Autism and Child Psychopathology Series

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Handbook of Childhood Psychopathology and Developmental Disabilities Treatment

Springer

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History

Johnny L. Matson and Claire O. Burns

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Overview

Disabilities, both physical and emotional/intellectual, have been known and reported since the beginning of recorded history. However, modern mental health care as we know it is of recent origin. Prior to these modern developments, children in ancient Greece and Rome were left outdoors to die. They were generally considered a burden to society and could not be supported. Explanations for these disabilities consisted of punishment from the God(s) or demonic possession. These nefarious causes resulted in even less sympathy for these children and their ultimate fate. Treatments as we currently know them were unknown. Thus, many of these conditions had no cure or means of supporting the child or their family.

Early attempts to develop effective classification and treatment occurred in the late 1800s and early 1900s. Lightner Witmer, for example, established the first children's clinic at the University of Pennsylvania in 1896. The focus of his efforts was on the assessment, diagnosis, and intervention of children's learning and behavior problems. Parry-Jones (1989) almost three decades ago made several observations regarding the history of child mental health and developmental movement that still hold true. He noted that developments were occurring but were slower and more discontinuous than in other scientific fields. We would note the advances in computer science which have been dramatic and very rapid in comparison.

A variety of reasons may be at play in explaining the rate of improvements. While computing is a complex enterprise, to interface between human genetics, biochemistry, and a vast number of environmental variables makes for a much more diverse and complex set of problems in the field of mental health. Second, there is a stigma associated with intellectual disabilities and mental health that does not exist in many other scientific fields. This affects people who chose to work in the field and often resource issues. Third, far fewer people are affected by these childhood maladies than persons who use cell phones. Thus,

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there is also an awareness problem with respect to the general population. Fourth, many of the problems in childhood mental health and developmental disabilities have only recently been defined. Fifth, the potential for profits is much less in mental health than in many other scientific fields. Funding obviously can help speed the development of new knowledge but disproportionately goes to other field. Sixth, the mental health field is maintained by a high level of inertia. Many methodologies such as psychoanalysis persist even though many other treatments with better databases have long since overtaken them. Seventh, until the last half of the twentieth century, many types of psychopathology were not recognized as occurring in children.

As recently as 1978, Monroe Lefkowitz and Nancy Burton argued that the diagnosis of pediatric depression may be inappropriate. They argued that symptoms of depression were actually transitory developmental behaviors. More recently, however, measures such as the Child Depression Inventory have been used successfully to identify childhood depression (Helsel & Matson, 1984). As recently as 1992, Harrington asserted that the diagnosis of childhood depression was controversial. He also asserted that research was rapidly accumulating to demonstrate the veracity of this diagnosis.

Early History

The history of child mental health, specifically, and psychology, in general, has been staples of the mental health field for many years. In fact, courses on the history of psychology have been imbedded in graduate and undergraduate psychology programs for many years (Hilgard, Leary, & McGuire, 1991).

In the 1800s, the reporting of children with marked deficits in development was written about by professionals. The case of the Wild Boy of Aveyron was perhaps the most famous of these reports. “Victor” was treated in an attempt to improve communication and socialