause-effect relationships. First, a relationship between *x* and *y* must be identified. Next, there should be confirmation that *x* precedes *y* in a temporal sequence. Third, plausible rival explanations for the observed relationships should be considered and ruled out. This latter condition is the basis for causal inference. As is widely recognized, RCTs and RFTs, when properly designed and implemented, can provide the most compelling

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evidence to support causal inference. This is because the mechanism for assigning participants to groups is random, and threats to internal validity due to selection are minimized (Shadish, Cook, & Campbell, 2002).

Unfortunately, the conditions under which experimental research is conducted in ECSE are not always amenable to RCTs or RFTs. Cook and Campbell (1979) outlined a number of situations in which these designs might not be suitable or feasible. The inability to conduct RCTs or RFTs, however, does not preclude the conduct of rigorous research studies in which *plausible causal evidence* in support of evidence-based practice is accumulated. In this chapter, we use the term *plausible causal evidence* to refer to evidence derived from studies in which participants are not randomly assigned to treatment groups, and, as a result, findings are more susceptible to design validity threats that could prohibit making definitive causal inferences.[1]

The purpose of this future frontiers chapter is twofold. First, we discuss advances in research designs and methods useful for generating plausible causal evidence in ECSE. Second, we describe contemporary perspectives about measurement and present example applications in ECSE. We begin the chapter by reviewing briefly the strengths, limitations, and implementation challenges associated with the conduct of RCTs or RFTs in ECSE research. This includes discussion of various design validity threats and issues related to causal inference. We then consider quasi-experimental and correlational research designs and discuss circumstances under which these designs might be appropriately and usefully applied to generate plausible causal evidence in ECSE research. Examples of studies that have used these alternative designs will be provided and issues that arise when using these designs will be described. The final section of the chapter focuses on measurement. We review current conceptualizations about reliability and validity and illustrate how generalizability theory and item response theory (IRT) represent measurement advances for application in ECSE.

[1] It is important to acknowledge, that findings from RCTs or RFTs might also be susceptible to design validity threats (e.g., differential attrition, poor fidelity of intervention implementation).

Randomized Controlled Trials: The Power of Randomization

In RCT designs, random assignment of participants to experimental conditions permits causal inferences to be made with more certainty than other types of group experimental designs. Through random assignment, threats (extraneous factors) that can compromise the ability to establish a functional relationship between *x* and *y* are significantly reduced or eliminated. The power of randomization is that when random assignment is correctly implemented, equivalence is more likely between treatment and control conditions on extraneous factors that might be identified by the researcher as well as those factors that the researcher might not have identified (Thompson, 2006).

Randomized experiments provide estimates of **average** causal effects. This is an important and often overlooked caveat—"average effects imply that in most cases, the intervention works better for some participants than others" (Snyder, 2006, p. 58). Establishing an average causal effect does not preclude the possibility that the intervention does not affect some participants and may have a negative effect on others. Nevertheless, if a research question focuses on does *x* cause *y* and if interest is on obtaining estimates of average causal effects under controlled conditions, then RCTs or a series of RCTs can offer important evidence to inform practice in ECSE (Snyder, 2011).

A Brief Review of Design Validity Threats and Causal Inference

All experiments are based on a logical structure or design. Experimental designs systematically vary something or introduce change into natural phenomenon, and the outcomes or effects of those changes are examined (Shadish et al., 2002). One

important feature of experiments is the researcher's ability to manipulate or control variables and measurements to rule out rival explanations for the cause-effect relationship between *x* and *y*. Rival explanations involve potential influences from extraneous variables. These variables can be extrinsic factors related to the environment or experimental situation or intrinsic factors related to characteristics or motivations of study participants. When extraneous factors are not controlled, they can exert a confounding influence, which, in turn, can compromise the ability to rule out rival explanations for the cause-effect relationship. In addition, confounds can limit support for counterfactual inference—what would have happened in the absence of treatment. Rigorous group experimental designs are designed to control for confounding influences by either eliminating or reducing them to the maximum extent possible or by demonstrating they affect all experimental groups equally.

It can be difficult to eliminate confounding influences completely in applied experimental research in ECSE. Even though causality can never be demonstrated with complete certainty, one strength of randomized designs is that random assignment helps eliminate or reduce internal validity threats, particularly selection threats. Campbell (1957) referred to these threats as plausible rival hypotheses.

Four types of design validity threats generally are described in the experimental design literature, including in seminal work by Cook and Campbell (1979) and Shadish et al. (2002). Cook and Campbell defined validity and invalidity as "the best available approximations to the truth or falsity of propositions, including propositions about cause" (p. 37). The four design validity threats they described are (a) internal validity, (b) external validity, (c) statistical conclusion validity, and (d) construct validity. Internal validity threats refer to the potential for confounding or extraneous factors rather than the experimental treatment to relate to observed changes in the dependent variable. Building off seminal work by Campbell and Stanley (1963), who introduced the terms internal and external validity, Cook and Campbell described statistical conclusion validity as another form of validity focused on examining rival explanations for observed relationships (covariation) between *x* and *y*. These authors asserted it was important to consider the statistical reasons why false conclusions about covariation might be drawn and pose threats to valid cause-effect inferences. Hence, the term statistical conclusion validity was used to refer to this type of validity threat. External validity threats compromise the extent to which inferences about cause-effect relationships can be generalized across persons, settings, treatment variables, and measurement variables. Cook and Campbell (1979) described construct validity of cause and effects as a form of external validity because it refers to "the approximate validity with which we can make generalizations about higher-order constructs from research operations" (p. 38). Table 27.1 lists and defines each of these types of validity threats, gives examples of various types of threats, and illustrates how these threats might be represented in applied experimental research in ECSE.

Two perspectives related to causal inference have appeared in the literature and are important to acknowledge when considering various experimental designs and design validity threats. Rubin's (1974) approach and its associated modern statistical approach use formal statistical criteria (Hedges, 2010). Campbell and colleagues (Campbell & Stanley, 1963; Cook & Campbell, 1979; Shadish et al., 2002) discuss causal inference from a scientific method perspective and emphasize the four types of validity threats described previously, which are likely to confront social science researchers. Others have provided an approachable discussion of both causal inference perspectives with an emphasis on causal inference and generalization for experimental and quasi-experimental design studies conducted in field settings (e.g., Shadish, 2010; West, Biesanz, & Pitts, 2000; West & Thoemmes, 2010).

Table 27.1 Examples of validity threats in causal research

Validity type	Definition	Validity threats	ECSE example
Internal validity	The extent to which there are no rival explanations for the observed effect	Ambiguous temporal precedence—lack of clarity about which variable occurred first	Data are analyzed from a cross-sectional sample of data in a large-scale data set without clear understanding about the temporal sequence of action and response
		Selection—systematic differences in participants across conditions that impact the treatment outcome	An intact group of parents volunteer to participate in a parenting intervention rather than being randomly assigned to an intervention or control condition
		History—events that occur concurrently with treatment and might impact the observed effect	During a study examining the efficacy of a dialogic reading intervention, the participating school district adopts a new literacy curriculum and provides training and coaching to teachers to implement the new curriculum
		Maturation—naturally occurring changes over time that might be confused with a treatment effect	The primary dependent variable for an evaluation of a public preschool program is a standardized measure of children's early literacy and numeracy skills. Children are assessed at age 4 before they enter the program and again at kindergarten entry?
		Regression—when participants are selected for treatment based on extreme scores, other measured variables are likely to be less extreme, which can be interpreted spuriously as a treatment effect	Children who score in the lowest 25th percentile on a receptive vocabulary assessment are selected to receive a targeted language intervention
		Attrition—loss of participants that is systematically correlated with treatment condition	20 % of teachers in a study examining a professional development intervention withdraw from the study after learning they will be in the control condition and will have to wait 2 years to receive the interveniton
		Testing—prior exposure to a test influences subsequent exposures	In a study examining the efficacy of a targeted language intervention, the same assessment is used to probe children's expressive vocabulary at four time points during the 8-week study
		Instrumentation—the nature of a measure changes over time or conditions	In a longitudinal study of children's growth and development from birth through age 5, parents are asked a number of questions related to their child's physical and cognitive development. Although there is an attempt to maintain consistency in questions over time, some questions are eliminated and others are added as children grow older in order to avoid respondent fatigue due to a large number of questions that are not relevant for the child's age
External validity	The extent to which a causal relationship persists across different participants, settings, treatments, or outcomes	Interaction of the causal relationship with units—an effect found with a particular type of unit does not hold with another type of unit	Findings of a study conducted with a sample of young children whose household income is >200 % of poverty are not replicated for children whose household income is below this poverty threshold
		Interaction of the causal relationship over treatment variations—an effect found with one variation of treatment does not hold with another variation	The size or direction of treatment effect is not replicated when a 15-week versus 10-week professional development intervention focused on embedded instruction for early learning is examined
		Interaction of the causal relationship with outcomes—an effect found with one type of outcome measure does not hold with another type of outcome measure	An intervention focused on increasing responsive interactions between parents and children is shown to have a positive effect on parents' perspectives of their relationship with their children who have disabilities, but there is no evidence of treatment effect on their responsiveness during daily routines
		Interaction of the causal relationship with settings—an effect found in one setting does not hold in another type of setting	Children who participate in a language intervention delivered in a clinical setting show improvements in their receptive and expressive vocabulary, but when the intervention is delivered in the classroom, there is no evidence of a treatment effect

Construct validity	The extent to which the study operations match the constructs used to define those operations	Inadequate explication of constructs	Failure to provide an operational definition of different categories of aggressive behavior for an observational coding system results in systematic error of measurement of these categories
		Mono-operation bias—only one measure is used to measure outcomes, only one manipulation of the independent variable occurs (i.e., intervention vs. control), or the study is carried out in only one setting. Using only one operationalization of a construct underrepresents the construct of interest and measures irrelevant constructs	In a study focused on examining literacy outcomes, only a receptive vocabulary measure is used
		Mono-method bias—using only one method to operationalize constructs results in the method becoming part of the construct	All of the outcome measures in a study examining child outcomes use teacher-report methods
		Confounding constructs with levels of constructs—the constructs that best represent study operations fail to describe limited levels of a construct that were studied	In a randomized study where teachers in the intervention condition received a 3-day *workshop* to implement a new curriculum, the researcher finds no evidence of treatment effect and concludes that *professional development* does not impact teacher's implementation of the curriculum
		Treatment-sensitive factorial structure—the structure of a measure changes as a result of treatment	A questionnaire designed to capture teachers' attitudes about inclusion is administered as a pre-post test to new ECE teachers. One group of teachers attends a 1-day seminar where they learn about the benefits of inclusion for children with and without disabilities, and the other group does not attend the seminar. A factor analysis supports a one-factor measurement model for teachers who had not attended the seminar and a 3-factor model for teachers who did
		Reactive self-report changes—self-reports are affected by participant motivation to be selected for a particular treatment	Teachers are asked to complete questionnaires about children's challenging behavior and social skills prior to being assigned to receive classroom supports to implement positive behavior supports in their classroom. Several teachers report more challenging behavior in their classroom in hopes that they will be selected to receive treatment based on a higher level of need
		Reactivity to the experimental situation—participant responses reflect expectations about a particular treatment in addition to treatments and measures	When an observer is present in the classroom, teachers change their implementation of teaching practices to match what they believe are the observer's expectations of them
		Experimenter expectancies—the experimenter conveys expectations about responses, thereby influencing participant responses or judgment-based observational ratings	Observers who are not blind to treatment condition score a judgment-based rating scale more leniently for teachers in the intervention group than the control condition
		Novelty and disruption effects—participants respond unusually well or poorly to a treatment depending on its novelty or the level of disruption to the normal routine	An intervention that impedes current services offered by an inclusive preschool program is found to be less effective than it might be if it were aligned with current services being provided in the program
		Compensatory equalization—administrators, staff, or other stakeholders provide compensatory services to participants who do not receive the treatment	In a multiyear study, a school district begins to notice changes in child outcomes for preschool classrooms that have been randomly assigned to implement a new language and literacy curriculum. The district administration is worried about meeting accountability standards and does not think it is fair to withhold an effective curriculum from other teachers in the district, so they purchase it for all the classrooms in the district before the study ends
		Compensatory rivalry or resentful demoralization—participants in the comparison condition change their behavior based on their treatment assignment	Participants in the comparison group try harder to implement instructional practices that are the focus of a study to show they can implement as well as participants in the treatment group
		Treatment diffusion—participants receive elements of a treatment condition from which they were not assigned	In a study examining the impact of a tiered literacy intervention, teachers who are assigned to receive training to implement the intervention share materials, resources, and implementation guides from their training with teachers who are in the control condition

(continued)

Table 27.1 (continued)

Validity type	Definition	Validity threats	ECSE example
Statistical conclusion validity	The extent to which inferences about the presence and strength of covariation between the cause and effect are reasonable	Low power—leads to incorrect conclusions that there is no treatment effect	The sample size of 20 teachers in a two-group intervention study is not sufficiently powered to detect effects against an alpha level of .05, beta of .80, and estimated effect size of .30
		Violated assumptions of statistical tests—lead to over- or underestimating the size and statistical significance of effect	Children are nested in teachers' classrooms in an intervention study and child-level measures are collected in each teacher's classroom so child-level scores are not independent of the teacher. If data analyses do not accommodate the nested structure of the data, biased estimates of standard errors of measurement could occur
		Unreliability of measures—weakens or strengthens the associations of variables, depending the number of variables	There is systematic measurement error due to raters for a primary dependent observation measure, weakening the association between the intervention and this outcome
		Restriction of range—usually weakens the relationship between variables	For an instrument with a 7-point Likert scale, 80 % of participants score in the 4–6 range
		Unreliability of treatment implementation—potentially weakens the relationship between the treatment and outcomes	Teachers deliver a multicomponent language intervention (i.e., independent variable), but treatment fidelity reveals only some of the intervention components were delivered at the frequency proposed for the study
		Fishing and test-wise and experiment-wise error rates—failure to correct for repeated tests for statistical significance, resulting in artificially inflated estimates of treatment effect	Multiple tests of statistical significance are conducted without correcting or adjusting alpha level for the number of tests performed
		Extraneous variance in the experimental setting—features of the experimental setting inflate error	The researcher administers a standardized assessment to children with disabilities under varying conditions (e.g., in a noisy classroom, in the child's home, in a therapy room)
		Heterogeneity of units—increased variability in outcomes within conditions that results in increases in error variance	Children in both experimental and control conditions in an emergent literacy intervention study have a wide range of cognitive and language abilities that impact their responses to assessment items
		Inaccurate effect size—the use of statistics that systematically over- or underestimate the size of an effect	Effect size is calculated for a study sample in which outliers skew the distribution of scores

Note: Examples are based on definitions provided in Shadish et al. (2002, pp. 33–93).

Advances in Experimentation: Alternatives to RCTs

We have described that experimental research designs in which participants are randomly assigned to treatment and comparison groups often are considered the "gold standard" for supporting causal inferences. Cook and Campbell (1979) and Shadish et al. (2002) outlined a number of situations in which RCTs might not be suitable or feasible, however. Cook and Campbell (1979) advanced discussions about the potential contributions of rigorous quasi-experimental designs to "probe causal hypotheses about a wide variety of substantive issues in both basic and applied research" (p. ix). They noted quasi-experimental designs have treatments, outcome measures, and experimental units but do not use random assignment to create comparisons to be examined for causal inference. By this definition, a quasi-experimental design encompasses both non-randomized studies in which the researcher manipulates treatment and studies in which a treatment or condition is defined but is not manipulated by the researcher. Studies of this latter description have often also been referred to as observational or correlational studies. In the present chapter, we use the term "quasi-experimental" to refer to non-randomized studies in which there is manipulation of a treatment, and "correlational" to refer to studies in which there is not. Both designs can be conducted with rigor to accumulate plausible causal evidence, and in the present chapter we describe the designs and statistical methods that can be implemented to improve the validity of findings from such designs.

The intuitive appeal of distinguishing quasi-experimental designs from true experimental or correlational designs and articulating taxonomies or levels-of-evidence hierarchies has dominated efforts to identify the best-available research evidence in the context of evidence-based practice (Snyder, 2006). A number of research methodologists have asserted that rather than focusing solely on the taxonomies of research designs and the extent to which various designs permit causal inference, we should focus attention on elemental design units such as assignment strategies, measurement occasions, and the advantages of different combinations of design features (Boruch, 1975; Trochim, 1986). This focuses attention to design principles and issues that cut across true experiments, quasi-experiments, and correlational studies, including principles and issues of applied measurement, which are discussed later in this chapter.

The next sections of the chapter highlight quasi-experimental and correlational research designs that might be useful for generating plausible causal evidence in ECSE. Although there are notable differences in the implementation of quasi-experimental and correlational research designs, there are many parallels in the ways in which these designs can be used to generate plausible causal evidence. To avoid redundancy, we present issues common to quasi-experimental and correlational designs in the context of quasi-experimental designs and include a discussion of issues relevant to correlational designs following the general presentation. We outline specific research designs and analytical approaches that can be used to generate plausible causal evidence, focusing on basic concepts of the design or analytical approach, advantages and limitations of the design or analytical approach, and, when applicable, special considerations for implementing the design or approach under correlational research conditions. The intent of this discussion is to highlight the utility of the design for generating plausible causal evidence in ECSE, to direct the reader to seminal resources on the topic, and, when possible, to illustrate how specific research designs or analytical approaches have been applied in either ECSE or in early care and education (ECE).

We begin with a discussion of how common treatment effects can be estimated, followed by a discussion of Rubin's potential outcomes framework for causal inference (Holland, 1986; Rubin, 1974, 1986) as a way of introducing a key limitation of non-randomized research designs: the validity threat of selection bias. Next, we present information on nonequivalent comparison group designs (NECGDs; also called nonexperimental group designs or nonexperimental control group designs), followed by regression discontinuity designs (RDDs) and interrupted time series designs (ITSDs).

Estimates of Treatment Effect

Numerous treatment effects can be estimated to examine causal or plausible causal relationships. We present information about three types of treatment effects to situate our discussion about the limitations of estimating treatment effects in quasi-experimental and correlational research, as well as the relative advantages and limitations of the research designs and statistical methods that follow.

The two treatment effect estimates used most commonly and that are applicable to ECSE research are average treatment effect (ATE), average treatment effect on the treated (ATT/TOT). The ATE is defined as the mean difference in expected observed outcomes for all individuals should they be exposed to the treatment condition and the expected observed outcomes for all individuals should they be exposed to the comparison condition (Morgan & Harding, 2006; Winship & Morgan, 1999). In contrast to ATE, the ATT (also referred to as TOT) represents the mean difference in the expected observed outcomes for individuals who received treatment and their expected outcomes if they had not been exposed to the treatment condition. An additional method for estimating treatment effects is to conduct intention-to-treat (ITT) analyses involves estimating effects on the basis of assignment to study conditions (Fisher et al., 1990). ITT analyses include all participants who were assigned to a study condition, and are typically used to overcome biased effects of treatment introduced to RCTs via differential attrition or noncompliance in the administration of the independent variable. The research designs and statistical methods described in the present chapter do not all lend themselves to estimating each of these treatment effects; therefore, an important consideration in the application of any of these methods is whether it is amenable to estimating the treatment effect of interest. Furthermore, the estimation of any of these treatment effects with quasi-experimental or correlational data presents limitations related to counterfactual inference due to the threat of selection bias.

Rubin's Potential Outcomes Framework

Rubin's potential outcomes framework (Holland, 1986; Rubin, 1974, 1986), which stems from the work of Neyman (1990/1923), is a common model for conceptualizing the problem of estimating treatment effects using nonexperimental data. Rubin's framework states: (a) all individuals in the population have potential outcomes from each treatment condition, (b) the outcomes associated with a particular treatment condition will only be observed in the presence of that treatment, and (c) the outcomes associated with no treatment or an alternative treatment will only be observed in the absence of the treatment (Guo & Fraser, 2014).

Consider a study with one treatment and one comparison group. Let Y_T denote the potential outcome under the treatment condition and Y_C the potential outcome under the comparison condition. The potential outcomes distribution is the bivariate distribution of Y_T and Y_C. Under Rubin's potential outcomes framework, unbiased estimation of the treatment effect is only possible if assignment to treatment condition is uncorrelated with the potential outcome distribution, conditional on observed covariates (Rosenbaum & Rubin, 1983a). This is known as the *strong ignorability of treatment* assumption. When participants are randomly assigned to treatment and nontreatment conditions, any nonequivalence between groups is assumed to be random, and the strong ignorability of treatment assumption is met. When participants are not randomly assigned to groups, as in quasi-experimental and correlational research designs, it is unlikely this assumption will be met; however, there are a number of strategies that can be applied in both the design and the analysis of quasi-experimental and correlational studies to improve estimation of the treatment effects described previously (i.e., ATE, ATT/TOT, ITT). Three research designs have been proposed to address issues that arise due to nonrandom assignment: NECGDs, RDDs, and ITSDs.

Nonequivalent Comparison Group Designs

NECGDs are among the most commonly implemented nonexperimental research designs (Campbell & Stanley, 1963; Cook & Campbell, 1979; Shadish et al., 2002). A key feature for generating plausible causal evidence from an NECGD is the inclusion of a pretest. Although it is possible to conduct NECGDs without collecting pretest data, this approach is likely to limit interpretability of findings significantly (Cook & Campbell, 1979; Shadish et al., 2002). Pretests can be applied in a number of ways in NECGDs. One of the simplest applications of the pretest is first to collect pretest data for all participants, apply the treatment or intervention, and then collect posttest data for all participants. This type of design is often represented using the following notation:

$$\text{NR}, O_1, X, O_2$$

$$\text{NR}, O_1, O_2$$

where "NR" denotes nonrandom assignment, "*O*" denotes collection of dependent variable data, and "*X*" denotes application of a treatment or intervention. Numerous additional NECGDs have been described and illustrated in texts focused on nonexperimental research designs (e.g., Cook & Campbell, 1979; Shadish et al., 2002). The availability of pretest data allows the researcher to determine the extent to which groups were equivalent before the application of an independent variable and shifts the focus of the research question from examining differences across groups at one point in time (i.e., posttest) to differences in how the groups change over time (May, 2012). In addition, this design increases the likelihood that the strong ignorability of treatment assumption will be met by allowing for control for the pretest covariate.

Advantages of NECGDs. NECGDs can be implemented as potentially viable alternatives to RCTs. Although they are not likely to yield conclusive causal evidence, there are conditions under which these designs can be implemented to yield similar estimates to RCTs (Shadish, 2011). The use of pretests in NECGDs is a relatively simple mechanism for reducing selection bias associated with violations of the strong ignorability of treatment assumption (Shadish, 2011; Shadish, Matt, Navarro, & Phillips, 2000; Steiner, Cook, Shadish, & Clark, 2010). When NECGDs are carried out as quasi-experimental research designs, the researcher is also able to consider and collect data on additional covariates that might be used to partially model the selection process in order to alleviate selection bias (additional information about reducing selection bias is found in the *Traditional Approaches for Reducing Selection Bias* section in the present chapter). In addition, the researcher can determine a priori which data might be helpful to collect in order to control for additional threats to validity, such as maturation and history. When such considerations are taken into account and represented in the design of a NECGD, the likelihood of the design yielding accurate estimates of treatment effect is increased (Shadish, 2011).

Limitations of NECGDs. Although it is possible to reduce the impact of validity threats on estimates of treatment effects in NECGDs, it is unlikely these designs will yield completely accurate estimates of treatment effect for a number of reasons. First, the analytical procedures commonly used to analyze data from NECGDs are limited in their ability to remove the influence of selection bias. This is particularly true if the instruments used to collect pretest data do not yield perfectly reliable measurements of the pretest construct (May, 2012; Shadish, 2011; Shadish et al., 2002). Methods such as structural equation modeling (SEM) can be used to model measurement error and improve estimation in the typical situation in which only fallible measurement is possible. Second, although it is possible to model some aspects of the treatment-selection mechanism, it is improbable the selection process will be known completely.

Constructing a thorough model of the treatment-selection mechanism involves collecting data on a number of covariates in addition to pretest data. This has implications for the practical

implementation of NECGDs, because it requires additional resources and can impose additional burden on research participants. As with pretest data, the degree to which these data help to alleviate selection bias is highly dependent on the reliability of covariate measurements obtained from the data collection instruments (Shadish et al., 2002; Steiner, Cook, & Shadish, 2011).

Special considerations for correlational designs. An appealing feature of correlational NECGDs is they are likely to permit the larger sample sizes necessary to yield estimates of treatment effect similar to those of RCTs; however, there are a number of considerations that must be taken into account when an NECGD involves correlational data. Each of these considerations stems from the fact that correlational studies do not involve direct manipulation or application of treatments. In many cases, these designs involve conducting secondary analyses of large-scale data sets, which include a plethora of variables from which a researcher might retrospectively construct "treatment" and comparison conditions. As such, the researcher has limited control over the quality and nature of the data available for analysis. For example, the researcher is not at liberty to determine the data collection instruments or the variables for which data are collected, which might result in some observed variables serving as proxies for variables that were not collected during primary data collection. In addition, the researcher might have limited access to information about the procedures used to collect data or the reliability and validity of measurements collected in the primary study. The timing of data collection might also impact the study. For example, if a researcher were to conduct an NECGD using data from a large-scale national longitudinal study in which data were collected every 2 years, the pretest data point might occur 2 years prior to treatment being implemented, or the latency between pretest and treatment application might be unknown. Given the importance of the quality with which pretest and covariate variables are measured for the viability of NECGDs as sources of plausible causal evidence, these limitations must be taken into account when analyzing and interpreting findings from NECGDs with correlational data.

Regression Discontinuity Designs

RDDs are a unique class of NECGDs that simultaneously capitalize on and control for issues related to selection bias. The basic tenet of the RDD is that the treatment-selection process is determined using a cutoff score on a continuous assignment variable (Cook & Campbell, 1979; Hahn, Todd, & Van der Klaauw, 2001; Imbens & Lemieux, 2008; Shadish et al., 2002; Thistlethwait & Campbell, 1960). Assignment variable data should be collected prior to the application of the independent variable, and participants are assigned to groups based on whether their scores on the assignment variable fall above or below predetermined cutoff scores. Using this approach, the outcome is modeled via a linear or nonlinear regression function relating participant outcomes to the assignment variable.

In its most basic form, the RDD can be represented as:

$$O_A, C, X, O_2$$

$$O_A, C, O_2$$

where O_A denotes measurement of the assignment variable prior to assignment and C denotes assignment to condition based on the cutoff score. Although the basic design as shown indicates only a treatment and comparison group, Shadish et al. (2002) have described more complex RDDs, including designs with more than one cutoff, more than two assignment conditions, combinations of RDD with randomization, and other quasi-experimental design features.

Figure 27.1 is an illustration of a hypothetical RDD, in which the independent variable is participation in a public preschool program for children at risk, and the cutoff variable is income eligibility. As shown in Fig. 27.1, children whose household income is less than 150 % of the poverty level are eligible to participate in the program

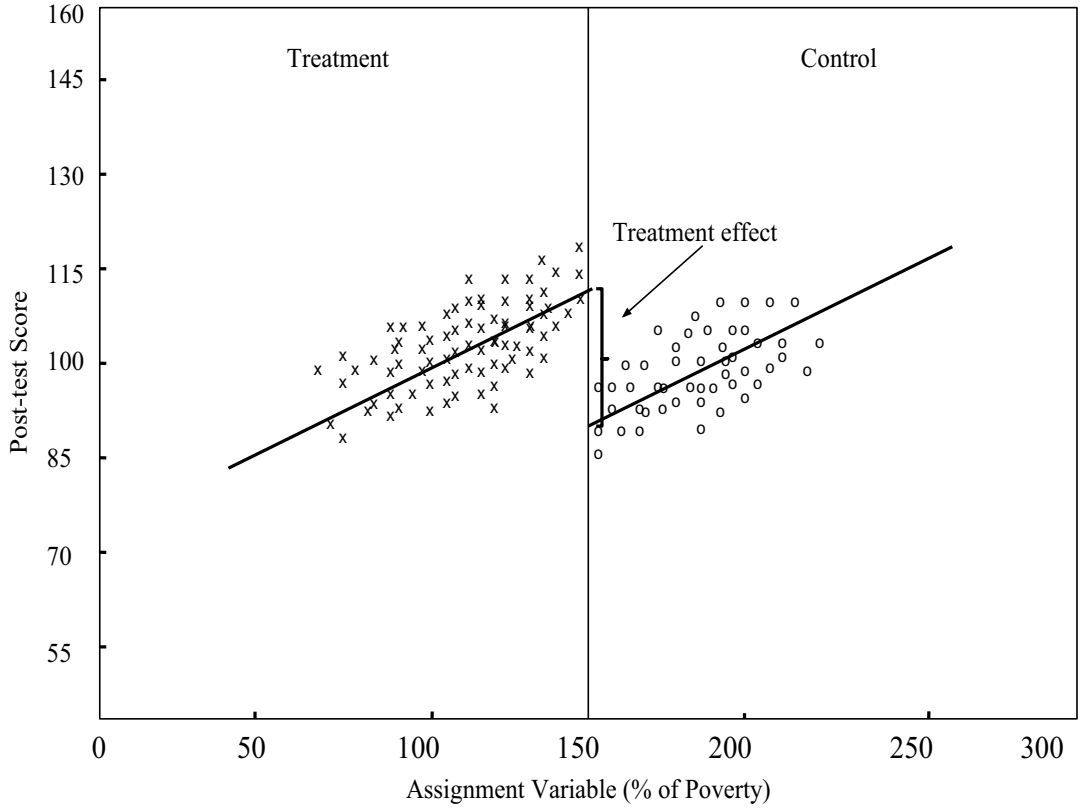

Fig. 27.1 Graphical representation of a hypothetical RDD showing a treatment effect

(i.e., "treated"), but children whose household income is more than 150 % of the poverty level are not eligible to participate (i.e., "comparison" or "untreated"). The dependent variable is children's scores on a standardized early literacy assessment ($M = 100$; SD = 15).

Wong, Cook, Barnett, and Jung (2008) presented two ways of conceptualizing and estimating treatment effects in RDDs like the one shown in Fig. 27.1. The first involves determining whether the level or slope of the regression line changes at the cutoff. Using this approach with the hypothetical study, the level of the regression line at the cutoff is higher for children who participated in the public preschool program. Another way to conceptualize and estimate treatment effects in RDDs involves treating observations around the cutoff as though they are observations from an RCT and comparing group means at the cutoff to estimate the local average treatment effect (LATE). When this approach is applied with the hypothetical data presented in Fig. 27.1, children who participated in the public preschool program appear to have higher scores at the cutoff than children who did not participate. Each of these approaches has strengths and limitations for generating plausible causal evidence, which are described next.

Advantages of RDDs. A number of researchers have argued RDDs are more robust for making plausible causal inferences than many of the more widely used quasi-experimental and correlational research designs (Cook, Shadish, & Wong, 2008; Shadish, 2011; Shadish et al., 2002). These arguments are based on several authors' proofs that RDDs provide unbiased estimates of treatment effect (e.g., Goldberger, 1972a, 1972b; Rubin, 1977). The key advantage to the RDD is that, as in an RCT, the assignment mechanism is

known. In addition, threats to internal validity are highly unlikely, because they would have to cause a discontinuity in the regression line that coincides exactly with the cutoff (Shadish et al., 2002). These characteristics of RDDs make them viable designs for generating plausible causal evidence; however, they are not without limitations.

Limitations of RDDs. A primary limitation of RDDs is that they are not as efficient as RCTs in detecting effect sizes (Capelleri, Darlington, & Trochim, 1994; Goldberger, 1972a; Shadish et al., 2002). For non-clustered designs in which the cutoff is placed near the mean of the assignment variable, RDDs require up to 2.75 times as many participants as a balanced RCT to detect treatment effects (Capelleri et al., 1994; Goldberger, 1972a), and as the cutoff for the assignment variable deviates from the mean, power is reduced even further. In clustered designs (e.g., children nested within classrooms), these ratios increase to 3 to 4 times that of RCTs (Schochet, 2008). Various strategies exist for improving power in RDDs (Shadish et al., 2002), but there are no conditions under which RDDs have been shown to achieve the same power as RCTs (Wong et al., 2008).

In addition, although internal threats to validity are minimized, RDDs are susceptible to statistical conclusion validity threats associated with errors in defining the functional form of the relationship between the assignment variable and the outcome variable(s) of interest (Shadish et al., 2002). In the hypothetical example, we present the simplest case in which there is a linear relationship between the assignment variable and the outcome variable and in which there is no interaction between the assignment and treatment variable. If the relationship between the assignment variable and the outcome is nonlinear, due to either an omitted interaction or polynomial in the model, estimates of treatment effect will be biased. Misspecifications in modeling functional form are particularly problematic when treatment effects are estimated by comparing the level and slope of the regression line for treatment groups at the cutoff (Wong et al., 2008), but researchers should always be mindful of the impact of model misspecification on the ability to estimate unbiased treatment effects using RDDs. Shadish et al. (2002) provide advice for modeling functional form in an attempt to alleviate potential problems stemming from this issue.

Thus far, the case of the "sharp" RDD has been considered, in which the probability of being assigned to the treatment group changes from 0 to 1 at the cutoff. This approach assumes treatment selection is modeled completely via the assignment variable cutoff and that there is no misallocation of treatment. Unfortunately, this assumption is not always logical, particularly when there are unknown variables that might impact treatment assignment or when the cutoff is malleable (Hahn et al., 2001; Imbens & Lemieux, 2008). In such cases, the probability of being assigned to the treatment group changes by a value less than 1 at the cutoff, and, as such, the treatment-selection mechanism is no longer known completely. This is referred to as a "fuzzy" RDD (Hahn et al., 2001; Trochim, 1984). Although not as desirable as the sharp RDD for generating plausible causal evidence, fuzzy RDDs can still produce better treatment estimates than other quasi-experimental designs, provided treatment misallocation is confined to a narrow range around the cutoff (Shadish et al., 2002; Trochim, 1984) and appropriate modifications are made to estimate treatment effects (Hahn et al., 2001; Imbens & Lemieux, 2008; Schochet, 2008).

Finally, inherent in the design of RDDs is a limitation in generalizability. Estimation of treatment effects is limited only to the area around the cutoff on the assignment variable; thus, findings are not generalizable to other locations on the assignment variable continuum (Shadish et al., 2002; Wong et al., 2008). As such, a strong theoretical rationale for the selection of the cutoff point is an important consideration for strengthening the capacity to generate plausible causal evidence from these designs.

The limitations described should be considered when designing and implementing RDDs. Fortunately, in many cases, knowledge of and preparation for limitations can alleviate potential bias that might stem from them, and guidance for implementing RDDs is available. Guidelines for

maximizing the effectiveness of RDDs to generate plausible causal evidence have been provided by Shadish et al. (2002) and Imbens and Lemieux (2008). The What Works Clearinghouse has also issued standards for RDDs (Schochet et al., 2010). In addition, Wong et al. (2008) provided a model for conducting RDDs in early childhood settings, which can be extended to applications in ECSE.

Applications in ECSE. Historically, RDDs have been more common in the areas of health, epidemiology, and economics than in educational research (Cook, 2008; Gersten & Dimino, 2006; Shadish et al., 2002), but they have gained popularity as viable designs for evaluating education-related interventions and programs (Schochet, 2008). Although there are relatively few published examples of RDDs in ECSE, there appears to be growing interest in using these designs to evaluate the impact of state prekindergarten programs on developmental outcomes for young children, including children who are typically developing, children who are dual language learners, and children who are at risk for or have disabilities (e.g., Gormley, Gayer, Phillips, & Dawson, 2005; Lipsey, Farran, Bilbrey, Hofer, & Dong, 2011; Phillips & Meloy, 2012; Weiland & Yoshikawa, 2013; Wong et al., 2008).

Researchers have also begun to acknowledge the merit of implementing RDDs within the context of response-to-intervention literacy-focused interventions for young children (e.g., Gersten & Dimino, 2006; Tuckwiller, Pullen, & Coyne, 2010), because inherent in these interventions is a process for universal screening. The screening process presents a mechanism for providing some children more targeted intervention based on a predetermined screening cutoff, which is amenable to RDD. This rationale can be extended to other situations in which children receive interventions or supports on the basis of predetermined eligibility criteria. Examples of this might range from small-scale studies, in which children are assigned to receive an intervention on the basis of a pretest score, up to large-scale evaluations of ECSE policies and programs. A summary of example RDDs in ECE and ECSE, as well as technical resources for RDDs, is provided in the Appendix.

Interrupted Time Series Designs

Time series designs are distinguished by the application of multiple measurement occasions that occur in a series and over time before and after exposure or treatment to document patterns or trends on dependent variables of interest. These designs involve a large number of repeated measurements made on the same variable consecutively over time and are analogous to the logic that underlies repeated measurement in single-subject experimental designs. Time series designs differ from other repeated measures group designs by a larger number of observations being taken across baseline (before treatment) and intervention (after treatment) phases. Time series designs are an extension of pretest-posttest designs with multiple "pretests" and "posttests" that can be used to examine if change in the dependent variable is occurring due to maturation, instrumentation, or testing or the confounding effects of extraneous variables. As noted by Shadish et al. (2002), the observations can be on the same units (e.g., one individual or group observed repeatedly over time on outcome of interest before and after treatment is applied), or they can be on different but similar units (e.g., examining transition outcomes for preschool children in a particular school district over several years before and after a systematic transition program is initiated and during which time the preschool population is different before and after treatment is initiated).

ITSDs are a special type of time series design used to evaluate treatment impact. A key feature of ITSDs to evaluate treatment impact is knowing the specific point in the measurement series at which treatment occurred. The logic of these designs is that if treatment has an impact, then the series of repeated measures data for the dependent variable after treatment will have different level, slope, or variability from the repeated measures data before treatment was applied. The term "interrupted" refers to level, slope, or variability of the data series being changed (interrupted) by the introduction of treatment or exposure. An example of design notation for the most basic ITSD is shown below. In the example, five serial observations occur before treatment (X)

and six serial observations occur after treatment occurs:

$$O_1 O_2 O_3 O_4 O_5 X O_6 O_7 O_8 O_9 O_{10} O_{11}.$$

There are several different ways to evaluate the *form* of the treatment impact in an ITSD. One way is to examine a change in level or intercept pre- and posttreatment. A second way to examine impact is to examine a change in trend or slope of the time series data pre- and posttreatment. A third consideration of impact would be a change in the variability of the data points if a treatment results in participants being more homogeneous (less variable) or heterogeneous (more variable) relative to pretreatment or baseline variations. Figure 27.2 illustrates changes in level, slope, and variability for three sets of hypothetical data associated with a basic ITSD. In addition to examining the form of the impact, Shadish et al. (2002) describe the importance of considering continuous versus discontinuous impacts and immediate versus delayed impacts. They assert interrupted time series impacts are best described using all three dimensions: (a) form, (b) continuity, and (c) immediacy.

Some researchers conducting ITSDs employ visual analysis alone to evaluate treatment impacts. When ITSDs are applied to groups of

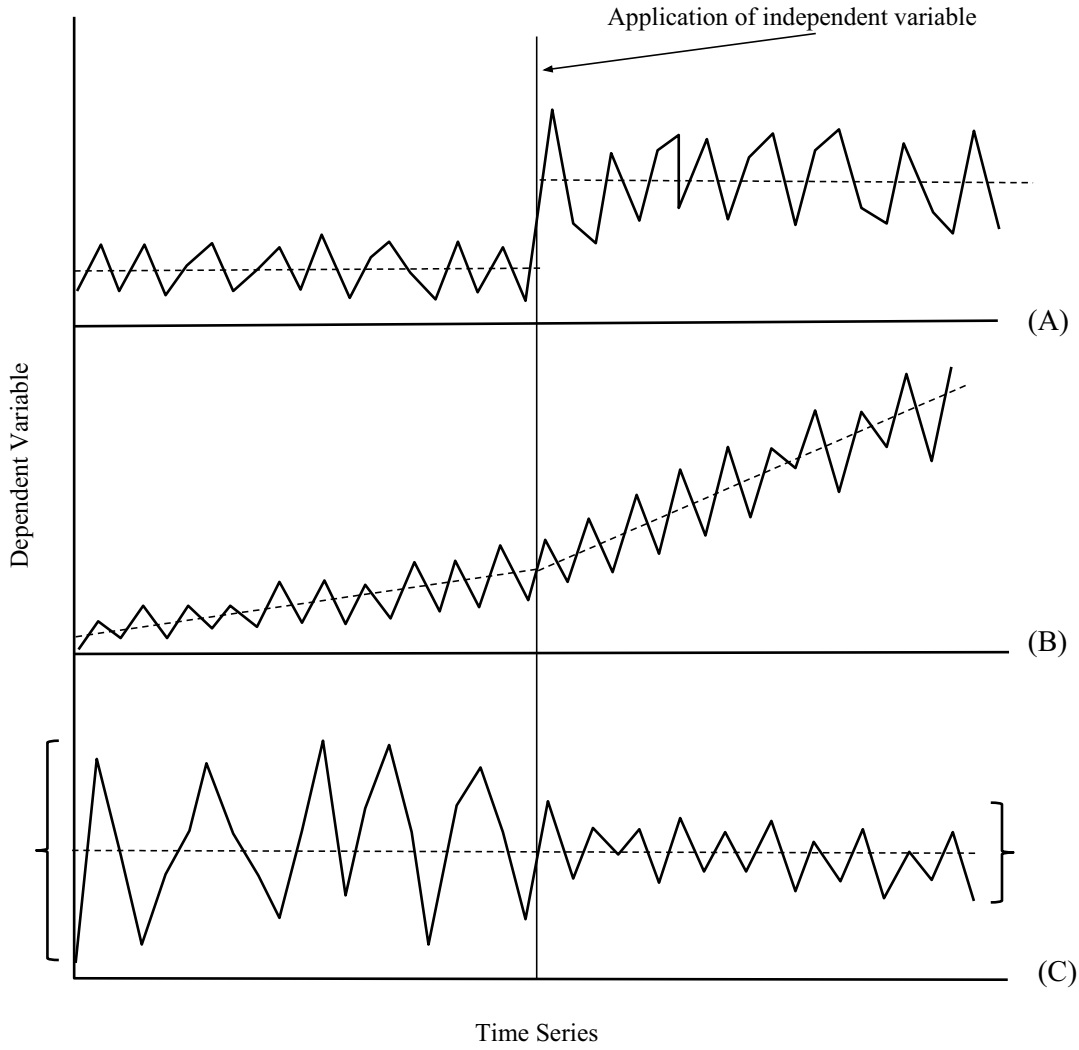

Fig. 27.2 Data from three hypothetical ITSDs. Graphs show changes in level (graph A), slope (graph B), and variability (graph C) of the dependent variable after application of the independent variable

participants, multilevel modeling can be used to evaluate treatment impacts in ITSDs (e.g., Swaminathan & Algina, 1977). Complex statistical methods have also been proposed to evaluate treatment impacts in ITSDs in the social sciences (Velicer & Fava, 2003). One method is autoregressive integrated moving average (ARIMA), which is a time-domain approach that models observations by predicting current values from previous values (Box & Jenkins, 1976; Box, Jenkins, & Reinsel, 1994, 2010; Velicer & Fava, 2003). This method is designed to accommodate the serial dependency in the data and weights scores closer to the points at which treatment is introduced. Velicer and Fava (2003) provide an approachable treatment of ARIMA methods. A second method involves frequency-domain approaches, which Shadish et al. (2002) describe as modeling the time series observations as a combination of periodic sine and cosine waves. According to Shumway and Stoffer (2011), although methodologists often pit time-domain approaches against frequency-domain approaches, both often produce similar results when data series are relatively long (e.g., 100 observations). According to these authors, shorter series are often best analyzed using time-domain approaches. When possible given the number of available data series, they suggest using the two approaches in a complementary pattern. Either of these approaches involves sophisticated analyses that are best conducted by methodologists skilled in these and other approaches for analyzing time series data. ECSE researchers can offer substantive input about the expected form, continuity, and immediacy of impacts based on the research questions being addressed and the types of observations being made.

Advantages of ITSDs. Shadish et al. (2002) described the ITSD as one of the most effective and powerful of all quasi-experimental designs if sufficient amounts of serial data are available, and other design features can be added to a basic design to address potential internal validity threats. Adding a nonequivalent, no-treatment control or comparison group time series strengthens the design. When using the most basic ITSD, history is the major threat to internal validity given it is possible that other extraneous variables and not the onset of treatment are responsible for changes in the dependent variable. This threat can be addressed by adding a no-treatment time series for a control or comparison group, if this is feasible to accomplish given resources and availability of individuals to participate in many serial observations without treatment. "Another" alternative is to gather information about events beyond treatment that could plausibly impact the outcomes and to examine if any of these occurred between the last pretest and the first posttreatment observations. While less optimal than having a control or comparison group, this latter approach might be more feasible for addressing potential history threats in applied research conducted in field-based settings.

Another option for strengthening plausible causal inferences in ITSDs, particularly with respect to construct validity of the effect, is to collect additional time series data for a nonequivalent dependent variable that the treatment should not affect but would respond in the same way to a validity threat as the primary dependent variable. Shadish et al. (2002) note that the two dependent variables should be conceptually related and illustrate several examples of ITSDs that have used this option.

A third option for strengthening plausible causal inference in ITSDs is to demonstrate both impact of treatment when it is introduced and return to baseline (no treatment) or near baseline levels when the treatment is withdrawn. This type of "withdrawal" design demonstrates a functional relationship between time series manipulation of an independent variable (applying treatment and then withdrawing treatment), which is a form of experimental control. The withdrawal design is not without limits, however. For example, it might be demoralizing or unethical to withdraw treatment, or the treatment might be such that behaviors designed to be changed are not able to be "withdrawn" once they are learned. In addition to a simple treatment/withdrawal time series designs, there also are ITSDs that introduce multiple treatment/withdrawal replications across the time series. These designs

are analogous to an ABAB or ABABAB withdrawal designs in single-subject experimental research. These designs provide further evidence of experimental control if a functional relationship is demonstrated between more than one replication of treatment and withdrawal of treatment on dependent variables of interest.

A final option for strengthening plausible causal inference in ITSDs is referred to as a multiple-baseline design or adding switching replications (Shadish et al., 2002). In this design, dependent variable time series data are gathered in baseline (no treatment) conditions across two or more groups, and treatment is introduced in a staggered way across each group. When one group receives the treatment, the other(s) remains in baseline (no treatment). When the treatment is introduced to the second and remaining groups, the original treatment group(s) serves as continued-treatment control. This design is analogous to a multiple baseline across participants design in single-subject experimental research.

Limitations of ITSDs. ITSDs might not be appropriate in situations where treatments are implemented slowly rather than occurring all at once or within a short timeframe. In addition, the number of data series recommended for statistical analyses of time series data (e.g., 100 observations, Shadish et al., 2002) might not be feasible or practical to collect, particularly when a control or comparison time series is involved. Although the addition of several of the design features described in the previous section might reduce the numbers of observations needed and permit visual analysis of the data with respect to plausible causal inference, it is unlikely that short data series will permit the use of time- or frequency-oriented approaches. When data from large-scale archival data sets are used to conduct ITSDs, it is important to ascertain if definitions for and measurement of dependent variables are consistent across the series and that data are available for the number of repeated measurements and schedule of repeated measurements desired.

Applications of ITSDs. Applications of group ITSDs have been relatively limited in ECSE. However, the use of ITSDs in single-subject experimental research is common in ECSE. Biglan, Ary, and Wagenaar (2000) described the potential utility of ITSDs for groups as part of the development of knowledge about impacts of community-level interventions from a prevention science perspective. These authors noted how a multiple-baseline ITSD across communities with introduction of the intervention staggered across communities could be informative for initial impact evaluations and for refining an intervention, particularly in circumstances when RCTs are not logical or feasible to implement.

Section Summary

We have presented three non randomized research designs that, when implemented with rigor, can yield plausible causal evidence. None of these designs is without limitation in terms of yielding biased estimates of treatment effects, but they should not be ruled out as viable alternatives when randomization is not feasible or desirable. Shadish et al. (2002) suggested RDDs and ITSDs, in particular, are underutilized designs that can be used to make significant contributions to research across a variety of disciplines. Although it is beyond the purview of the present chapter to delve into the relative intricacies of the designs presented, we encourage readers to review the references provided in this chapter (see Appendix) to explore further these designs and their potential applications in ECSE.

Advances in Analysis: Statistical Methods

In this section of the chapter, we move beyond considerations of research designs to statistical methods that can be used to enhance causal inference in quasi-experimental and correlational research. It is important to note these methods are not presented as alternatives to rigorous study design features. Shadish et al. (2002) emphasized the importance of high-quality research design over the use of statistical procedures, stating that

statistical procedures are likely to work poorly in the absence of rigorous design features and that "in the interplay between design and statistics, **design rules**" [emphasis added] (p. xvi). We reiterate this sentiment and discuss statistical methods that can augment rigorous design features to yield plausible causal evidence in ECSE. We begin with a discussion of traditional approaches for reducing selection bias in nonequivalent data, followed by more contemporary approaches that utilize propensity scores and a discussion of SEM as a means for examining plausible causal relationships.

Traditional Approaches for Reducing Selection Bias

Traditional approaches for reducing selection bias in nonequivalent data involve the use of covariates that are hypothesized to be associated with selection bias. The goal of such approaches is to balance nonequivalent groups statistically rather than via randomization. We discuss four common approaches for balancing nonequivalent data using covariates: regression-based approaches, the difference-in-differences (DID) approach, matching participants on selected covariates, and stratifying participants on a continuous covariate. Although each of these approaches has been used frequently to reduce selection bias in nonequivalent data, research suggests they are likely to yield biased estimates of treatment effects (Guo & Fraser, 2014). In addition, the viability of each approach is restricted by practical limitations, which we will describe briefly in order to highlight the possible advantages of propensity score methods discussed later in this section of the chapter.

Regression-based approaches. Two regression-based approaches are used commonly to reduce bias in nonequivalent groups. One of these is multiple regression, which involves controlling for a number of covariates by adding them as predictors in regression models including variables representing treatment conditions. ANCOVA is a special case of this method, which controls for pretest group differences by using pretest scores as a covariate in a regression model (Reichardt, 1979). Rubin (1997) described three limitations of this approach. First, it is generally necessary to adjust for many covariates in order to adequately reduce selection bias. This issue is of particular concern when designing and conducting research in applied settings, because it requires more resources and potentially introduces a larger burden on research participants to provide relevant data on the covariates of interest to the researcher. Second, the degree to which selection bias can be reduced is dependent on whether the distributions for each of the covariates overlap across groups. Standard regression diagnostics do not provide a detailed analysis of these distributions, and, therefore, researchers must conduct an additional analysis to check on overlap. Third, regression models entail an assumption about the functional form of relationship between the covariates and the outcome. If the assumption is not correct, estimates of treatment effect will still be biased, despite the inclusion of appropriate covariates to the model. In addition, random measurement error in the covariates can cause bias in the treatment effect estimator (May, 2012; Wright, 2006).

Difference-in-differences (DID) approach. The DIDs approach involves analyzing pre-post change scores for treatment and nontreatment groups (Greene, 1993) and is often used as an alternative to ANCOVA to reduce selection bias when comparing nonequivalent groups. To estimate treatment effects using the DID approach, the researcher first calculates the change in the dependent variable across time points for each group (difference #1) and then examines differences in changes across the two groups (difference #2) via *t* test. This approach invokes an untestable assumption of parallel trends in growth across groups at time points prior to the onset of treatment. Although it is possible to gain some idea of the plausibility of this assumption if observations of the dependent variable are collected at two or more pretest occasions, DID is very often applied in pre-post designs in which it is not possible to examine possible differences in trend or functional form of the trajectories of

growth across groups. It should be noted that the DID approach can also be implemented in a split-plot analysis. This application of split-plot analysis is subject to the concerns identified for the DID approach.

Matching. Matching is used to balance groups of study participants on observed covariates, and then treatment effects are estimated by comparing matched groups (Rossi & Freeman, 1989). To be effective at reducing selection bias, this approach is likely to require matching on several covariates (Guo & Fraser, 2014). Matching on a single covariate is relatively feasible, given overlapping distributions of the covariate across treatment and comparison groups. It becomes much more difficult as more covariates are added, because it requires that for every participant in the treatment group, there is a matched participant on all covariates in the comparison group.

Stratification. Stratification involves stratifying participants on a continuous covariate to create homogenous treatment and comparison groups within strata of approximately equal size (Cochran, 1968; Rosenbaum, 2002). After strata have been constructed, treatment effects are estimated within each stratum and then averaged across strata to obtain the overall estimate of treatment effect. Typically, the distribution of the covariate is divided into five strata, based on early research findings that quintile stratification removes approximately 90 % of selection bias from an estimate of the population mean (Cochran, 1968). Although these findings suggest stratification is fairly effective at reducing selection bias, this method, like multiple regression and matching on covariates, requires sufficient overlap in the distributions of the covariate across groups to ensure adequate numbers of participants across groups in each stratum. In addition, for this technique to be effective, it is necessary to stratify on multiple variables.

Propensity Score Methods

A number of researchers advocate the use of propensity score methods as an alternative to traditional approaches to balance nonequivalent data (e.g., Guo & Fraser, 2014; Rosenbaum & Rubin, 1983a, 1985; Rubin, 1997). A propensity score is a single value that summarizes an individual's probability of assignment to a treatment or comparison condition, conditional on a vector of observed covariates that are thought to be associated with both treatment selection and outcomes (Rosenbaum & Rubin, 1983a, 1985). Propensity scores frequently are calculated using a logistic regression model, in which treatment condition is regressed on a set of covariates hypothesized to affect selection bias, but data mining methods have also been used to obtain propensity scores with the advantage of automatically detecting interactions and nonlinear effects (McCaffrey et al., 2013; McCaffrey, Ridgeway, & Morral, 2004; Setoguchi, Schneeweiss, Brookhart, Glynn, & Cook, 2008; Westreich, Lessler, & Funk, 2010). Once calculated, the propensity score can be used in place of individual covariates to reduce selection bias via matching, stratification, or weighting procedures.

Matching and stratification of propensity scores. Matching or stratifying propensity scores alleviates the need to ensure overlap in the distributions of every covariate included in the propensity score model (Rosenbaum & Rubin, 1983a, 1984, 1985; Rubin, 1997) and also the potential difficulty of matching or stratifying on multiple covariates. Rosenbaum and Rubin (1983a) demonstrated that when individuals across treatment conditions were matched or stratified based on propensity scores, differences on the covariates from which the propensity score was calculated were sufficiently balanced across nonequivalent groups. In the case of matching, the use of propensity scores increases the utility of matching to balance data, because the researcher needs only to ensure overlap among the distributions of propensity scores for the treatment and comparison groups in question rather than every covariate individually. This approach also increases the likelihood of generating matched groups, because matching occurs on only one value rather than many. It is still true, however, that there will be unmatched participants if there is not adequate overlap in the distributions of propensity scores, which results in a loss of data and limited generalizability of

findings. As such, this method is often more amenable to estimating the average treatment effect for the treated (ATT) rather than the ATE.

The advantage of stratifying based on propensity scores rather than observed covariates is that the use of a propensity score allows the researcher to ameliorate bias induced by multiple covariates with one variable. Another benefit of stratification is that it can be applied post-matching to obtain more robust estimates of treatment effects (Guo & Fraser, 2014). Similar to matching with propensity scores, stratification can increase the likelihood of generating balanced groups within strata, but, as with matching, this is only true if there is sufficiently large area of overlap in propensity scores across groups, such that there are participants from treatment and comparison groups in each stratum.

Weighting with propensity scores. Weighting with propensity scores involves using propensity scores to obtain weights that balance the differences between distributions of treated and comparison groups. Inverse probability of treatment weighting (IPTW) is a common weighting procedure to estimate the (ATE), wherein propensity scores are used to calculate weights for each individual in a sample, such that the each person's weight is equal to the inverse of the probability of receiving the treatment he or she actually received (Hirano & Imbens, 2001; Robins & Rotnitzky, 1995; Rosenbaum, 1987). These weights are then used to create an artificial population in which covariates associated with selection bias are independent of treatment status (Joffe, Ten Have, Feldman, & Kimmel, 2004). This approach has been shown to be very effective at reducing selection bias in observational data, particularly when correlations among covariates in the propensity score model are low to moderate (Austin, 2009). IPTW is advantageous because it is not dependent on assumptions about the distributions of potential outcomes; therefore, it is less susceptible to loss of data than matching (Guo & Fraser, 2014; Schafer & Kang, 2008). Nevertheless, this approach is susceptible to biased estimates of treatment effect and standard errors when there are cases with extreme weights (Robins, Rotnitzky, & Zhao, 1995; Robins, Sued, Lei-Gomez, & Rotnitzky, 2007; Scharfstein, Rotnitzky, & Robins, 1999). Strategies based on weight trimming (Lee, Lessler, & Stuart, 2011; Stürmer, Rothman, Avorn, & Glynn, 2010) and weighting through stratification (Hong, 2012) have been proposed to reduce the extreme weight problem.

Advantages of propensity score methods. Each of the propensity score methods described previously has been shown to reduce selection bias in nonequivalent group designs (Austin, 2009; Gu & Rosenbaum, 1993; Stuart, 2010). In addition, these methodologies can be applied in conjunction with one another or with more traditional statistical methodologies to further reduce selection bias. For example, provided the assumptions under which ANCOVA can be used to estimate treatment effects are met, ANCOVA can be combined with propensity score matching (Schafer & Kang, 2008). Furthermore, propensity score matching, stratification, and weighting can be combined with advanced models for the outcome such as structural equation models and multilevel models to estimate treatment effects involving latent variables, longitudinal data, and cluster effects (Hong & Yu, 2008; Kaplan, 1999; Leite, 2015). Likewise, propensity scores can be added to the model used to estimate treatment effects in addition to being used as a variable for matching, stratification, or weighting as a means of estimating "doubly robust" effects (Kang & Schafer, 2007). Treatment effects of study samples matched, stratified, or weighted using propensity score can also be estimated via multiple regression analyses, wherein additional covariates thought to covary with treatment outcomes (but not treatment selection) are added to the model. This versatility in application has led to widespread use of propensity score methods as a means to reduce selection bias in nonequivalent data across a number of fields.

Limitations of propensity score methods. As mentioned previously, the allure of propensity score methods is the ability to balance a number of observed covariates using only one value: the propensity score. It is important to note, however,

this balance is only guaranteed when the *true* propensity score is known (Schafer & Kang, 2008). In the applications described previously, the propensity score is estimated from observed covariates and, thus, is not the true propensity score. Rosenbaum and Rubin (1983a) noted two key assumptions that must be met for propensity score methods to yield a comparison group for which observed individual outcomes can serve as proxies for counterfactuals in quasi-experimental or correlational studies. The first assumption, known as the *overlap assumption*, requires that every individual has a probability of receiving the treatment. In order to meet this assumption, the probability of treatment assignment (i.e., the propensity score) can be neither zero nor one for any individual in the sample. This assumption can be checked easily by examining the distributions of propensity scores in the treatment and comparison groups.

The second assumption described by Rosenbaum and Rubin (1983a) requires there to be no unmeasured variables that affect treatment assignment and outcomes. Propensity scores are estimated based solely on observed covariates and, therefore, cannot be used to reduce hidden bias due to unobserved covariates that might affect selection. Given the selection process in non-randomized studies is unknown, it is highly unlikely that data for all covariates associated with treatment selection will be available, which will result in a violation of this assumption. As such, Rosenbaum and Rubin (1983b) suggested conducting sensitivity analyses as a means to determine the impact of hidden bias due to unobserved covariates on estimates of treatment effect. Another potential way to alleviate this problem is to use data from numerous observed covariates; however, some researchers have argued that when the selection mechanism is measured accurately, fewer covariates are needed to construct the propensity score model (Shadish, 2011). In situations where there are not a sufficient number of covariates or the selection mechanism is not measured accurately enough to construct an adequate propensity score model, the benefit of propensity score methods over traditional statistical approaches is diminished (Schafer & Kang, 2008; Shadish, 2011).

Even when it is possible to collect data on a number of observed covariates to include in the propensity score model, the efficacy of propensity score methods to reduce selection bias is dependent on the extent to which the model is specified accurately. If the model is misspecified, then the probability of treatment assignment will be spurious, which will lead to inaccurate estimates of treatment effect. Given the importance of specifying the propensity score model, a number of researchers have offered guidelines for selecting covariates to include in the propensity score model, specifying the model and examining balance of covariates before and after the application of propensity score methods (e.g., Austin, 2011; Guo & Fraser, 2014; Schafer & Kang, 2008; Stuart, 2010).

Application of propensity score methods in ECSE. Propensity score methods have become widely used to reduce selection bias in a number of fields, including statistics, epidemiology, economics, sociology, and political science, and they are gaining popularity in the fields of ECE and ECSE, particularly for purposes of program evaluation (e.g., Gormley, Phillips, Newmark, Welti, & Adelstein, 2011; Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014; Ruzek, Burchinal, Farkas, & Duncan, 2013; Sullivan & Field, 2013). This is perhaps due to the more widespread availability of large-scale data sets in ECE and ECSE (Bishop, Leite, & Snyder, 2016), as these methods can be particularly suitable when data are available for a number of observed covariates thought to affect selection bias. Although the availability of such covariates is appealing, it is important to note that the accuracy with which these covariates are measured is critical to ensuring accurate propensity score estimates (Shadish, 2011). This is the same issue that afflicts the regression/ANCOVA approaches for reducing selection bias previously described. An even more essential criterion for determining the applicability of propensity score methods is that it is reasonable to expect there would be an overlap in the propensity scores for treatment and comparison groups and that what overlap exists is congruent with theoretical expectations and the context to which findings will be generalized.

Although the use of propensity score methods is fairly new in the field of ECSE, there are illustrations of how to apply propensity score matching (Hahs-Vaughn & Onwuegbuzie, 2006) and IPTW (Bishop et al., 2016) in educational research available; these are summarized in the Appendix. In addition, a number of technical resources for implementing these methods exist in statistics (Stuart, 2010), epidemiology (Austin, 2008), economics (Imbens & Wooldridge, 2009), sociology (Winship & Morgan, 1999), and political science (Ho, Imai, King, & Stuart, 2006). These resources provide a more thorough introduction to the technical intricacies of propensity score methods and guidance for selecting the appropriate method (e.g., matching, stratification, weighting) to reduce selection bias in nonequivalent group designs.

Causal Modeling: Structural Equation Models and Directed Acyclic Graphs

Conventionally, the term *structural equation modeling* (SEM) refers to a family of statistical techniques used to model relationships between observed and latent variables based on patterns of covariance between the observed variables (Kline, 2011). Many researchers use SEM exclusively to examine measurement issues via confirmatory or exploratory factor analysis, but it is also frequently used a means for estimating causal effects of variables (Duncan, 1975; Goldberger, 1972c, 1973). In SEM, the researcher articulates hypothesized causal pathways a priori via a graphical model (Haavelmo, 1943; Wright, 1921, 1934), examines statistically the extent to which the proposed model fits a set of empirical data, and interprets parameter estimates in terms of causal direct and indirect effects.

The extent to which SEM can be used to examine causality has been vigorously debated. Some researchers have argued that SEM, as a statistical approach, "rarely yields results that have any interpretation as causal effects" (Wilkinson & Task Force on Statistical Inference, 1999, p. 600). The rationale for this stance stems, perhaps, from the fact that in the absence of theoretically sound causal assumptions, data can only provide information about associations (not causal relationships) between variables (Elwert, 2013) and a concern about an uncritical stance toward two important assumptions of causal modeling using SEM (Bollen & Pearl, 2013). The first is the assumption that structural residuals are uncorrelated with exogenous variables (variables that do not have causes specified in the models) and implies that variation due to causal variables omitted from an equation is uncorrelated with the exogenous variables in the equation. The second is the assumption that the structural residuals in each pair of equations are uncorrelated and implies that variation due to causal variables omitted from one equation is uncorrelated with variation due to causal variables omitted from the other equation. These are very strong subject-matter assumptions about causality, and when their validity is in doubt, causal interpretation of SEM should be avoided.

An approach to causal models that holds promise for overcoming the concerns about causal interpretation of SEMs is graphical causal models. These models use directed acyclic graphs (DAGs; Elwert, 2013; Lauritzen, 1996; Morgan & Winship, 2007; Pearl, 1988, 2009a, 2010; Spirtes, Glynmour, & Schein, 2001) as a means to specify causal hypotheses.

DAGs are nonparametric structural equation models consisting of three components: (a) variables, (b) arrows depicting direct causal relationships between pairs of variables, and (c) missing arrows depicting strong assumptions of no causal relationship between variables (Elwert, 2013; Pearl, 2009a). In addition to providing a relatively straightforward process for illustrating direct and indirect relationships between variables, an appealing feature of DAGs is their utility for determining whether the causal effects in a DAG can be estimated (Elwert, 2013; Pearl, 2009a, 2009b, 2012; Sauer & Vander Weele, 2013). These tasks are accomplished via application of a set of rules for the visual analysis of DAGs, which have been articulated in great detail by Pearl (1988, 2009a) and translated into more user-friendly terms in a number of recent publications (e.g., Elwert, 2013; Knight & Winship, 2013; Sauer & Vander Weele, 2013).

Engaging in the development and visual analysis of DAGs a priori requires the researcher to present a solid theoretical justification for the model and provides a mechanism for assessing the plausibility of the model before any analytics take place, thus, improving the rigor of the study design from the outset. In particular, DAGs require the researcher to present explicitly their assumptions about common causes that will not be measured in the data. The latter feature holds promise for forcing researchers to attend to this critically important aspect of a causal model and overcomes the concerns that many critics have of the causal interpretation from SEM.

Limitations of DAGs. Although there appears to be growing support for the use of DAGs, there are some practical considerations that limit their application. The first occurs when DAGs are interpreted as nonparametric structural equation models (NPESMs). NPESMs are models that do not entail specified functional form relating variables to one another. In this situation the translation of DAGs into procedures for estimating effects is complex. Although this does not preclude researchers from using DAGs interpreted as NPESMs, it does limit their accessibility, particularly in comparison to traditional parametric SEMs. Because NPESMs are a special case of SEM, some of the limitations of SEM also apply to NPSEMs. One that is likely of particular concern in ECSE is the requirement of large sample sizes to estimate parameters in either parametric or nonparametric SEMs. Unfortunately, there are no absolute criteria for determining sufficient sample sizes in SEM. Some researchers have recommended at least a sample size of 100 (Lomax, 1989) or 200 (Baldwin, 1989). Others have recommended making determinations about samples size based on the number of observed variables in the model, with recommendations of at least 10 people per observed variable, but preferably 15–20 people per observed variable (Mueller, 1997). Thompson (1998) noted the required sample size for applying SEM increases as (a) the number of observed variables increases, (b) the complexity of the model increases, (c) more sophisticated parameter estimation techniques are employed, and (d) if model search specification is employed. Despite the ambiguity in sample-size recommendations for SEM, one notion is clear: SEM is a large-sample approach; thus, it requires more resources for data collection, particularly when the model includes numerous observed variables.

Applications in ECSE. Neither SEM nor DAGs have been applied widely in the field of ECSE. This is perhaps due, in part, to the requirement of large sample sizes and types of research questions historically addressed in the field. Over the past several years, however, numerous large-scale, longitudinal data sets containing data for young children with or at risk for disabilities have become more widely available and present opportunities for applying these techniques. To date, most studies in which SEM has been employed have not been conducted with the intent of examining causation but instead to examine associations between variables for the purposes of identifying potential areas for intervention (e.g., Bailey, Nelson, Hebbeler, & Spiker, 2007; Bennett, Weigel, & Martin, 2002). There have been some applications of SEM using data from children with disabilities or their families to validate plausible causal models (e.g., Dunst, Hamby, & Brookfield, 2007; Garrett, Ferron, Ng'Andu, Bryant, & Harbin, 1994; Kim & Park, 2011). These studies are summarized in the Appendix.

Despite the potential difficulties in estimating parameters in DAGs, the use of these graphical models as a mechanism for developing and articulating assumptions about causality holds promise. These graphical models might aid in the construction of sound theoretical models and the design of more rigorous studies, be they experimental, quasi-experimental, or correlational. Furthermore, both SEM and DAGs are becoming more accessible due to the availability of technical resources to support their implementation (see Appendix; Elwert, 2013; Glynmour & Greenland, 2008; Hoyle, 2012; Sauer & Vander Weele, 2013; Thompson, 1998).

Section Summary

We have presented analytical strategies that, when employed in conjunction with rigorous research designs, can be used to examine plausible causal relationships with non-randomized data. We highlighted the potential benefits of propensity score methods, which have typically not been utilized widely in the field, and presented possible applications for reducing selection bias in non-randomized data. We presented a contemporary theoretical perspective for reconsidering SEM as a framework of causation. We also introduced the use of DAGs as a mechanism for articulating and testing causal hypotheses with nonexperimental data, which appears to be gaining popularity among research methodologists and in fields that commonly use correlational data to examine plausible causal relationships. In the final section of the chapter, we discuss measurement frontiers for application in ECSE.

Measurement Frontiers: Examples of Contemporary Approaches Used to Gather Reliability/Precision and Validity Evidence

Although it has been widely acknowledged that sophisticated theoretical conceptualizations, research designs, and analyses cannot compensate for poor measures (cf. Pedhazer & Schmelkin, 1991), until very recently, little attention has been paid to the impacts of score reliability and validity on estimates of treatment effect in applied research in ECSE. This is particularly evident when noting if score reliability and validity estimates reported in applied research studies are obtained from study samples versus from previous studies or test manuals.

For example, Snyder, Thompson, McLean, and Smith (2002) reviewed 495 group quantitative design studies published between 1990 and 1998 in association with the DEC Recommended Practices (Sandall, McLean, & Smith, 2000). They found that 57 % ($n=255$) of studies provided information about one type of score reliability, but in only 38 % of the studies ($n=169$) were the score reliability estimates obtained from study samples. At least one score validity estimate was reported in only 20 % ($n=92$) of the studies, and in only 4 % ($n=17$) of these studies was the score validity estimate based on data obtained from study samples. In addition, in over 53 % ($n=242$) of the reviewed studies, researchers operationalized dependent variables using author-developed measures with little or insufficient information about the psychometric integrity of scores from these instruments. As Snyder et al. (p. 146) noted, "Failure to establish or report the psychometric integrity of scores derived from dependent measures compromises the meaningfulness of data and limits the substantive conclusions that should be drawn about the variables under consideration." Given relationships among score reliability coefficients, statistical significance, and effect sizes, Wilkinson and Task Force on Statistical Inference (1999) advised more than 15 years ago that researchers should provide score reliability coefficients for the data being analyzed, even when the focus of the research is not psychometric.

Researchers in ECSE and ECE have identified the need to develop and validate psychometrically sound measures. These measures should yield sensitive and accurate scores to support inferences about outcomes hypothesized to be associated with early learning, family support, or professional development interventions—as well as for other intended purposes such as use in eligibility for early learning services or supports, program evaluation, or accountability (National Research Council, 2008). In addition, the *Standards for Educational and Psychological Testing* have been updated with increased attention to standards related to validity evidence, reliability/precision of measurement and errors of measurement, fairness in testing, and the use of technology (American Educational Research Association [AERA], American Psychological Association [APA], National Council on Measurement in Education [NCME], 2014).

Within both the National Research Council (2008) report and the AERA/APA/NCME

standards, both classical and contemporary measurement approaches used to gather validity and reliability/precision evidence are described. In this final section of the chapter, we briefly review current conceptualizations related to measurement validity and reliability/precision. We then describe generalizability theory and IRT and present applications of these methods in ECSE to illustrate how they can be used to expand measurement frontiers in the field.

Validity and Sources of Validity Evidence

Validity refers to evidence that supports the adequacy and appropriateness of inferences made from scores derived from measurement (Messick, 1993). The *Standards for Educational and Psychological Testing* (AERA et al., 2014) notes that, "Validity refers to the degree to which evidence and theory support the interpretation of test scores for proposed uses of tests" (p. 11). Perspectives about validity and what constitutes validity evidence have evolved over time (Snyder, McLean, & Bailey, 2014). Current conceptualizations focus on *sources* of validity evidence rather than *types* of validity (e.g., content validity, predictive validity). Four sources of validity evidence are described in the standards: (a) evidence based on content, (b) evidence based on internal structure, (c) evidence based on relationships to other variables, and (d) evidence based on consequences of using an assessment instrument. These sources of validity evidence highlight different aspects of score validity, but they do not represent distinct types of validity because validity is considered a unitary concept—meaning that it is the degree to which the accumulated evidence supports intended interpretations of scores.

Validity evidence focused on internal structure and relationships to other variables often is emphasized to support causal or plausible causal inferences. For example, in SEM, these two forms of validity evidence are generated by using data from observed variables to both confirm relationships with hypothesized latent factors and to evaluate relationships among observed variables as well as latent factors.

Exploratory or confirmatory factor analyses can also be used to generate validity evidence for internal structure, including whether internal structure is consistent across different subgroups and in relationships with other variables. These analyses use SEM to identify latent factors related to constructs of interest (e.g., latent factors representing dimensions of social competence).

If validity evidence suggests measured variables have strong relationships with other measured variables, researchers might use a statistical technique known as principal component analysis (a variable-reduction technique) to reduce the number of observed variables to fewer components. They might choose to use the component scores rather than the observed scores in subsequent substantive analyses.

Reliability/Precision of Measurement

Reliability typically has been defined as the consistency of measurement (Snyder et al., 2014). In the *Standards for Educational and Psychological Testing* (AERA et al., 2014), two terms are used to encompass both a classical test theory perspective and a more general notion about reliability. The term *reliability/precision* is used to capture the general notion of consistency of scores across instances of the testing procedure, and the term *reliability coefficient* is used to refer to the reliability coefficients of classical test theory.

It is emphasized in the *Standards* that the reliability/precision of scores varies across replications of measurement, and analyses of reliability/precision are dependent on the kinds of variations that are permitted to occur in the measurement (e.g., items, raters, occasions). These variations often are referred to as facets of measurement. Exploring reliability evidence for instruments used in ECSE research based on data obtained from study samples is important to have confidence that scores have been demonstrated to be reliable/precise across aspects or facets of the measurement context that might introduce error and, in turn, impact the types of score validity

inferences that can be made about obtained scores (Snyder et al., 2014). In addition, the potential influences of score reliability on both statistical significance and obtained effect size estimates can be evaluated.

Traditionally, researchers have used the classical true score model articulated by Spearman (1907, 1913) to generate reliability evidence for measurement systems. The basic tenet of the classical true score model is that any observed score is equal to the composite of a hypothetical true score and measurement error (Crocker & Algina, 2008). Using classical test theory, a researcher can estimate only one source of error at a time. For example, a researcher might use classical test theory to estimate the consistency of observed scores across different raters (i.e., interrater reliability) *or* across different rating occasions (i.e., test-retest reliability) individually, but it would not be possible to estimate error variances of both sources of error at the same time.

Generalizability Theory

Generalizability (G) theory expands on classical test theory by taking into account multiple sources of error simultaneously (Brennan, 2001, 2010; Cronbach, Gleser, Nanda, & Rajaratnam, 1972; Cronbach, Rajaratnam, & Gleser, 1963; Thompson, 2003). G theory provides an optimal framework for analyzing reliability of observed scores from measures designed for use in naturalistic early childhood contexts, because the researcher is able to investigate multiple aspects of the measurement process that are present in early childhood contexts and likely to be sources of measurement error (Bruckner, Yoder, & McWilliam, 2006; Chen, Hu, Fan, & Li, 2014; Goodwin & Goodwin, 1991; McWilliam & Ware, 1994; Snyder, Hemmeter, Fox, Bishop, & Miller, 2013). Using a G-theory framework, the researcher is able to gather reliability evidence using a two-step process, which involves: (a) conducting a generalizability (G) study, in which variance components for multiple sources or facets of measurement error and the object of measurement (e.g., teachers, children) are estimated, and (b) using information from the generalizability study to conduct a decision (D) study, in which reliability coefficients, corresponding absolute error variance, and relative error variance are calculated for specified measurement conditions (Shavelson & Webb, 1991; Webb, Shavelson, & Haertel, 2007). Although a detailed account of how to carry out G and D studies is beyond the purview of the present chapter, there are a number of helpful primers and tutorials on generalizability theory available, including some with illustrations of its application in ECSE (e.g., Bruckner et al., 2006; Goodwin & Goodwin, 1991; Shavelson & Webb, 1991). A summary of these resources is provided in the Appendix.

Advantages of G theory. The application of G theory in ECSE is advantageous for several reasons. The ability to include multiple measurement facets in the analytical model for the G study allows the researcher to examine both main effects and interactions between measurement facets to determine the largest sources of error variance, which helps to inform decisions about potential revisions to measurement processes. For example, consider a G study in which raters, items, and occasions are facets in the universe of admissible observations for a judgment-based, observational rating instrument used to conduct child assessments. Suppose the G study reveals that the largest source of variance in observed scores is the interaction between raters and children (conceptually similar to interrater reliability). This might suggest a need for better operational definitions in the scoring guidance for the instrument and more stringent training of raters. If the largest source of variance appeared to be the interaction between rating occasions and children (conceptually similar to test-retest reliability), additional rating occasions might be necessary to ensure dependability of scores.

The D study also has multiple advantages for gathering reliability evidence for measurement processes and for informing decisions about their use in research studies. One advantage of the D study is that it allows the researcher to examine the dependability of measurements under various

measurement designs. This process provides information about the minimum conditions under which a measurement system can be applied and still yield dependable scores. Such information can be extremely useful in developing guidelines for the measurement process for research and for practice. For example, a researcher who is planning to use a particular instrument as the primary dependent measure in a research study might be interested in determining how many measurements to take at each data collection wave to ensure scores for participants are dependable at each wave without depleting study resources for data collection unnecessarily. In this instance, the researcher might manipulate the number of occasions the instrument is administered at each wave to determine the impact on the dependability of scores and use this information to determine the optimal number of occasions to both ensure dependability of scores and optimize study resources.

An additional advantage of the D Study is that the researcher is able to estimate two different reliability coefficients (i.e., *G* and *Phi*), which correspond to two types of inferences drawn from observed scores. The *G* coefficient provides information about the consistency of observed scores when scores are used to determine how the object of measurement (e.g., teachers, children) performs *relative* to others, whereas the *Phi* coefficient provides information about the consistency of observed scores when scores are used to determine how the object of measurement performs in relation to a specified *criterion* (Brennan, 2001, 2010; Shavelson & Webb, 1991). The ability to calculate these two different reliability coefficients provides more specific information about the dependability of observed scores in relation to the intended use of the instrument.

Issues related to G studies. Although there are a number of advantages to conducting G and D studies to gather reliability evidence, there are some issues that should be taken into consideration. First, G studies require careful consideration in their design and implementation, because the information from a D study is dependent on the design of the G study. For example, if a researcher conducts a G study in which different sets of raters conduct observations on different rating occasions (i.e., raters are nested within rating occasions), the researcher will not be able to determine the dependability of observed scores under conditions in which the same raters conduct observations on multiple occasions, because the rater effect cannot be isolated from the occasion effect. In general, a G study design in which each facet in the model is fully crossed with all other facets (e.g., every teacher is rated by the same two raters using the same set of items on every rating occasion) is optimal, because it allows for more freedom in the manipulation of potential measurement conditions in the D study. Nevertheless, a fully crossed design requires more resources to implement and might not always be feasible to conduct. There are alternatives to fully crossed designs described in the G-theory literature, including in the resources shown in the Appendix.

An additional potential issue with conducting G studies is the need for adequate sampling of both the object of measurement (e.g., teachers, children) and the facets of measurement (e.g., raters, occasions) to avoid biased estimates of universe score variance and error variance. This requires a sampling pool representative of the population for which observed scores are collected and an object-of-measurement sample large enough to allow a range of observed scores, in addition to a representative sample of each facet of measurement. These sampling design considerations have implications for the resources needed to conduct a generalizability study that will yield interpretable findings.

The extent to which results from the G study will generalize to the conditions under which a measurement instrument or measurement processes will be administered is limited by design decisions related to sampling procedures for determining from whom data will be collected, when data are collected, and how data are collected. These considerations translate into a need for a carefully planned study in which obtaining information about the consistency of observed scores is a primary goal. Although generalizability studies might require more resources to implement than classical approaches to obtaining

information about the consistency of observed scores, they should not be ruled out either during data collection or in the process of instrument development, particularly for measurement instruments designed for use in ECSE settings.

Applications of G theory in ECSE. Although the advantages of applying G theory to gather reliability evidence for measurement systems used in ECSE have been noted by several researchers in the field (e.g., Bruckner et al., 2006; Goodwin & Goodwin, 1991; McWilliam & Ware, 1994; Snyder et al., 2013; Suen, Lu, Neisworth, & Bagnato, 1993), relatively few studies have been published in which this theoretical framework has been applied in either ECSE or ECE settings. The majority of studies published have examined reliability evidence for judgment-based observational measures of child and teacher behaviors within natural early childhood contexts (e.g., Bruckner et al., 2006; Chen et al., 2014; McWilliam & Ware, 1994; Snyder et al., 2013). McWilliam and Ware (1994) and Bruckner et al. (2006) applied G theory to determine how many raters and rating and occasions were necessary to obtain stable estimates of children's engagement and children's language abilities, respectively. More recent applications of G theory in early childhood contexts reflect its use in the process of developing judgment-based observational rating scales designed to capture the fidelity with which early childhood teachers implement evidence-based teaching practices (e.g., Chen et al., 2014; Snyder et al., 2013).

An additional application of G theory that might be particularly relevant in ECSE is its use for validating measurement systems that employ a convergent assessment model, where observed scores are obtained via multiple raters. Suen et al. (1993) highlighted this application in a study designed to examine a convergent assessment system used by interdisciplinary early intervention teams. These authors used G theory to gather reliability evidence for an assessment of children's functional abilities and to determine how many team members and items were necessary to yield consistent observed scores.

IRT and Rasch Models

IRT (Embretson & Reise, 2000; Reise, Ainsworth, & Haviland, 2005) comprises models for examining the relationship between responses to a collection of test or questionnaire items and the latent variables measured by the items. The models vary in terms of item types that are the focus of the model and whether one variable or more than one latent variables are assumed to be measured by the items. The simplest IRT model is the model developed by Rasch (1980/1960) and popularized by Wright (e.g., Wright, 1968) and his students. The Rasch model, also known as the 1-parameter logistic model, is a model for the relationship between responses to dichotomously[2] scored test items and a single latent ability. It can be used, for example, to analyze data collected using cognitive items that are scored incorrect-correct. According to the Rasch model, the probability of a positive response to the item (e.g., the correct response to a cognitive item) is a function of the difficulty of the item and the ability of the person responding to the items.

The function that relates probability of a positive item response to the latent ability is called an item characteristic curve (ICC). Figure 27.3 shows Rasch ICCs for three items. Each vertical line connects a point on the latent ability axis to the .5 value on the ICC. The value at which a vertical line crosses the latent ability axis is the item difficulty for that item. For example, the item difficulty for the first item, depicted by the ICC to the far left, is −1; people with a latent ability of −1 have a 50 % probability of answering the first item correctly. The item difficulty for the third item is 1. Because the third item requires more ability than does the first item to have a 50 % probability of answering the item correctly, it is a harder item.

There are several other unidimensional IRT models that can be used with dichotomously scored items. Among the logistic models, there are 2-, 3-, and 4-parameter models. With more

[2] Rasch models also exist for polychotomously scored items (see, e.g., Bond & Fox, 2007).

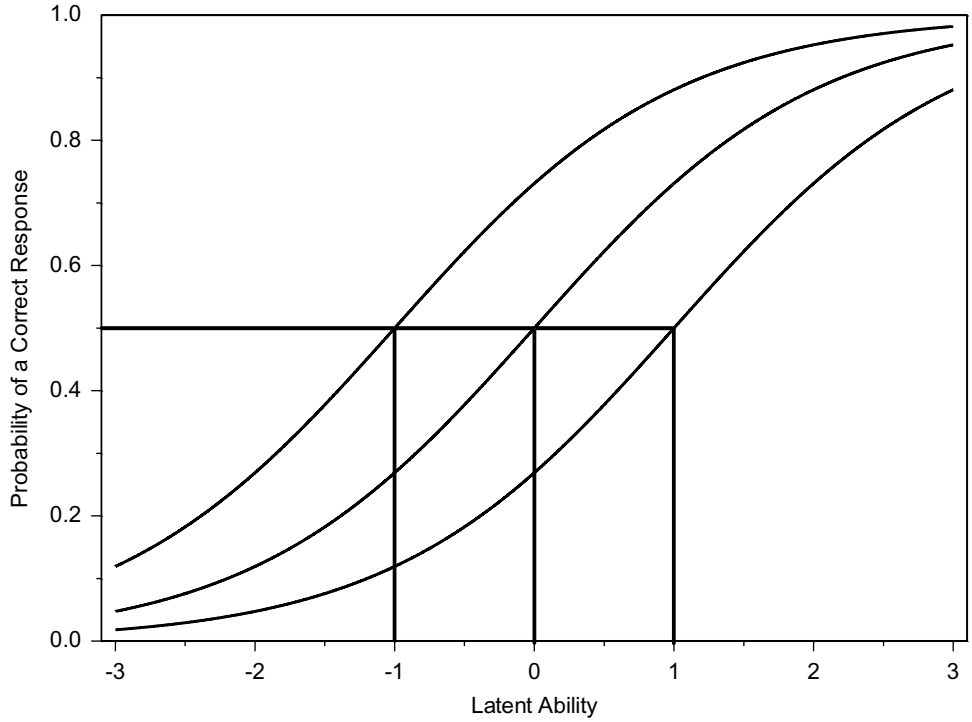

Fig. 27.3 Item characteristic curves for three hypothetical test items of varying difficulty from a one-parameter dichotomous model

parameters, the shapes of the curves can be more complicated, thus increasing the capability of the model to capture features of the data. These features are variation among the items in item discrimination (captured in the 2-, 3-, and 4-parameter models), the possibility that the probability of a correct response does not go as low as zero due, for example, to guessing (captured in the 3- and 4-parameter models), and the possibility that the probability of a correct response does not go as high as one (captured in the 4-parameter model). There are also normal ogive models that have between 1 and 4 parameters. These use a different equation for the ICC, but the appearance of an ICC in a normal ogive model is qualitatively similar to the appearance of an ICC in the logistic model. In addition, there are multidimensional versions of the logistic and normal ogive models. These models are appropriate for data collected using items that are thought to measure more than one latent ability.

There are also models that can be used when the response scale on the items is ordinal, such as when a Likert scale is used. These models include Rasch models, which do not allow item discrimination to vary across items, and models which do allow between-item variation in item discrimination (see Yen & Fitzpatrick, 2006, for an introduction to these models). In addition, there is a nominal response model that can be used when the response scale is nominal. This model can be used, for example, to model the probabilities of response options on a multiple choice test. The preceding models do not exhaust the IRT models that are available. There are important relationships between IRT models and factor analysis models for ordered categorical variables (e.g., Kamata & Bauer, 2008). In addition, the accessibility of IRT models has been extended by the development of software such as M*plus*, EQS, and LISREL, which permit IRT models to be estimated as special cases of general latent variable models (e.g., Huggins & Algina, 2015).

Advantages of IRT models. IRT models are used for a variety of purposes in test development and scoring. IRT models are an alternative to classical test theory for item analysis. The item statistics used in classical test theory are typically the item mean (proportion correct for dichotomously scored items) and the item-total correlation. A disadvantage of these statistics is that they depend on the sample to which the test was administered. Consider a receptive language test administered to preschool children with language delays. The item means and item-total correlations would likely be quite different for this sample than for a sample that included preschool children with language delays in proportion to their incidence in the preschool population. In particular, the item means would likely be smaller for the sample that included only preschool children with language delays. Provided the IRT model adequately represents the relationship between item responses and ability for a given population (e.g., preschool children), estimates of the IRT parameters do not vary systematically when subsamples have differing abilities (e.g., the sample of students with language delays and the sample in which these students are included in proportion to their incidence in the preschool population).

An important practical problem of test development is equating multiple forms of a test so that the effect of test form on the test scores is reduced (Huggins & Penfield, 2012). IRT is widely used for this purpose, because it allows for multiple forms to be used when the objective is to compare performance over time. An example of this case is curriculum-based measurement. If the same form of a measure is used repeatedly, children might learn to respond correctly to the particular items on the form due to repeated exposure to the items. The use of multiple forms mitigates this possibility.

A related practical problem is scoring tests that are used over a longer time span on a developmental score scale. In this situation, the items that are appropriate when children are younger are different than the items that are appropriate when they are older. Nevertheless, scoring the test on a single scale is desirable so that change can be measured. IRT models are commonly used to prepare developmental score scales. Of great concern in the last 40 years is whether sets of test items measure the same latent variables for different subgroups of children (e.g., socioeconomic background, gender, ability). Among the studies test developers conduct to identify items that have this problem are differential item functioning (DIF) studies (Kamata & Vaugn, 2004). IRT models are widely used to conduct DIF studies. Groups of children for which some items might measure different latent abilities are identified, and ICCs are compared for these groups. If an ICC for an item differs systematically for the identified groups, then it may be revised or discarded.

Limitations of IRT models. Although IRT models are often considered an improvement over psychometric approaches that are rooted in classical test theory, there are some notable limitations associated with their application. First, the extent to which findings from IRT analyses can be interpreted is dependent on whether the assumptions of the specified model are congruent with the true relationship between item responses and the latent variable(s) of interest (Harvey & Hammer, 1999). For example, if a 1-paramenter Rasch model is specified, all items are assumed to discriminate ability equally. If this is not the case, then interpreting findings produced by fitting a 1-parameter model might yield spurious conclusions. To avoid this problem, it is important to examine the fit of the IRT model to the data before proceeding with interpreting parameter estimates.

Another potential limitation of IRT is that most models assume the item pool of interest is unidimensional; that is, it measures only a single latent trait (Harvey & Hammer, 1999). Although it is possible to estimate multidimensional IRT models, the technology for doing so is less accessible than unidimensional models. Fortunately, there is some evidence that IRT models are fairly robust to minor violations of the unidimensionality assumption (Harvey & Hammer, 1999). Nonetheless, it is important to test this assumption explicitly (Hambleton, 1985).

Applications of IRT in ECSE. Researchers in ECSE and ECE have acknowledged the need for more frequent use of IRT models, particularly for examining the psychometric properties of instruments to assess quality of ECE programs across a variety of contexts (Bryant, Burchinal, & Zaslow, 2011; Gordon, Fujimoto, Kaestner, Korenman, & Abner, 2013; Lambert et al., 2008), including contexts in which children with or at risk for disabilities receive educational and related services. Many of these instruments are comprised of items measured by indicators anchored in ordinal categories representing different levels of quality. Researchers have begun to examine the extent to which the proposed ordering of indicators and categories holds up statistically via IRT (e.g., Gordon et al., 2013; Lambert et al., 2008) and have used findings from these studies to propose possible revisions or adaptations to existing measures (see Appendix).

Although more attention has been given recently to measures of environmental quality, it is important to consider how IRT might advance understandings about the psychometric properties of assessments intended to examine child and family outcomes. For example, Justice, Bowles, and Skibbe (2006) highlighted the need for more rigorous empirical validation of instruments developed to measure preschool children's print-concept knowledge. They used IRT models to examine the extent to which the Preschool Word Print Awareness (PWPA; Justice & Ezell, 2001) differentiated outcomes for children at risk based on socioeconomic status and language ability. They demonstrated how modeling children's performance allows clinicians and educators to track children's performance over time and to determine whether deviations from expected outcomes might be clinically relevant. Weiland and Yoshikawa (2013) also used IRT analyses to collect psychometric evidence for a short-form mathematics assessment for preschool and kindergarten children.

Another useful and underutilized application of IRT in ECE and ECSE is examining DIF across subgroups of children with and without disabilities. Although the importance of examining DIF for educational tests is highlighted in the *Standards for Educational and Psychological Testing* (AERA et al., 2014), empirical examinations of DIF for assessments administered to young children typically are focused on subgroups such as socioeconomic status, age, or gender rather than disability status. Some researchers have used IRT to examine psychometric properties of popular instruments within disability groups (e.g., Zaidman-Zait et al., 2010), but these analyses have not included an examination of DIF across subgroups. Given the widespread use of instruments in heterogeneous samples of programs, classrooms, children, and families, these studies seem particularly relevant for the field.

Chapter Summary

In this chapter, we have highlighted several "future frontiers" for applied research in ECSE. Our discussion focused on alternative research designs to RCTs, advances in statistical methods related to these alternative designs, extensions of classical test theory, and contemporary approaches to gather reliability and validity evidence for measures used in applied research in ECSE. Many of the methodologies discussed in this chapter are not new, but they have not been widely applied to address second-generation research questions in ECSE. Increased understanding about the uses and limitations of these methods, the availability of technical resources and statistical software, and opportunities to collaborate with experienced methodologists is likely to lead to increased use. Increased use of these methods will help generate plausible causal evidence and inform ongoing measurement development and validation activities in the field to advance evidence-based practice for young children with disabilities and their families.

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Appendix Technical resources, practical illustrations, and example empirical applications of advanced designs and analyses

Methodology	Citation	Resource summary
Technical resources		
Experimental and quasi-experimental research designs	Shadish et al. (2002)	Basic concepts of experimental and quasi-experimental designs, including threats to validity, randomized research designs, NECGDs, RDDs, and ITSDs
RDD	Imbens and Lemieux (2008)	Review of practical and theoretical issues in implementing RDDs
	Schochet et al. (2010)	What Works Clearinghouse standards for RDDs
ITSD	Box et al. (2010)	Comprehensive overview of tools and strategies for modeling and analyzing ITSDs
	Biglan et al. (2000)	Description of the basic features of ITSDs and the value of implementing them to evaluate the efficacy of community interventions
Propensity score methods	Guo and Fraser (2014)	Basic concepts and rationale for applying propensity score methods
SEM	Hoyle (2012)	Comprehensive overview of the application of basic and advanced SEM strategies
	Kline (2011)	Basic concepts and applications of SEM
	Thompson (1998)	Decision-making processes and ten recommendations for applying SEM
DAGs	Elwert (2013)	Basic principles related to DAGs, including example applications
	Sauer and Vander Weele (2013)	Basic principles related to DAGs, in addition to a description of how they can be used to select covariates for statistical adjustment and identify sources of bias, and supporting interpretation of comparative effectiveness studies
Generalizability theory	Brennan (2001)	Comprehensive presentation of principles and application of generalizability theory
	Brennan (2010)	Basic characteristics of generalizability theory in relation to classical test theory
	Shavelson and Webb (1991)	Primer including basic concepts, designs, and applications of generalizability theory
IRT	Bond and Fox (2007)	Principles and procedures for applying the Rasch model in human sciences, including software for examples and applications
	Embretson and Reise (2000)	Principles of IRT and different IRT models
	Reise et al. (2005)	Introduction to the fundamentals of IRT and the advantages of its application to improve measurement in psychology

(continued)

Appendix (continued)

Methodology	Citation	Resource summary
Practical illustrations		
RDD	Tuckwiller et al. (2010)	Illustration of RDD to examine the feasibility of RDD for research related to learning disabilities and to examine effects of tiered vocabulary instruction for kindergartners
	Wong et al. (2008)	Illustration of RDD to evaluate the impact of five state prekindergarten programs on children's receptive vocabulary, math, and print awareness skills
Propensity score matching	Hahs-Vaughn and Onwuegbuzie (2006)	Illustration of propensity score matching using data from the Early Childhood Longitudinal Study, Kindergarten Class (ECLS-K; Institute of Education Sciences, National Center for Education Statistics, n.d.)
Propensity score weighting	Bishop et al. (2014)	Illustration of propensity score weighting using data from the National Early Intervention Longitudinal Study (NEILS; SRI International, 2014)
Generalizability theory	Bruckner et al. (2006)	Illustration of the application of generalizability theory to determine the optimal number of raters and rating occasions to obtain stable estimates of children's language abilities using conversational language samples
	Goodwin and Goodwin (1991)	Overview and illustration of the benefits of using generalizability theory to calculate interrater reliability in ECSE
Example empirical applications		
RDD	Gormley et al. (2005)	Evaluation of the impact of participating in a universal public prekindergarten program on children's developmental outcomes
	Lipsey et al. (2011)	Evaluation of the impact of participating in a state voluntary prekindergarten program on children's kindergarten language, literacy, and math outcomes
	Weiland and Yoshikawa (2013)	Evaluation of the impacts of a public prekindergarten program that implemented a coaching system for teachers and consistent curricula on children's literacy, language, mathematics, executive function, and emotional skills
Propensity score matching	Gormley et al. (2011)	Evaluation of the effect of participation in public prekindergarten programs and Head Start programs on children's social-emotional outcomes in kindergarten
	Lee et al. (2014)	Examination of the impact of participation in Head Start on children's school readiness outcomes in kindergarten using data from the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B; Institute of Education Sciences, National Center for Education Statistics, n.d.)

Propensity score weighting	Ruzek et al. (2013)	Examination of the effect of preschool special education services on children's kindergarten reading and math outcomes using data from ECLS-B
	Sullivan and Field (2013)	Examination of the effect of preschool special education services on children's kindergarten reading and math outcomes using data from ECLS-B
SEM	Dunst et al. (2007)	Evaluation of the effects of family, child, and early childhood process and structural variables on parent and family well-being
	Garrett et al. (1994)	Examination of the determinants of the developmental status of young children
	Kim and Park (2011)	Examination of the causal relations between spasticity, strength, gross motor function, and functional outcomes in children with cerebral palsy
Generalizability theory	McWilliam and Ware (1994)	Application of generalizability theory to determine the optimal number of raters and rating occasions to obtain stable estimates of children's engagement
	Snyder et al. (2013)	Preliminary study of the dependability of scores for the pilot version of the Teaching Pyramid Observation Tool (TPOT-P; Fox, Hemmeter, & Snyder, 2008)
	Suen et al. (1993)	Dependability of a convergent assessment system used by interdisciplinary early intervention teams to assess children's functional abilities
IRT	Gordon et al. (2013)	Examination of the degree of disorder in ordinal categories on the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 1998)
	Justice et al. (2006)	Preliminary psychometric investigation of an instrument used to assess preschool children's print-concept knowledge
	Lambert et al. (2008)	Examination of the factor structure and the degree of disorder in indicators on the Language and Reasoning subscale of the ECERS-R (Harms et al., 1998)
	Weiland et al. (2012)	Evaluation of the psychometric properties of a short-form mathematics assessment for 4- and 5-year-old children

Note: Technical resources are texts, technical reports, or articles that provide guidance for implementation; practical illustrations are articles that provide background information and an illustrative example of the application of a methodology using real or hypothetical data; example empirical applications are studies in which the methodology has been used to address research questions of interest.

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Role of Research Syntheses for Identifying Evidence-Based Early Childhood Intervention Practices

28

Carl J. Dunst

Introduction

The purpose of this chapter is to describe the manner in which different types of research syntheses of early childhood intervention research studies can inform the identification of evidence-based practices. The term evidence-based is used broadly to mean early childhood practices informed by research findings demonstrating a statistical or functional relationship between the characteristics and consequences of an intervention practice where the nature of the relationships can be used to inform what a practitioner or parent can do to produce a desired outcome.

The term practice is also used broadly to include both intentionally planned and naturally occurring interventions (experiences, learning opportunities) that have specified characteristics, features, active ingredients, etc. that are associated with observable changes or improvements in outcomes of interest. The use of naturalistic instructional practices to promote child acquisition of language skills is an example of an intentionally planned intervention (Kaiser & Trent, 2007). Parents' or teachers' use of a responsive interactional style where variations in responsiveness are related to variations in child outcomes is an example of a naturally occurring intervention (e.g., Nievar & Becker, 2008).

The chapter is divided in four sections. The first section includes an overview of the types of research studies that are commonly found in the early childhood intervention literature. The second section includes a description of four types of research syntheses that have or could be used to analyze early childhood intervention research studies. The third section includes a framework for categorizing four types of research studies and four types of research syntheses with examples of literature reviews for different combinations of studies and syntheses. The fourth section includes a description of a particular type of research synthesis that is designed to identify the active ingredients (features, elements, characteristics, etc.) of an intervention practice where research studies on a practice are amendable to the analysis of all four types of research studies described in the chapter. This section includes examples of different types of research syntheses and the implications of the results for informing identification and use of evidence-based early childhood intervention practices. The chapter concludes with a description of gaps in the knowledge base and the need for additional types of research syntheses.

The chapter differs from other descriptions of research syntheses of early childhood intervention whose purpose is often the efficacy or effectiveness of intervention programs (e.g., Anderson

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et al., 2003; Layzer, Goodson, Bernstein, & Price, 2001) where there is no attempt to unpack (or unbundle in Lipsey's, 1993, terminology) the programs to identify which program components or features account for observed effects. The research syntheses described in this chapter included the identification of practices that early childhood practitioners can use to influence changes in child, parent, or family outcomes or parents can use to effect changes in child outcomes.

Types of Research Studies

The early childhood intervention research literature is rich with examples of quantitative and qualitative studies and group as well as single-subject studies. At least four types of research studies are commonly found in the early childhood intervention literature: group, single subject, correlational, and descriptive (case studies). Any one of these types of studies can be experimental or observational (Concato, 2004); controlled, naturalistic, or field experiments (Leichsenring, 2004); or quantitative or qualitative (Creswell, 1994) investigations. Studies can also differ according to the quality or rigor of the research (Shadish, Cook, & Campbell, 2002; Wortman, 1994). The diversity of research in early childhood intervention can make any attempt at culling findings from research studies of the same or similar kinds of practices a daunting task. The particular types of studies that have been or could be analyzed in a research synthesis are briefly described next.

Group Design Studies

Group design studies typically involve comparisons between groups of study participants under contrasting conditions (e.g., intervention vs. non-intervention) where between-group differences on outcomes of interests are used to establish whether a group experiencing an intervention outperforms the comparison or control group (e.g., Shadish et al., 2002). These types of studies typically involve comparisons or contrasts between groups that experience planned interventions (e.g., Cheng et al., 2007), but they also include studies that compare groups that have been provided different types of interventions which are expected to influence the same outcomes of interest (e.g., Ingersoll, 2011). Law et al.'s (2011) comparative study of two different therapeutic approaches to intervening with young children with cerebral palsy is an example of a randomized design group study.

Single-Subject Design Studies

Single-subject or single-participant design studies involve detailed quantitative measurement and analysis of individuals or groups of study participants under different conditions, where changes in behavior or other dependent measures before and after the introduction of an intervention are used to establish the effects or influences of the intervention on outcomes of interest (Horner, Halle, McGee, Odom, & Wolery, 2005). These types of studies are typically planned interventions and implemented using any number of research designs including, but not limited to, ABA, ABAB, and multiple baseline designs (e.g., Barlow, Nock, & Hersen, 2009). Warren, Yoder, Gazdag, Kim, and Jones's (1993) use of a multiple baseline design to investigate the effects of milieu teaching on the acquisition of prelinguistic communication skills among young children with developmental delays is an example of a single-subject design study.

Correlational Studies

Correlational studies include the collection of information on one or more aspects or features of an intervention (planned or naturally occurring) and outcomes of interest to establish the nature and strength of the relationships among measures (e.g., Cohen, Cohen, West, & Aiken, 2003). These types of studies, when properly conducted, can establish the time precedence between two or more variables in a study to establish causal

inferences or directions of influence (Kenny, 2004). Kim and Mahoney's (2004) study of the relationship between mothers' styles of interaction and child engagement in social and nonsocial activity is an example of a correlational study.

Case Studies

Case or descriptive studies include detailed analyses of the experiences or interventions afforded an individual, small group of participants, or a whole class, where the focus of analysis is identifying the nature of the relationship between an intervention and the outcomes or benefits of interest (Yin, 2014). These types of studies typically include multiple sources of information which are used to triangulate the relationships between interventions and outcomes (e.g., Patton, 2002). Qualitative analyses of the home visiting practices used by early childhood professionals to promote parents' use of effective parenting practices are examples of case studies (e.g., Hebbeler & Gerlach-Downie, 2002; McBride & Peterson, 1997).

Types of Research Syntheses

The research syntheses described in this chapter are particular types of integrative reviews of studies of the same or similar practices where the focus of analysis includes the relationship between the key characteristics or elements of an intervention practice and the outcome(s) the practice is intended to have in terms of changes or improvements in behavior, learning, or development. According to Davies (2000), a research synthesis includes "methods for summarizing, integrating and, where possible, cumulating the findings of different studies on a topic or research question" (p. 367). Similarly, Cooper (1984) defined a research synthesis (integrative review) as a set of procedures to "summarize past research by drawing overall conclusions from many separate studies that are believed to address related or identical hypotheses" (p. 10).

There have been numerous attempts to describe and classify different types of research syntheses, the majority of which have or could be used for literature reviews of early childhood research studies. The ones described in this chapter are narrative reviews, summative reviews, systematic reviews, and meta-analyses. The thoughtful work of Davies (2000) informed much of what is described next although considerations noted by others were also used to characterize each type of research synthesis (e.g., Akobeng, 2005; Sandelowski, Barroso, & Viols, 2008; Uman, 2011).

Narrative Reviews

Narrative, or traditional literature, reviews "attempt to identify what has been written on a subject or topic, using which methodologies, on what samples or populations, and what findings" (Davies, 2000, p. 367). Narrative reviews typically include summaries of the results from primary studies and interpretative statements about the nature of the relationships between an intervention practice and outcome variables of interest (Harder, 2010). Korfmacher et al.'s (2008) research synthesis of how parents are involved in home visiting programs in terms of both the quantity and quality of participation and engagement in program activities is an example of a narrative review.

Summative Reviews

Summative reviews are similar to narrative reviews but include some type(s) of quantification often in terms of the number of studies or findings according to type of intervention, settings, research designs, study participants, or some other relevant intervention or study feature. The findings from these types of reviews are often described as the "state of the art" or "state of the science" for a practice (e.g., Muijs et al., 2014). The outcomes of summative reviews are generally a series of statements or conclusions about "what is known" about a practice or

intervention. Horner, Carr, Strain, Todd, and Reed's (2002) research synthesis of behavioral interventions for young children with autism which includes detailed descriptions and analyses of the effects of different intervention practices on reductions in child problem behavior is an example of a summative review.

Systematic Reviews

Systematic reviews are research syntheses "in which there is a comprehensive search for relevant studies on a specific topic, and those identified are then appraised and synthesized according to a predetermined explicit method" (Klassen, Jahad, & Moher, 1998, p. 701). These types of research syntheses, as the name implies, use a systematic approach for determining the types of studies to be included in a review, the search strategy to identify relevant studies, the methods to appraise the quality of identified studies, the methods for analyzing results, and the methods for establishing intervention effects (e.g., Akobeng, 2005; Penn & Lloyd, 2006). As noted by Davies (2000), "systematic reviews have much to offer the educational community in terms of providing unbiased evidence from a wide range of studies of educational policy and practice" (p. 375). Pennington, Goldbart, and Marshall's (2004) research synthesis of interventions to promote the conversational skills of children with cerebral palsy that used the statistical results reported in the primary studies as the basis of overall conclusions is an example of a systematic review.

Meta-Analyses

A meta-analysis is a particular type of systematic review where effect sizes are used for assessing the relationship between a practice and outcome, where the combined effect size results from a series of studies are used to estimate the average effect of a practice (Shadish & Haddock, 2009). An effect size is a measure of the strength of the relationship between two variables expressed in terms of a quantitative metric (Hedges, 2008). Goldstein, Lackey, and Schneider's (2014) research synthesis of group and single-subject design studies of social skills interventions where Cohen's *d* effect sizes for group design studies and the Phi^2 coefficient for single-subject design studies were used as the sizes of effect of the interventions is an example of a meta-analysis of early childhood interventions.

Research syntheses that use meta-analytic methods rely on the statistical analysis of study results as the basis for synthesizing and interpreting findings from studies of the same or similar practices. Meta-analysis "combines individual study treatment effects into a 'pooled' treatment effect for all the studies combined, and for specific subgroups of studies" (Davies, 2000, p. 368). This approach to a research synthesis permits meta-analysts to determine the extent to which the results from many studies yield consistent results and thus provide empirical evidence for a practice.

Effect Size Estimates

One of the more common effect size metrics in group design studies is the posttest mean difference between experimental and control (or comparison) groups on an outcome measure divided by the pooled standard deviation of that measure (Thompson, 2007). This standardized score, calculated for the results in each of the studies in a research synthesis, is combined (i.e., averaged) and used for substantive interpretation of the aggregated results. A number of different effect sizes have been proposed for the analysis of single-participant design studies (e.g., Dunst, 2012; Goldstein et al., 2014; Kratochwill et al., 2010; Parker, Vannest, & Davis, 2011). Although the value of these effect sizes has been questioned (e.g., Wolery, Busick, Reichow, & Barton, 2010), they nonetheless can be useful for conducting meta-analyses of these types of studies. Correlations are typically used as the effect sizes in naturalistic or observational studies where the focus is the relationships between different features or elements of a practice and outcomes of interest (e.g., Dunst & Hamby, 2012; Hemphill, 2003). Case study

researchers have proposed a number of different effect sizes for synthesizing results from qualitative studies (e.g., Onwuegbuzie, 2003; Sandelowski et al., 2008).

Framework for Categorizing Research Studies and Research Syntheses

Figure 28.1 shows a framework for categorizing research syntheses by the type of research study that is the focus of a literature or integrative review. Accordingly, each of the four types of studies, or combinations of studies, of the same or similar practices in different investigations could be synthesized by each type of research synthesis or two or more types of literature reviews. The focus of any research synthesis, for the purpose of identifying evidence-based early childhood intervention practice, would be the identification or isolation of the key characteristics, features, elements, or active ingredients of an intervention practice (independent variable) and the manner in which they are related to one of more outcomes of interest (dependent variables).

This section of the chapter includes examples of literature reviews that had a focus on some particular type of intervention practice, including one or more of the four types of studies described above, where the results were analyzed using one of the types of research syntheses described earlier. The characteristics listed for each intervention practice are examples and not a complete list of the practice characteristics or features that were the focus of investigation. The research syntheses were purposively selected to represent diverse examples of how one or more features or characteristics of an intervention practice were related to one or more outcomes of interest. In instances where a research synthesis for a particular type of study was not located in the early childhood intervention literature, a relevant review is cited as an example of a research synthesis that included analyses of the relationship between some characteristics or features of a practice and outcomes of interest. The reader should bear in mind, however, that there is no exact correspondence between the research syntheses used as examples and the organization in the Fig. 28.1 matrix because the investigators conducting the

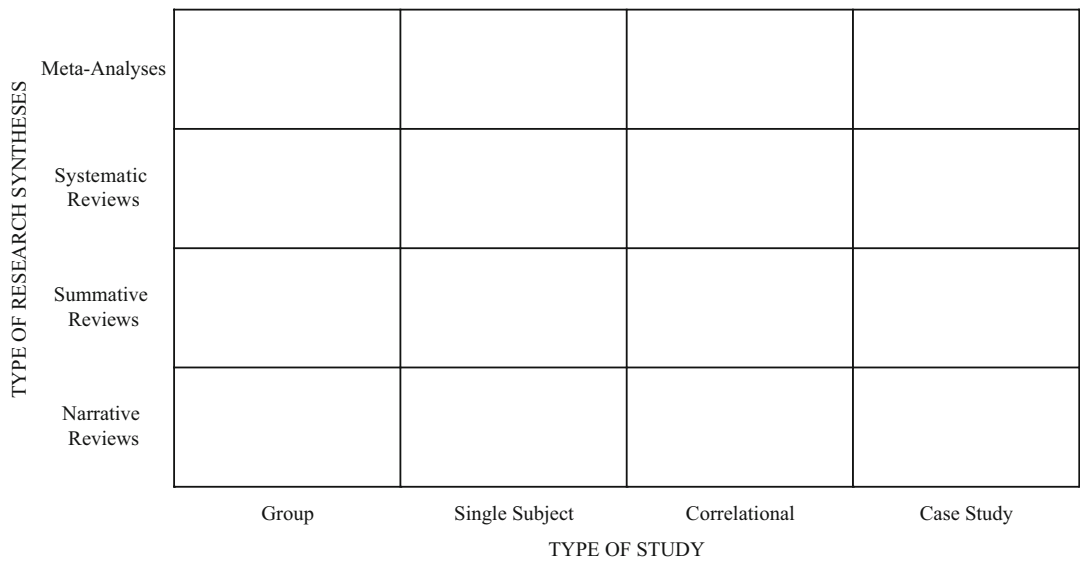

Fig. 28.1 Framework for categorizing and classifying different types of research syntheses according to type of both study and literature review

syntheses did not necessarily do so using the framework described in this chapter.

Narrative Reviews

Examples of narrative reviews of different kinds of intervention practices are shown in Table 28.1. The reviews included descriptions of one or more characteristics of a practice constituting the focus of a research synthesis and the outcomes of interest to the investigators. The different reviews included either only one type of study (e.g., Shields, Pratt, & Hunter, 2006; Vu, Hustedt, Pinder, & Han, 2014) or two or more types of studies (e.g., Campbell, Milbourne, Dugan, & Wilcox, 2006; Korfmacher et al., 2008). The nature of the evidence for the relationship between the practice characteristics and study outcomes differs, but each synthesis nonetheless includes information that can be used to identify which characteristics for a practice "stand out" as most important in terms of implications for practice. Although not done in the majority of the narrative reviews, procedures such as pattern matching (Hak & Dul, 2010) could be used to determine if the relationships between the intervention practices and study outcomes are the same or similar (i.e., replicate across studies) which would strengthen conclusions from a narrative review (see, e.g., Dunst, Trivette, Davis, & Cornwell, 1988; Dunst, Trivette, Starnes, Hamby, & Gordon, 1993, for examples of how pattern matching was used to analyze case study data).

A good example of a narrative review of descriptive studies was conducted by Fiese et al. (2002) on the relationship between naturally occurring family routines and rituals and family and child outcomes. The investigators used three characteristics of routines and rituals (communication, commitment, continuity) to analyze the relationships between routines of daily living and rituals in family life and the direct effects of participation in the activities on family health and well-being and the indirect effects of routines and rituals on child outcomes mediated by family health and well-being. The investigators concluded that routines and rituals are contexts for interpersonal interactions and patterns of communication among family members which influence healthy family and child functioning where the results could inform the focus of natural environment interventions and the kinds of outcomes that could be expected using everyday activities as sources of child learning opportunities (Dunst, Trivette, Humphries, Raab, & Roper, 2001).

Summative Reviews

Table 28.2 includes examples of summative reviews of different kinds of intervention practices. The investigators of the reviews reported different ways in which selected characteristics of the study participants, interventions, outcomes, and the results from the studies were used to draw conclusions about the effectiveness of the practices constituting the focus of analysis. The most detailed descriptions and analyses were performed in the majority of the summative reviews (Horner et al., 2002; Joseph & Strain, 2003; Odom et al., 2003; Pennington et al., 2004; Rakap & Parlak-Rakap, 2011; Ziviani, Feeney, Rodger, & Watter, 2010). The approaches to doing so, however, varied considerably but nonetheless each provides a different lens for understanding the relationships between the intervention practices and study outcomes. Rakap and Parlak-Rakap (2011), for example, categorized embedded instructional practices according to types of classroom activities, types of instructional procedures, and child-targeted behavior and, after careful analyses of each study, drew conclusions about the conditions under which embedded instruction had positive child effects. In contrast, Erwin, Brotherson, and Summers (2011) used a type of pattern matching to illustrate how the same or similar themes (including intervention practices) were found in the different studies included in their review, whereas Dempsey and Keen (2008) categorized the studies in their synthesis according to different family-centered processes, parent and child outcomes, and moderating variables.

Odom et al.'s (2003) summative review of different types of intervention practices, each of which

Table 28.1 Examples of narrative research synthesis reviews

Narrative reviews	Intervention practice	Selected practice characteristics	Type of study			
			Group	Single subject	Correlational	Case study
Shields et al. (2006)	Family-centered care	Parent-professional roles:				X
		• Information sharing				
		• Collaboration				
		Negotiation:				
		• Parent participation				
		• Parent feedback				
Mahoney and Nam (2011)[a]	Parenting behavior	Sensitivity			X	
		Contingent responsiveness				
		Reciprocity				
Schlosser and Sigafoos (2006)	Augmentative and alternative communication	Aided devices/approaches		X		
		Unaided devices/approaches				
		Combination				
Vu et al. (2014)	Adult-child relationship building	Positive parenting	X			
		Adult-child interactions				
		Child discipline method				
Odom et al. (2004)	Preschool inclusion	Classroom practices:	X	X		X
		• Instruction				
		• Environmental arrangements				
Fiese et al. (2002)	Family routines and rituals	Parenting routines				X
		Parenting practices				
		Parent-child interactions				
Korfmacher et al. (2008)	Parent involvement	Parent participation	X		X	X
		Engagement strategies				
Kreichauf et al. (2012)	Physical activity	Social environment	X			
		Play environment				
		Activity lessons				
Campbell et al. (2006)	Assistive technology	Switch interface devices	X	X		X
		Computer use				
		Power mobility				
		AAC				

[a]The example from Mahoney and Nam (2011) is for only a subsample of studies included in their literature review

Table 28.2 Examples of summative research synthesis reviews

Summative reviews	Intervention practice	Selected practice characteristics	Type of study			
			Group	Single subject	Correlational	Case study
Erwin et al. (2011)	Parenting supports	Information sharing				X
		Participatory opportunities				
		Instrumental supports				
Koerting et al. (2013)	Parent involvement	Program responsiveness				X
		Engagement strategies				
		Practitioner helping style				
Dempsey and Keen (2008)	Family-centered practices	Collaboration			X	
		Professional help giving				
		Parent autonomy				
Odom et al. (2003)	Behavioral interventions	Adult-directed practices		X		
		Peer-mediated practices				
Rakap and Parlak-Rakap (2011)	Embedded instruction	Instructional procedures:		X		
		• Constant time delay				
		• System of least prompts				
		• Simultaneous prompting				
Joseph and Strain (2003)	Social-emotional curricula	Relationship building	X			
		Child sharing strategies				
		Child problem-solving				
Horner et al. (2002)	Behavioral interventions	Stimulus-based practices	X	X		
		Instructional practices				
		Reinforcement-based practices				
Ziviani et al. (2010)	Therapy and parent-implemented practices	Family support	X		X	
		Parent education				
		Direct therapy				
Pennington et al. (2004)	Adult-child interactions	Communication boards	X	X		
		Adult responsiveness				
		Interactional strategies				

was designed to promote child learning and development, is illustrative of the yield from this type of research synthesis. The synthesis included the classification of the studies according to participants, settings, and design features; the categorization of the studies according to levels of evidence (well established, emerging effectiveness, probably efficacious); and the nature of the relationships between nine types of practices and the study outcomes. Their careful analysis of the studies identified adult-directed interventions and differential reinforcement of desired child behavior as having well-established evidence for effectiveness and peer-mediated practices, visual supports, child self-monitoring, and family involvement as having emerging evidence for effectiveness.

Systematic Reviews

Examples of systematic reviews of different kinds of intervention practices are shown in Table 28.3. Each review included the classification or categorization of the study results based on some a priori criteria for ascertaining effectiveness. Most of the reviews included analyses of the relationships between selected characteristics of the intervention practices and different study outcomes. In those cases where effect sizes or some other metric was used to quantify results, the pattern of results (but not aggregate findings) were used to draw conclusions about the effectiveness of the intervention practices. Hinkley et al. (2014), for example, used statistical significance to ascertain the relationship between child physical activity and sedentary behavior and child psychosocial behavior to draw conclusions from their analyses. In contrast, White et al. (2011) categorized studies as having positive, negative, or mixed results and used the patterns of results to identify adult-child play and adult use of naturalistic instruction as important factors for promoting joint attention.

Blauw-Hospers and Hadders-Algra's (2005) review of the effectiveness of different types of practices for promoting the motor development of infants and toddlers with identified disabilities and

Table 28.3 Examples of systematic research synthesis reviews

Systematic reviews	Intervention practice	Selected practice characteristics	Type of study			
			Group	Single subject	Correlational	Case study
Lequia et al. (2012)	Activity schedules	Photographs		X		
		Line drawings				
		Videos				
White et al. (2011)	Joint attention	Naturalistic instruction	X	X		
		Contingent imitation				
		Turn taking				
Kim et al. (2003)	Toy and group practices	Social toys	X	X		
		Group composition				
		Classroom activities				
Bult et al. (2011)	Type of activity	Social activities	X			
		Inclusive settings				
Warren et al. (2011)	Intensive interventions	Behavioral practices	X	X		
		Parent training				
		Interactional strategies				
Blauw-Hospers and Hadders-Algra (2005)	Type of motor intervention	Active child participation	X			
		Passive child participation				
		Sensory stimulation				
Hinkley et al. (2014)	Physical activity	Type of activity:	X			
		• Walking				
		• Bike riding				
		• Physical play				

those at risk as a result of preterm births or low birth weights is a good example of how a systematic review can be used to identify evidence-based intervention practices. The review included group design studies, single-subject studies, and case studies, each of which were coded in terms of selected characteristics of the interventions (e.g., passive or active child participation in physical activities), the intensity of the interventions, and parent involvement in the interventions (among other features), where the results were analyzed in terms of which characteristics were associated with positive child outcomes. The number of statistically significant differences between groups favoring the intervention group was used to ascertain effectiveness (Bushman & Wang, 2009). Results showed that practices that actively involved children in motor activities and which encouraged their exploration were most effective.

Meta-Analyses

Table 28.4 includes examples of meta-analyses of different kinds of early childhood intervention practices. The meta-analyses included effect sizes for estimating the strength of the relationships between intervention practices and the study outcomes, where the average effect sizes (and in most cases the confidence intervals for the average sizes of effect) were used for ascertaining which practice characteristics proved most important. Roberts and Kaiser (2011), for example, were able to surmise from their effect size analyses that "parent training had a positive effect on parent-child interactional style in terms of [parent] responsiveness" (p. 104) and that parent responsiveness was the most important variable associated with positive child language development.

Table 28.4 Examples of meta-analysis research synthesis reviews

Meta-analyses	Intervention practice	Selected practice characteristics	Type of study			
			Group	Single subject	Correlational	Case study
Dyches et al. (2012)	Positive parenting practices	Sensitivity	X	X	X	
		Responsiveness				
		Supportive exchanges				
Benzies et al. (2013)	Type of intervention	Social support	X			
		Parent education				
		Child-focused practices				
Mol et al. (2008)	Dialogic book reading	Requests for:	X			
		• Feedback				
		• Information				
		• Expansions				
Goldstein et al. (2014)	Social skills intervention	Adult-directed practices	X	X		
		Peer-based practices				
		Child self-monitoring				
Roberts and Kaiser (2011)	Parent-implemented language intervention	Sensitivity	X			
		Milieu teaching				
		Joint attention				
McConachie and Diggle (2007)	Parent-implemented practices	Parent training	X			
		Behavioral practices				
		Pivotal responsive training				
Marulis and Neuman (2010)	Vocabulary intervention	Type of training:	X			
		• Explicit instruction				
		• Implicit instruction				
Dunst et al. (2008)	Family-centered practices	Relational practices			X	
		Participatory practices				

A unique feature when using effect sizes in meta-analyses is the ability to evaluate moderators and mediators of the relationships between intervention practices and study outcomes (Shadish & Sweeney, 1991). Moderator analyses permit tests of whether the sizes of effect of an intervention and outcome differ as a function of another variable (e.g., frequency of use of a practice). Five of the meta-analyses in Table 28.4 evaluated moderator effects (Dunst, Trivette, & Hamby, 2008; Dyches, Smith, Korth, Roper, & Mandleco, 2012; Marulis & Neuman, 2010; Mol, Bus, de Jong, & Smeets, 2008; Roberts & Kaiser, 2011). Mediator analyses permit tests of whether the relationships between an intervention variable and outcomes are indirect where a mediated variable explains the influence of an intervention practice on an outcome measure. The meta-analysis of family-centered practices was the only research synthesis that evaluated the effects of a mediator (self-efficacy belief and personal control appraisals) on parent, family, and child outcomes (Dunst, Trivette, & Hamby, 2008). The results showed that family-centered practices were directly related to outcomes measuring parent behavior (e.g., well-being) but were indirectly related to distal outcomes (e.g., child behavioral functioning) mediated by belief appraisals (see especially Dunst & Trivette, 2009b; Trivette, Dunst, & Hamby, 2010, for meta-analyses that included tests of multiple mediator effects).

Practice-Based Research Syntheses

Practice-based research syntheses are particular types of literature reviews that explicitly attempt to identify the characteristics of an intervention practice, planned or naturally occurring, that are related to outcomes of interest, where the results are used to identify evidence-based practice characteristics that inform a practitioner or parent as to which practice features or elements are most likely to have desired consequences or effects. According to Bronfenbrenner (1999), any planned or naturally occurring environmental experience or opportunity has discernible features and elements that can be examined as determinants or correlates of behavior and development. Bronfenbrenner (1992) noted, for example, that these features can either invite or inhibit engagement in sustained activity or interactions and that experiences having developmentally instigating features and elements are most likely to positively influence the course of human development. Development instigating refers to those environmental and person factors that invite, encourage, and sustain interactions with people and objects, and development enhancing refers to the consequences of those interactions, including, but not limited to, improved child learning and development.

Approach

The identification of the practice characteristics associated with outcomes of investigative interest is accomplished using a particular set of procedures for conducting practice-based research syntheses. These types of syntheses involve the analysis of studies examining the same or similar practices where different characteristics (elements, features, components, active ingredients, etc.) of the practices are coded so that the presence and absence of the characteristics (or variations in the use of the characteristics) can be related to variations in the study outcomes. In the largest majority of cases, the studies included in a practice-based research synthesis are coded using either a priori or evolving coding scheme that permits as much specificity as possible in terms of the particular characteristics that "make up" a practice, intervention, experience, opportunity, and so forth that are the focus of investigation.

Figure 28.2 shows graphically the framework that is used to analyze studies in a practice-based research synthesis. The studies are examined in terms of specific practice characteristics and different study outcomes. The more practice characteristics that can be coded, the more likely there can be specificity in terms of which characteristics or combinations of characteristics matter most in terms of reported outcomes. The goal of a practice-based research synthesis is to

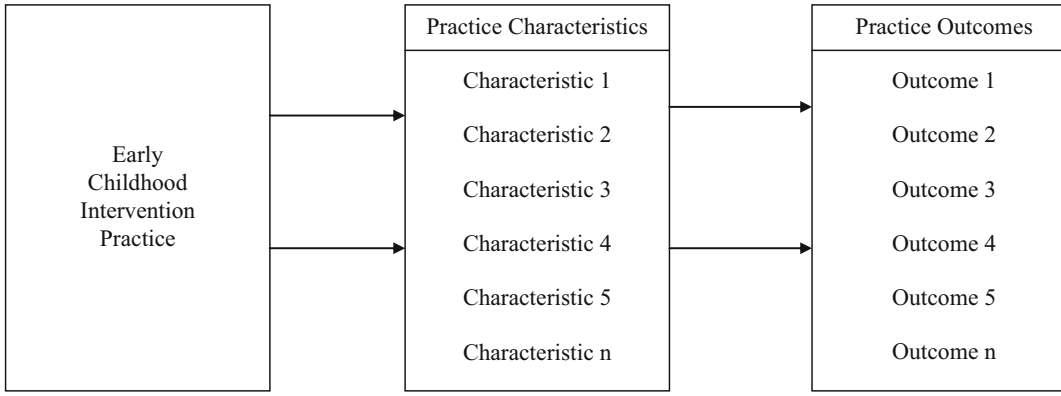

Fig. 28.2 Framework for planning and conducting a practice-based research synthesis for identifying evidence-based practice characteristics

unpack, disentangle, and unbundle (Lipsey, 1993) an intervention practice, experience, or opportunity to identify a characteristic or set of characteristics that stand out as being most important. The ways in which the characteristics and consequences of a practice are related depend on the kind of studies included in a research synthesis as described below.

Illustrative Example

A meta-analysis of four adult learning methods is used to illustrate the process and yield from a practice-based research synthesis. The synthesis included 58 randomized controlled design studies of coaching, just-in-time training, guided design, and accelerated learning (Dunst, Trivette, & Hamby, 2010). Each study was coded in terms of the types of practices used to (1) introduce and (2) illustrate new knowledge or a practice to a learner, (3) learner use of the knowledge or practice and (4) his or her evaluation of their experience, and instructor-facilitated learner (5) reflection on and (6) self-assessment of his or her understanding (mastery) of the knowledge or practice. Thirty-six different types of practices were used in the studies of the six adult learning methods.

The efficacy of the adult learning methods was evaluated by comparing the posttest outcome scores of the intervention and control group participants. Cohen's d effect size for the between-group differences was $d = .42$, favoring the intervention groups. The relative effectiveness of the four adult learning methods was evaluated by comparing the posttest outcome scores for each approach to adult learning. Coaching ($d = .91$), just-in-time training ($d = .52$), and guided design ($d = .49$) but not accelerated learning ($d = .05$) were found to be effective in terms of differences in learner knowledge and practice.

Further analyses were conducted to identify the particular practices for each of the six learning methods that were associated with the largest between-group differences. Results showed that those practices that actively involved learners in the use, evaluation, understanding, reflection on, and assessment mastery of new knowledge or skills were most effective. These included, but were not limited to, real-life application, learner evaluation of his or her experiences, learner reflection on his or her understanding of a practice or content area, and learner self-assessment of mastery. Results also showed that when five or six of the most effective practices were incorporated into the learning process, the more effective were the adult learning methods (Dunst & Trivette, 2012). Additionally, it was determined that the number of adult learners and the number of hours and sessions of learning opportunities moderated the effects of the use of five or six of

the most effective adult learning methods. The smaller the number of learners, the more learning opportunities that were provided the learners, and the more the learning opportunities were distributed over time, the more effective were the adult learning methods.

The results from the meta-analysis together with findings from other studies (e.g., Dunst & Trivette, 2009a; Raab, Dunst, & Trivette, 2013) were used to develop a set of evidence-based practices for planning and conducting training to promote parents' (e.g., Dunst, Trivette, & Raab, 2014) and practitioners' (e.g., Trivette, Raab, & Dunst, 2014) use of evidence-based intervention practices. Findings to date indicate that when training opportunities mirror the results from the meta-analysis, the higher the likelihood that the intervention practices are used with fidelity (Dunst, Trivette, & Raab, 2013).

Early Childhood Intervention Practices

The manner in which a practice-based research synthesis can be used to identify evidence-based early childhood intervention practices is illustrated next for five different practices, each conducted using a different type of research synthesis. The syntheses were purposively selected to represent diverse ways in which one can go about identifying the characteristics and conditions under which practices are most effective where the results inform the identification of evidence-based practices. Each of the research syntheses included extensive searches of electronic databases as well as hand searches of relevant journals, journal articles, book chapters, books, dissertations, and other sources (Lucas & Cutspec, 2007). The five practices are (1) response-contingent child learning; (2) caregiver interactional behavior; (3) interest-based child learning; (4) adaptations to the environment, materials, and activities; and (5) type of child reading interventions. Most of the research syntheses were completed as part of cooperative agreements with the US Department of Education which included the provision that they be made freely available to professionals, parents, and the general public either as web-based products or through other means of (e.g., open access journal articles).

Child Response-Contingent Learning

The purpose of this summative review was to ascertain the conditions under which response-contingent child (operant) learning was associated with enhanced positive and attenuated negative child social-emotional behavior (Dunst, 2007). Response-contingent learning opportunities are characterized by behavior-based contingencies where a child's behavior either elicits a reinforcing consequence (e.g., swiping at a mobile and producing movement and auditory feedback) or his or her behavior is reinforced by another person (e.g., a parent tickling a child's tummy each time she smiles or vocalizes). The social-affective behavior that infants and young children manifest in response to their ability to produce or elicit reinforcing consequences are considered behavior indicators that children recognize that they are the agents of the environmental consequences. These relationships are illustrative of what are described as contingency detection and contingency awareness (Dunst, Trivette, Raab, & Masiello, 2008; Tarabulsy, Tessier, & Kappas, 1996).

The synthesis included 42 studies of children with ($N=13$) and without ($N=29$) developmental delays or identified disabilities. The studies were a mix of single-participant design studies, group comparative studies, and case (descriptive) studies. The majority of studies involved comparisons of baseline vs. intervention phases where the intervention phase involved reinforcement of child operant responding. Whereas all of the studies involved the analysis of the relationship between individual child contingency and social-emotional behavior, data analysis was performed for groups of children in the majority (74 %) of the studies. A type of pattern matching was used to map child social-emotional responses onto different types of contingency experiences to identify which conditions were associated with increased positive and decreased negative child affective responses to their response-contingent behavior.

Three different types of reinforcement were used in the studies: episodic, synchronous, or conjugate. Episodic reinforcement is delivered discretely following the production of an operant behavior (saying "good baby" following a smile by an infant). Synchronous reinforcement is made available continuously as long as the operant behavior is manifested (e.g., a visual display remaining "on" as long as a child is vocalizing). Conjugate reinforcement involves the presentation of a reinforcing event contingent upon a response where the amount and intensity of the reinforcement is proportional to the strength of operant responding (e.g., the harder a child kicks, the more movement and sound from a mobile).

The results showed that child learning occurred in most studies for the most children regardless of type of child response-contingent behavior, type of reinforcement, or child condition. The relationship between child learning and child social-emotional behavior was able to be examined under five different experimental conditions (e.g., learners vs. non-learners; type of reinforcement). Findings showed that response-contingent child learning opportunities where the relationship between child behavior and its consequences was clearly detectable were associated with increased positive and decreased negative child behavior. More specifically, the results showed that situations where the relationship between child operant behavior and its consequences were separated by a few seconds as was the case for episodic reinforcement, it seemed easier for a child to detect a contingency at least when first learning to produce environmental consequences.

The results from the research synthesis together with findings from meta-analyses of other response-contingent child learning studies (e.g., Dunst, Gorman, & Hamby, 2010) have been used to develop guidelines for using contingency learning games as an intervention for promoting child acquisition of response-contingent behavior and especially among young children with disabilities who have not yet acquired the ability to use instrumental behavior to produce reinforcing consequences (e.g., Dunst, Pace, & Hamby, 2007). These types of interventions have proved quite effective in terms of not only increasing child operant responding but also increasing child positive social-emotional behavior (e.g., Dunst, Raab, Trivette, Parkey, et al., 2007; Dunst, Raab, Trivette, Wilson, et al., 2007).

Caregiver Interactional Behavior

The purpose of this meta-analysis was to identify the particular types of caregiver interactional behavior that were associated with secure infant attachment (Dunst & Kassow, 2008). The synthesis included 75 studies of more than 4500 caregiver-child dyads. The studies differed in terms of which of the ten caregiver interactional behaviors were the focus of investigation (e.g., response quality, contingent responsiveness, caregiver-child synchrony). In each of these observational studies, caregiver behaviors were first assessed in terms of parent-child interactions, and then the children were tested in terms of their type of attachment where the results of both sets of measures were correlated.

The average effect sizes and the 95 % confidence intervals for each of the ten interactional behaviors were used to identify which caregiver behaviors were associated with secure infant attachment. Four of the ten interactional behaviors proved to be the best predictors of child outcomes: caregiver-child mutuality where both the adult and child were attending to each other, caregiver-child synchrony where interactional episodes were reciprocal and mutually rewarding, caregiver contingent responsiveness to the child's behavior and interactions, and response quality where the caregivers' responses to child behavior maintained child engagement in caregiver-child interactions.

Results provided support for the contention that "if the [caregiver-child] relationship is going well, there should be some indication of sustained pleasure and mutual interest, as well as a well-modulated range of [caregiver-child] emotional expression" (Emde & Easterbrooks, 1985, p. 80). The particular types of interactional behavior that proved most important are ones that are part of most naturalistic teaching procedures (Dunst, Raab, & Trivette, 2011). They are also behavior that the relationships between caregiver-

child interactional behavior and other child outcomes have been found in other syntheses (e.g., Mahoney & Nam, 2011; Warren & Brady, 2007). Results from those types of research syntheses have been used to develop evidence-based instructional practices (e.g., Raab & Dunst, 2009) as well as evidence-based parenting interactional interventions (Kim & Mahoney, 2004).

Interest-Based Child Learning

The purpose of this meta-analysis was to ascertain if the ways in which child interests were incorporated into early intervention practices with young children with autism had similar or different effects on the children's social and communicative behavior (Dunst, Trivette, & Hamby, 2012a). The syntheses included 14 single-participant design studies of 30 infants, toddlers, and preschoolers with autism.

The 14 studies all included some attempt to incorporate either personal or situational interests into different types of intervention practices. Personal interests included a child's preferences for desired activities or objects that are characterized by enjoyment, excitement, and other positive emotional responses. Situational interests include person and environment stimuli, events, and activity that evoke and sustain social and nonsocial engagement. The studies in the syntheses were coded according to which type of interest was used as part of the interventions with the children. The outcomes that were the focus of analysis included positive child affect, social responsiveness to adult interactions, joint attention, and child language production. The intraindividual point-biserial correlation coefficients between the baseline (=0) vs. intervention (=1) phases of the study and the child outcomes were used as the size of effect for the relationship between the interest-based interventions and the child outcomes (Dunst, 2012).

Results showed that incorporating either type of child interest into early intervention practices was associated with positive child outcomes but that effect sizes were larger for personal compared to situational interests. Moderator analyses showed that interest-based child interventions were equally effective for children with different severities of autism and for interventions in different settings (home, classroom, clinic).

The results from the Dunst, Trivette, and Hamby (2012a) research synthesis as well as those from other syntheses of interest-based child learning (e.g., Dunst, Trivette, & Hamby, 2012b) were used to develop evidence-based intervention practices for young children with autism (Dunst, 2011). The practices have proven effective for promoting child learning and development (Dunst, Trivette, & Masiello, 2011; Trivette & Dunst, 2011).

Adaptations to the Environment, Materials, and Activities

The purpose of this research synthesis was to determine if different types of adaptations used as part of interventions with young children with disabilities facilitated child participation in typically occurring activities and had positive child behavioral outcomes (Trivette, Dunst, Hamby, & O'Herin, 2010). The synthesis included 19 studies of 104 children with different types of identified disabilities or developmental delays. Investigators used single-participant designs, between-conditions designs, a cross-sectional design, or case studies to evaluate the effects of adaptations on the child outcomes.

In addition to computing effect sizes for different contrasts (e.g., baseline vs. intervention) where possible, pattern matching (Yin, 2002) was used to code all the studies in the synthesis, including those that reported no quantitative results, to ascertain the value and yield from this methodology for conducting a meta-analysis. Each of the studies was systematically examined to determine if the patterns of results were consistent with investigator hypotheses, expectations, or predictions. This was accomplished using a 5-point scale (−2 = highly inconsistent, −1 = somewhat consistent, 0 = neither consistent nor inconsistent, 1 = somewhat consistent, 2 = highly consistent) for determining how well the results matched investigator expectations. Inspection of graphs in the single-participant design studies, the magnitude of reported effects in the contrasting conditions and cross-sectional studies, and the narrative descriptions in the case studies were

used to make ratings where pattern matching was used to code and analyze studies for which standardized effect sizes could not be computed. Inter-rater agreement for the pattern matching ratings was 90 % for the complete set of findings.

Results showed that 68 % of the ratings matched investigator expectations that adaptations would be related to positive child outcomes. The patterns of results were very much like those for studies in which effect sizes could be computed from other information in the primary reports. Analyses of the pattern matching results for different intervention-related variables found, for example, that the adaptations were effective when made to materials, activities, or the environment and when the interventions were implemented in classroom or home (but not therapy room/clinic) settings. Results also showed that interventions were most effective when implemented for more than ten sessions.

The findings, taken together, indicated that adaptations to the environment, activities, or materials increase child participation in everyday activities (routines, activity settings, natural environments, etc.) where children become engaged in learning or therapy activities that provided contexts for improved knowledge, skills, and competence. Methods and procedures for using adaptations for increasing participation in everyday learning activities, when done in ways consistent with what was found in the research synthesis, would be considered evidence based (e.g., Campbell, Milbourne, & Wilcox, 2008).

Type of Child Reading Interventions

The purpose of this meta-analysis was to determine the relative effectiveness of different approaches to reading interventions with preschool children where secondary analyses of more traditional research syntheses were performed to identify the conditions under which the intervention practices were most effective (Trivette & Dunst, 2007). The three interventions were dialogic reading (What Works Clearinghouse, 2006a), interactive shared book reading (What Works Clearinghouse, 2007), and shared book reading (What Works Clearinghouse, 2006b). The majority of studies in each synthesis were randomized design studies where posttest intervention vs. control/comparison group differences were used to evaluate the effectiveness of the interventions.

The three syntheses included 13 studies of 729 children. The secondary analysis of the studies included tests for the effects of degree of child participation in the reading episodes (passive to active), length of reading session, and length of intervention as factors that might be related to differences in the study outcomes. In contrast to the conclusions in each of the efficacy syntheses of the three reading approaches, the findings from the practice-based research synthesis showed that active child participation in the reading interventions was associated with positive child outcomes and that reading sessions of 15 or fewer minutes were associated with larger effect sizes compared to sessions lasting more than 15 min. The results demonstrate the yield from practice-based research syntheses that are not generally the focus of either efficacy or effectiveness research syntheses.

The results showed that the more actively a child is involved in early reading episodes while using effective adult-child reading strategies, the more likely he or she will benefit from the interventions. These strategies include, but are not limited to, asking **Wh__** questions, prompting descriptions and elaborations, and asking inferential questions (van Kleeck, 2006). A common theme found in most practice-based research syntheses of child-level intervention practices is the important role that active child engagement plays in promoting child learning and development (Dunst, Trivette, Williams, Simkus, & Hamby, 2012; Dunst, Valentine, Raab, & Hamby, 2013).

Discussion

The approach to conducting research syntheses described in this chapter was developed in response to the fact that many, if not most, literature reviews of either the efficacy or effectiveness of early childhood intervention programs or practices do not include information useful for identifying which program components or practice

features best explain the effects of the interventions on outcomes of interest. The chapter included multiple examples of different types of research syntheses of different types of studies to illustrate the yield of "going beyond" efficacy and effectiveness analyses and digging deeper to identify which characteristics of a practice are associated with different study outcomes.

Although not explicitly described or promoted, the framework for categorizing research syntheses proposed in this chapter does not include any a priori assumptions that one type of study or one type of research synthesis is superior to the others as long as a synthesis includes believable and defensible information about how an intervention practice is related to outcomes of interest. This differs from approaches where different types of studies are placed in a hierarchy of evidence where certain types of research syntheses are considered better than others in establishing functional or statistical relationships between interventions and the outcomes they are expected to influence or change. The conduct of research syntheses using an "applied lens" focuses on what can be gleaned or learned from how a practice was used and what observed effects were manifested or realized.

Practice-based research syntheses, in contrast to efficacy or effectiveness syntheses, employ a type of replication logic (Yin, 2014) where patterns of results from different types of studies are used to ascertain if the intervention practice-outcome relationship is the same or similar, and if so, what can be learned about the relationship to inform the use of the practice by practitioners and parents in order to have the same outcomes when used as part of routine interventions. If, for example, results from single-subject studies establish a functional relationship between an intervention practice and study outcomes, results from observational studies establish a statistical relationship between the same practice and outcomes, and the patterns of results are the same or similar, the information gleaned or learned from the two types of studies can help inform the identification of evidence-based practices.

This type of pattern matching was used in the Dunst (2007) narrative review of the relationship between response-contingent child learning and child social-emotional responses to contingency detection and awareness. The syntheses included group studies, single-participant design studies, and case description studies. All of the investigators examined the relationships between child contingency behavior and social-emotional responding, and although the results differed in terms of the reported magnitude of effects (investigators in case studies tended to overestimate the effects based on their observations), the patterns of results, regardless of type of study, were very much alike. The results, therefore, provided converging evidence for the conditions under which response-contingent learning opportunities were likely to have optimal positive child consequences.

A pattern matching approach to identifying evidence-based practices is based on Campbell and Stanley's (1963) assertion that "If several sets of differences can all be explained by the single hypothesis that *X* has an effect, while several separate uncontrolled-variable effects must be hypothesized, a different one for each observed difference, then the effect of *X* becomes the most tenable" (p. 36). This is likely to be the case where "more than one research methodology" (Odom et al., 2005, p. 140) is used to identify evidence-based practices and mixed-methods approaches to conducting research syntheses are employed (Collins, Onwuegbuzie, & Sutton, 2006) in order to have converging evidence for identifying both the characteristics and conditions under which the characteristics are related to study outcomes.

Conclusion

The chapter included examples of different types of research syntheses of different types of studies of different types of practices to illustrate how investigators have gone about unpacking and unbundling intervention practices to identify the characteristics of and conditions under which the practices were associated with outcomes of interest. In reviewing research syntheses of early childhood intervention practices for inclusion in the chapter, an interesting pattern emerged that sheds light

on the current state of knowledge with regard to the research foundations for early childhood intervention practices with infants, toddlers, and preschoolers with identified disabilities or developmental delays.

The largest number of research syntheses that were located was for different types of behavioral interventions with young children with autism (e.g., Goldstein et al., 2014; Warren et al., 2011), and those located for other types of practices (with some exceptions) were mostly conducted by researchers outside the early childhood intervention field (Dodd, Taylor, & Damiano, 2002; Vanderveen, Bassler, Robertson, & Kirpalani, 2009) where the main focus was often not variables useful for informing early childhood intervention practices. What became increasingly clear as more and more databases were searched for research syntheses is that there is a gap in the knowledge base for different intervention practices (e.g., transitions between classroom activities, natural learning environments) even though many studies have been conducted on these practices but which have not yet been subjected to research syntheses. Therefore, an important next step in identifying evidence-based early childhood intervention practices is to determine which particular early intervention and preschool special education practices are considered recommended, promising, or even effective in the absence of research syntheses of studies on the practices, to identify relevant studies and conduct research syntheses for practices to identify which characteristics of the practices are associated with study outcomes. The framework in Fig. 28.1 might prove useful for doing so to "fill in" missing evidence for different early childhood intervention practices.

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Accounting for the Developing Brain

29

Jason Wolff

Early childhood is a time of dramatic change both in terms of behavior and neurobiology. The nature and pace of this change are in part why this interval is viewed as a unique opportunity for intervention—a highly plastic period during which a child's developmental trajectory may be advantageously altered. To date, most applied research in early intervention has relied on behavioral measures alone. Because behavioral and brain development are intrinsically connected, behavior-only approaches to understanding risk, needs, and outcomes may miss important sources of information. A synergistic approach which brings neuroscientific techniques to bear may significantly enrich the efforts of applied research in early childhood special education. This is not to say that neuroscience is the future of special education research or that it represents a "silver bullet" for early intervention. Instead, the premise of this chapter is that thoughtful integration of brain and behavior has the potential to increase the depth and breadth of inquiry available to researchers in both ECSE and neuroscience. In support of this premise, this chapter will first review the limitations of neuroscience in the context of educational research, address the ways in which neurobiological inquiry might bolster the aims of special education research specifically, and conclude with an overview of methods of brain measurement appropriate for studies involving young children.

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The Mixed Marriage of Neuroscience and Education

A relatively young area of inquiry, neuroscience is centrally concerned with studying the nervous system. How the nervous system is studied and to what end are evolving prospects. More a meeting ground than a discipline unto itself, neuroscience lends itself to transdisciplinary research, with boundaries expanding far beyond its basic neurobiological roots. While quintessential bench science research, such as the use of proteins to manipulate single nerve cells in fruit flies, remains well within its purview, so too do studies employing electrophysiology to gauge consumer behavior, skin conductance as feedback on test anxiety, or brain imaging to predict recidivism. It is perhaps no surprise that neuroscience has grown so popular with researchers, funding agencies, and the public alike. Many of its methods push the leading edge of technology, broadening the scope of that which is testable. Neuroscience appeals to curiosity, purporting to offer insights into the complex and deeply personal black box of the human brain.

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The notion that neurobiological data might inform educational research and practice is by no means new. Several decades ago, for example, brain research was said to portend a major shift in education, and that through neuroscience "present failure can be virtually eliminated" (Hart, 1981, p. 445). This major shift has certainly not come to fruition, and the direct relevance of neuroscience research to education remains in question (Busso & Pollack, 2014; Pincham et al., 2014). Those leery of linking neuroscience with education have presented well-reasoned arguments for their position, pointing to issues such as unresolved differences in the units of analysis between the fields, such as the inherent practical and theoretical challenges involved in extrapolating molecules to classrooms (Bruer, 2006). The position of Bruer and others has been that neuroscience may be more appropriately partnered with cognitive psychology, with applied educational research too conceptually distal. While the perceived disconnect between education and neuroscience exists largely in practice rather than fact (see Tommerdahl, 2010; Varma, McCandliss, & Schwartz, 2008), questions about the compatibility of educational and neuroscience research endure.

Beyond conceptual challenges, research linking neuroscience and human behavior brings with it practical collaborative challenges as well. Efforts which bridge fields of study compound sources of error as each discipline adds its own unique limitations to the scientific process (Board on Health Sciences Policy & Institute of Medicine, 2008). Even a modest brain imaging study of mathematical ability in school-aged children must address issues ranging from scanner calibration to maturation and testing effects, necessitating input from experts in fields as disparate as biophysics and education. Lack of collaboration increases the potential for poor study design as well as misinterpretation and well-meaning misuse of data. For example, how might a neurobiologist appropriately utilize results from a functional behavior assessment or picture vocabulary test without close collaboration with counterparts from education or psychology? Engaging in productive team science necessarily raises a host of issues concerning communication, academic culture, and shared purpose unique to interdisciplinary endeavors (Bennett & Gadlin, 2012; Kessel & Rosenfield, 2008; Pincham et al., 2014). Failure to address these issues up front amounts to throwing neuroscience at a behavioral question and hoping something sticks.

Neuroscience in particular is also prone to sensationalism and overinterpretation. Its findings, so often accompanied by now-familiar color renderings of neural architecture and activity, inspire compelling but often hyperbolic media coverage. Incredibly, simply including an image of a brain in a scientific report significantly increases its perceived credibility among readers (McCabe & Castel, 2008). Overstated results easily become part of a cascade of misinformation, made fact through repetition, and into policy and practice by individuals far removed from scientific research (Bruer, 2006). Similarly, neuroscience has been exploited for financial gain by those offering products or approaches "based on neuroscience" to a trusting public. In education in particular, the guise of neuroscience has been associated with numerous ill-conceived fads and pervasive myths detrimental to practice such as left vs. right brain learning styles and reification of "use it or lose it" sensitive periods (Bruer, 2006; Busso & Pollack, 2014; Goswami, 2006). In short, there are many instances where the impact of neuroscience on education has been oversold, vastly misunderstood, and even abused outright.

Despite limitations and cautionary tales, neuroscience has slowly but quite steadily forged meaningful partnerships with education and related behavioral research. The marriage of these fields is now evidenced by a growing base of published studies, new graduate training programs, and special interest groups and meetings around the nascent field of "educational neuroscience" (Pincham et al., 2014). The crux of many of the criticisms leveled at this new field has been that the partnership lacks conceptual foundation, amounting often to the clumsy extension of neuroscience speculation to educational policy and practice. There is little question that this has been, and will continue to be, an issue.

However, neither past wrongs nor the continued potential for error has precluded the synthesis of brain and behavior in applied educational research when scientifically appropriate (Varma et al., 2008). The history of educational neuroscience thus far would suggest that the way forward entails a grounded but forward-thinking approach of bottom-up partnership between neuroscience and educational researchers, integrating analytic approaches around shared aims (Tommerdahl, 2010; Varma et al., 2008). There is nothing to be gained from strict adherence to disciplinary boundaries. As put by the authors of an excellent recent review of the issues facing educational neuroscience, "now is the time to be both practical and brave" (Sigman, Peña, Goldin, & Ribeiro, 2014, p. 501).

Brain, Behavior, and Individualization

Early childhood special education research is particularly well suited for integration with neuroscience. As opposed to general education, one-size-fits-all approaches are antithetical to ECSE research and practice. Developmentally informed individualization is the rule, and any data which guide the timing, dosage, and content of intervention for a given child may be viewed as actionable (Bailey, 2002). It is in these matters where neuroscience is most likely to contribute a value-added perspective. Augmenting behavioral research with brain-based measures should allow researchers to account for individual differences in neurobiology and neurodevelopment, factors which can directly inform prevention and intervention practice (Beauchaine, Neuhaus, Brenner, & Gatzke-Kopp, 2008). In this respect, the coupling of ECSE research and neuroscience amounts to the expansion of the interventionist's toolkit in that it allows access to additional sources of individual data. Optimally, a partnership with neuroscience could help refine the definition of *targeted* intervention by offering prescriptive information based on individual biobehavioral differences (Cramer et al., 2011; Gabrieli, 2009).

Accounting for the brain in studies of early intervention would also directly address existing conceptual ties between ECSE and neurodevelopment. It is well recognized across disciplines, including special education, that early intervention capitalizes on the highly malleable developing brain (Andersen, 2003; Dawson, 2008; DeBoer, Scott, & Nelson, 2007; Fox, Levitt, & Nelson, 2010). Part C of IDEIA 2004, for example, justifies the exigency for high-quality early intervention on the basis of brain development during the first years of life. The role of developmental timing generally and biobehavioral reciprocity specifically is likewise implicated in the standards set forth by professional organizations concerned with early childhood education (Schertz, Baker, Hurwitz, & Benner, 2010). This explicit conceptual recognition of the brain as integral cognitive and behavioral growth and function, as set forth by the field of ECSE itself, provides additional rationale for empirical study. While there is a small but growing body of literature linking early brain and behavioral development, and to a lesser extent early intervention, the nexus of these research pursuits remains grossly unexplored. We will next examine key elements of this rather lean but critically important literature base as we consider common methods for studying the brain.

Measuring the Early Developing Brain

While basic neuroscience research has the potential to influence research and practice in special education through the translation from bench-to-living room or classroom (e.g., Chakrabarti, Scafidi, Gallo, & Haydar, 2011; Restivo et al., 2005), the remainder of this chapter will focus on noninvasive, clinical neuroscience approaches appropriate for direct use in applied research involving young children. In particular, the following section will briefly review the most common approaches to measuring the brain and its development, touching upon both practical considerations and relevant examples of brain-behavior studies of children prior to school age.

Electroencephalography (EEG)

First used in humans nearly a century ago, EEG is a popular and relatively inexpensive means of recording neural activity data from children of all ages. Fundamentally, EEG measures change in the electrical signal between a given pair of electrodes over time. This signal reflects the summation of synchronized postsynaptic potentials from large groupings of pyramidal neurons. EEG electrodes are typically contained within a cap or net sized for the age group in question, and electrodes must be specifically positioned on the scalp for proper recording. Low-density recording systems, which utilize fewer sensors, often require skin abrasion to support conductance across electrodes. This involves light scratching of small areas of the skin across the scalp, which may cause very minor discomfort. Nontoxic conductive gel is applied to each electrode, though pre-gelled, disposable electrodes are available. Newer, high-density systems utilize upward of 256 sensors arranged in a net, providing increased accuracy while also rendering skin abrasion and conductive gel unnecessary (DeBoer et al., 2007). These high-density EEG nets require less scalp preparation overall and are in most cases soaked in a saline solution prior to application.

Though improved technology has increased efficiency, EEG recording can be demanding for participants and researchers alike (Webb et al., 2015). Optimizing data quality requires ample preparation and patience. EEG is sensitive to artifacts which may be subject related, such as gross motor movement or involuntary movement including eye blinks. Nonsubject sources of error may include improper placement of electrodes or electronic interference from sources ranging from cell phones to electrical wiring. These sources of error can be partially ameliorated through good planning and post-processing of data. For children under age 5, strategies to increase compliance with EEG often include some combination of behavioral training; use of distractors such as videos, games, or snacks; and assistance from parents and well-trained research staff comfortable working with young children (Bell & Cuevas, 2012; Slifer, 2013).

Once in place, EEG records electrical transmissions originating in the cortex. This may be done at sleep or rest, but may also be time locked to a specific task or activity. The latter approach is concerned with event-related potentials (ERPs), which are neural responses following the presentation of a stimulus. A given stimulus is presented multiple times, with ERPs averaged across sessions. Because EEG has a high sampling rate (or temporal resolution), it provides very precise links between neural activity and external stimuli or behavior. ERP data yield well-characterized waveforms, which may be analyzed on the basis of latency, frequency, or amplitude, giving the researcher some insight into underlying processes of behavior (Bell & Cuevas, 2012). Tasks designed for older children are often not developmentally appropriate for children under the age of five, and the addition of any task demand may compound error given that participants must sit relatively still while wearing a net of electrodes (DeBoer et al., 2007). Identifying a behavioral task which can be executed by young children may be further complicated if some participants have a disability affecting cognitive or motor development, such as autism spectrum disorder or developmental delay (Webb et al., 2015). Depending on the age and developmental level of participating children, passive tasks involving the presentation of stimuli may maximize cooperation, ensuring a higher yield of viable data.

There is a wealth of published work using EEG to predict cognitive and behavioral outcomes in young children. Examples include a study of young toddlers by Mundy, Fox, and Card (2003), who found that degree of EEG coherence, a measure of association between two or more regions, predicted individual differences in language ability at age 2. Others have found that asymmetry in frontal lobe activity among 10- to 24-month-old children predicted externalizing and internalizing behavior at age 30 months (Smith & Bell, 2010). In a study of children institutionalized in infancy, Vanderwert, Marshall, Nelson, Zeanah, and Fox (2010) identified that timing of foster care placement was linked to significant differences in EEG by school age.

Specifically, they found that foster placement prior to, but not after, age 2 was associated with brain activity virtually indistinguishable from patterns observed in children who were never institutionalized. Cuevas, Hubble, and Bell (2012) found that task-related change in EEG signal in the medial frontal region, measured at age 4 years, contributed significantly to a biobehavioral model predicting executive function skill post-kindergarten.

Aside from its predictive power, there is additional evidence that EEG is sensitive to treatment effects in young children. A study of 4- and 6-year-old typically developing children found that educational intervention was associated with a more mature pattern of activity in the brain's executive attention network, a finding supported by corresponding improvements in cognitive and behavioral measures (Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005). As part of a randomized controlled trial of the Early Start Denver Model, treatment effects on posttest ERPs were identified in response to a face viewing task among toddlers with autism spectrum disorder (Dawson et al., 2012). In that study, children in the treatment group showed activation patterns to social stimuli resembling those observed in typically developing children, while children in the control group did not.

Magnetoencephalography (MEG)

Like EEG, MEG provides a direct measure of cortical neuronal activity with high temporal resolution. It uses highly specialized equipment to measure minute fluctuations in the magnetic fields produced by neuronal activity (Chuang, Otsubo, Pang, & Chuang, 2006). Unlike EEG, MEG is electrode-free, offering an advantage in terms of subject preparation. Participants either sit or lay with their head partially surrounded by a large apparatus which does not come into direct contact with the participant's head, and specific models for pediatric populations are available. MEG may be performed while a child is sleeping or awake and, like EEG, may be time locked to a behavioral task or the presentation of stimuli.

As with EEG, MEG is sensitive to subject movement, and participants may require behavioral training or distractors to encourage compliance. MEG is more costly to both purchase and operate relative to EEG and is less well established in research settings. It also requires special shielding to reduce interference as well as technical expertise to operate and process data. MEG does offer a significant advantage over EEG in its ability to accurately pinpoint the source of a given signal. However, it does not provide any anatomical information such as that acquired through magnetic resonance imaging (MRI). MEG (or EEG) may be linked with MRI, however, thus bringing to bear the high temporal resolution of the former with the high spatial resolution of the latter through multimodal integration (see Chuang et al., 2006; Wheless et al., 2004). The integration of MEG and MRI, called magnetic source imaging (MSI), is relatively common in MEG research.

MEG and MSI have been utilized in far fewer published studies of young children than methods such as EEG. Nonetheless, there are sufficient examples suggesting both the promise and feasibility of these approaches. In one study of typically developing preschoolers, for example, greater leftward dominant parietotemporal connectivity was positively correlated with higher scores in verbal knowledge and comprehension (Kikuchi et al., 2011). Data in that study was collected while children watched an age-appropriate video and linked to cognitive tests administered off-line. In a study of 12- to 18-month-old infants, Travis et al. (2011) found evidence of adult-like patterns of left-lateralized frontotemporal activation during lexical-semantic processing, suggesting that this region supports word learning from infancy. Contrary to the adult-like activation patterns observed in relation to language processing among young children, sensory-motor behavior performed during MEG evinces activation patterns which significantly differ from those seen in older children and adults (Cheyne, Jobst, Tesan, Crain, & Johnson, 2014). Demonstrating the sensitivity of MEG to treatment effects, a study of 4- to 6-year-olds found that children receiving a year of Suzuki violin training showed significant

change in neural responses to music, but not noise, relative to children who did not receive music training (Fujioka, Ross, Kakigi, Pantev, & Trainor, 2006).

Outside of typical development, several studies have demonstrated through MSI that kindergarten-aged children at risk for reading failure show atypical patterns of brain activation during letter and word naming tasks (Simos et al., 2006). Specifically, while skilled early readers appear to be characterized by activation patterns in the left parietotemporal region similar to those observed in typical older readers, at-risk readers are not. In a follow-up work involving intensive reading intervention, children showing the greatest improvement in phonological decoding ability were characterized by relative "normalization" of activation patterns (Simos et al., 2007). Children who did not respond to intervention were characterized by activation patterns suggesting dependence on alternate, possibly compensatory, brain regions for tasks involving reading.

Magnetic Resonance Imaging

MRI uses a strong magnetic field to temporarily alter the movement, or spin, of protons in living tissue. Protons, which are positively charged, typically spin on random axes. During an MRI scan, however, these protons align in response to the magnet. Pulses of calibrated radio waves are used to capture signal from these protons as they are excited or relaxed over time. This signal is then reconstructed into three-dimensional, high-resolution image data. How this data is interpreted depends on the nature of the MRI modality and may be used to delineate brain structures as well as putative structural and functional connectivity. MRI is quite common in studies of older children and adults and was first used to image the human brain over 35 years ago. However, its application to studies of young children has only recently expanded due in part to challenges associated with processing and obtaining data.

MRI offers superb spatial resolution and is capable of providing data on the entirety of the central nervous system, including subcortical regions. MRI systems are graded in terms of magnetic field strength or tesla (T). A higher tesla unit means shorter scan time and higher-resolution image data. Many research scanners used for human imaging are currently rated at 3T, which by virtue of comparison produces a magnetic field about 3000 times stronger than the average refrigerator magnet. Although its cost continues to decrease, MRI is among the more expensive means of obtaining neurobiological data. Based on a survey of ten major academic imaging centers, the average cost of MRI per hour is just shy of $500, with prices ranging from $375 to $650 depending on the institution. MRI scans pose virtually no risk to participants and do not involve radiation or use of intravenous tracers (as with CT or positron emission tomography). MRI is deemed safe for children as young as 1 month of age and would only be inappropriate for children with metal implants or prostheses.

All modalities of MRI are highly susceptible to motion and thus require that participants remain still throughout the scan. Even minor movements imperceptible to the human eye can produce systematic errors which at best create noisy data and at worst mimic true signal (Power, Barnes, Snyder, Schlaggar, & Petersen, 2012; Van Dijk, Sabuncu, & Buckner, 2012; Yendiki, Koldewyn, Kakunoori, Kanwisher, & Fischl, 2013). This can be a particular concern for studies where compliance may vary between groups of children, such as children who are typically developing versus children with a neurodevelopmental disorder. One approach to obtaining successful scans from young children involves behavioral training, such as habituating participants to the scanning protocol or reducing head motion through differential reinforcement (Slifer, Koontz, & Cataldo, 2002; Theys, Wouters, & Ghesquière, 2014). For infants and toddlers, MRI scans are typically obtained during natural sleep at nap or bedtime. Several strategies may be employed to increase the likelihood of a successful sleep scan, such as habituation to scanner noise, replication of bedtime routine, swaddling, and arranging the scan room environment to encourage sleep (Dean et al., 2014; Nordahl et al., 2008). This last approach can

involve dimming the lights, removing or covering distractions, playing music or white noise, and budgeting time for the child to fall asleep with help from the parent or a research assistant.

Structural MRI (sMRI)

sMRI measures the physical structure, or morphometry, of the brain. It may be used to characterize numerous dimensions of anatomical structure including volume, shape, area, or thickness. sMRI can, for example, yield estimates of total brain volume, degree of gyrification, thickness of a given cortical lobe, or shape and volume of individual structures, such as the temporal lobe, corpus callosum, or amygdala. Segmentations of structures within the brain may be made manually or automatically or by some combination thereof. Different pulse sequences are used to emphasize the various components of brain structure. For example, a T1-weighted image, in which lipids appear brightest, emphasizes gray and white matter contrast; a T2-weighted image emphasizes water content, with cerebrospinal fluid appearing brightest. There are some specific challenges associated with structural segmentation among children under age 1 as MRI contrast between tissue types is less intense in the infant brain. However, several approaches to overcoming this limitation are available (e.g., Prastawa, Gilmore, Lin, & Gerig, 2005).

sMRI has been applied to the study of numerous conditions affecting young children, as well as typically developing and at-risk populations. A recent study of infants at high and low genetic risk for Alzheimer's disease, for example, found gray matter differences in regions affected by the disease many decades ahead of the typical age of onset (Dean et al., 2014). Among kindergartners, sMRI has been used to identify differences in whole-brain spatial properties, or topology, between beginning readers with and without a family history of dyslexia (Hosseini et al., 2013). Structural differences specific to the striatum have been observed in preschool-aged children with ADHD (Mahone et al., 2011), with children at that age showing no evidence of the slowed cortical growth observed in older children with the disorder (Shaw et al., 2007). There is a relatively large body of work on structural brain development in young children with autism. Well-replicated findings include evidence for increased cerebral gray and white matter volume (Hazlett et al., 2011; Schumann et al., 2010) and amygdala overgrowth linked to social impairments (Mosconi et al., 2009; Schumann, Barnes, Lord, & Courchesne, 2009) from age 2. Others have demonstrated that specific cortical and subcortical neuroanatomical features distinguish preschool-aged children with fragile X syndrome from children with autism (Hazlett et al., 2009; Hoeft, Walter et al. 2011) and that certain subcortical features are differentially associated with aberrant behavior (Wolff, Hazlett, Lightbody, Reiss, & Piven, 2013).

Diffusion Tensor Imaging (DTI)

DTI is an MRI modality based on the diffusion of water molecules through brain tissue. In white matter, which is comprised of myelinated bundles of nerve fibers connecting brain regions, water molecules move more easily along fiber structure than against it. By measuring the magnitude and direction of diffusion in white matter regions, the microstructural properties of neural circuits may be estimated (Mori & Zhang, 2006). Measures commonly derived from such imaging data include mean diffusivity; axial and radial diffusivity, representing diffusion along and orthogonal to the principle direction of a given fiber bundle; and fractional anisotropy (FA), a measure reflecting degree of directional diffusion. Data derived from DTI do not directly characterize a single structural attribute. Instead, such data provides an indirect measure of structure reflecting multiple facets of tissue composition such as axon size, density, cohesion, and myelination, as well as error related to movement and other artifacts (Jones, Knösche, & Turner, 2013). In this respect, DTI is generally considered to reflect the so-called structural connectivity.

There are numerous published studies on older children and adults linking DTI data to cognitive

and behavioral outcomes. Hoeft, McCandliss et al. (2011), for example, found that combined DTI and fMRI data were superior to standard paper and pencil measures in predicting reading gains among adolescents with dyslexia. DTI is also highly sensitive to the effects of early development (Geng et al., 2012) as well as training and intervention (Gebauer et al., 2012; Hofstetter, Tavor, Tzur Moryosef, & Assaf, 2013; Scholz, Klein, Behrens, & Johansen-Berg, 2009).

To date, there are relatively few DTI studies involving children prior to school age. Extant literature includes evidence of predictive structure-function relationships between specific connective pathways and joint attention (Elison et al., 2013), working memory (Short et al., 2013), and visual attention (Elison et al., 2013) in typically developing infants. In a study of neonates born preterm, Aeby et al. (2013) identified that multiple diffusion measures in the left superior temporal gyrus predicted expressive and receptive language at age 2. Among typically developing children entering kindergarten, Saygin et al. (2013) found that a specific language pathway, the *arcuate fasciculus*, predicted phonological awareness. For toddlers and preschool-aged children with autism spectrum disorder, atypical patterns of structural connectivity unique to early childhood have been reported across numerous brain regions (Ben Bashat et al., 2007; Weinstein et al., 2011; Wolff et al., 2012). Relevant to the premise of this chapter, I am currently investigating the moderating role of specific brain circuits, measured using DTI during the first years of life, on early behavioral outcomes and response to early intervention in children who develop autism. The hypothesis of this work underway is that treatment efficacy, as well as early symptom severity, may be determined in part by individual differences in neurodevelopment.

Functional MRI

Functional MRI (fMRI) is an indirect measure of regional brain activity. Increased blood flow and oxygenation to active brain regions causes minor changes in the signal measured by MRI. This "blood oxygenation level-dependent" (BOLD) effect is measured over time to extrapolate an estimate of neural activity either at rest or in relation to some condition or task (Amaro & Barker, 2006; Logothetis, 2003, 2008). The colorful activation images often associated with fMRI represent areas in which the BOLD signal exceeded (or fell below) some user-determined threshold. Whereas DTI measures properties of the structures connecting one or more regions, fMRI is concerned with positive or negative correlations of BOLD signal between regions or patterns of co-activation. Functional MRI lacks the high temporal precision of either EEG or MEG, but, unlike those measures, provides excellent spatial resolution and anatomical localization for cortical and subcortical brain regions.

Task-based fMRI is not commonly used among children under age five due to challenges associated with subject cooperation (O'Shaughnessy, Berl, Moore, & Gaillard, 2008). For example, it can be difficult to ensure that a 4-year-old child remains perfectly still for more than a few seconds or to develop behavioral tasks which can be successfully implemented with very young participants. These challenges can be overcome through training, however. Examples of successful implementation of task-based fMRI include studies of typically developing preschool children using a phonetic discrimination task (Raizada, Richards, Meltzoff, & Kuhl, 2008), symbolic and nonsymbolic numerical processing (Cantlon, Brannon, Carter, & Pelphrey, 2006), and onset of depression using an emotion viewing task (Gaffrey, Barch, Singer, Shenoy, & Luby, 2013).

Many fMRI studies of young children overcome the challenges of implementing task-based protocols by investigating resting-state functional connectivity (rsfMRI). This method may be used while a child is sleeping or lying motionless and measures spontaneous patterns of activation in similar fashion to traditional fMRI but in the absence of active engagement with a task or stimulus. When BOLD signal between two regions is consistently synchronous, as defined by a significant positive or negative correlation,

those regions are said to be functionally related (Fox & Raichle, 2007). From these patterns of activation, various resting-state networks may also be derived and tested for attributes such as organization, strength, and efficiency. Patterns of connectivity derived from rsfMRI are strongly tied to development and have been shown to predict degree of brain maturation across much of the lifespan (Dosenbach et al., 2010). Although there are relatively few rsfMRI studies involving children prior to school age, reported findings to date suggest that unique and dramatic changes to functional organization take place during the first years of life (for a review, see Hoff, Van den Heuvel, Benders, Kersbergen, & De Vries, 2013).

Among typically developing children, sleep-based fMRI has also been used to demonstrate that functional specialization of the anterior temporal lobe to speech versus nonspeech sounds occurs in early infancy (Blasi et al., 2011). Similarly, increased exposure to parental discord at home has been associated with heightened sensitivity to angry speech stimuli as reflected by increased brain activity in regions implicated with stress and emotion in infants (Graham, Fisher, & Pfeifer, 2013). In an intriguing test of the neural bases of Piaget's concrete operational stage, Houdé et al. (2011) found that differences in the parietofrontal network explained performance in a number conservation task between preschool- and school-aged children. Eyler, Pierce, and Courchesne (2012) examined passive response to language among children with autism ages 12–48 months, finding atypical left- and right-lateralized response patterns to speech sounds. This group of researchers has also identified reduced co-activation of bilateral inferior frontal and superior temporal regions in toddlers with autism relative to children with language delay and typically developing children (Dinstein et al., 2011).

Other MRI Modalities

While this section has reviewed the most common imaging modalities, other more specialized variants are also available. Examples include approaches which can provide information as to local chemical composition through spectroscopy (Corrigan et al., 2013; Posse, Otazo, Dager, & Alger, 2013), white matter macrostructure using magnetization transfer (Gozzi et al., 2012; Henkelman, Stanisz, & Graham, 2001), and degree of myelination based on myelin water fraction (Deoni et al., 2011). As the technological capabilities of MRI expand, so too does its ability to delineate and capture specific structural and functional information.

Near-Infrared Spectroscopy (NIRS)

NIRS is an imaging approach which uses infrared light to monitor regional changes in blood oxygenation in cortical brain tissue. It measures the absorption of specific wavelengths of light to gauge the concentration and oxygen saturation of hemoglobin (Ferrari & Quaresima, 2012; Jöbsis, 1977). NIRS may be used passively or while a child is engaged in a behavioral task or other activities, in which case the method is referred to as "functional" (fNIRS). By measuring blood oxygenation change in relation to external stimuli and behavior, inferences as to functional activation may be made. In this respect, NIRS is most similar to fMRI, which likewise relies on blood oxygen as a proxy for regional neuronal activation. Unlike fMRI, however, NIRS is portable and less prone to errors stemming from subject motion, thus lending itself to use in naturalistic settings (Vanderwert & Nelson, 2014). It also offers temporal resolution which is greater than MRI but less than that of EEG.

A relatively new technology, NIRS is available in models which measure a portion of the cortex, such as the prefrontal region, as well as more expensive whole-brain models still in development. Like EEG, most NIRS platforms utilize a snugly fitting cap which contains its optical sensors. A greater span and density of sensors increases the degree to which inferences may be made as to specificity of cortical activation to a set of stimuli (Aslin, 2012). NIRS cannot provide a direct measure of brain structure, and the location of measured signal must be

estimated, making it less precise than fMRI, which does offer higher spatial resolution. As NIRS relies on the penetration of infrared light through scalp and skull, it is particularly well suited to very young children who have less of these tissues than adults and older children (Gervain et al., 2011). Regardless of the age of participants, NIRS provides data limited to the outer cortex (about 10–15 mm in young children, 5–10 mm in adults), and its signal cannot reach deeper cortical or subcortical regions.

The number of studies employing NIRS to study infants has greatly increased over the past few years (Vanderwert & Nelson, 2014). For example, fNIRS has been used among typically developing infants to pinpoint the acquisition of left temporal specialization to speech sounds (Grossmann, Oberecker, Koch, & Friederici, 2010), identify regions implicated in early mathematical processing (Hyde, Boas, Blair, & Carey, 2010), and link motion processing to fine motor development (Lloyd-Fox, Wu, Richards, Elwell, & Johnson, 2015). Lloyd-Fox et al. (2013) found less response to visual and auditory social stimuli in infants at risk for autism spectrum disorder relative to low-risk controls in the superior temporal sulcus, a brain region linked to social perception. In a sleep-state NIRS study, infants with Down syndrome were found to have disrupted functional connectivity relative to infants born preterm and typically developing controls (Imai et al., 2014). Similar disruptions, in this case characterized by early over-connectivity, have been observed in 3-month-old infants at risk for developing autism spectrum disorder (Keehn, Wagner, Tager-Flusberg, & Nelson, 2013).

The majority of published NIRS data involving young children have centered on infancy. This is in part due to the suitability of the method to this age group. However, NIRS is a feasible approach to neurobiological measurement among toddlers and preschool-aged children as well. Examples include studies of sensory regulation and inhibition (effortful control) in relation to properties of the prefrontal cortical network in toddlers (Fekete, Beacher, Cha, Rubin, & Mujica-Parodi, 2014), acquisition of functional specialization underlying cognitive shifting (Moriguchi & Hiraki, 2009), and hemodynamic response during an emotion regulation task involving frustration (Perlman, Luna, Hein, & Huppert, 2014) in preschool-aged children.

Conclusion

To the extent possible, accounting for behavior *and* neurobiology may sharpen our ability to target interventions and preventative practices to individual children. There are many well-vetted approaches to measuring the brain in children prior to school age—what remains is the application of these measures to the study of early intervention. Past criticisms concerning the role of neuroscience in educational research, which have been rightly skeptical, point to ill-conceived leaps from basic science to applied research and the often overzealous application of high-profile findings to educational policy and practice. A more reasoned and hypothesis-driven process of integrating brain and behavior is required.

This necessarily entails bridging the gulf between disciplines through collaboration around a common goal. The key here lays in a mutually informative relationship linking behavioral and brain science and not one where neuroscience is indiscriminately applied to questions of behavior (Sigman et al., 2014). Modern neuroscience research can by no means supplant behavioral approaches, and nor is such a case likely feasible or desirable. However, the conceptual and technical expertise of neuroscience may yield unique information about individual children or subgroups of children, accounting for variance which would otherwise go unexplained. Such focused and truly transdisciplinary research in early childhood special education research has the potential to raise all ships.

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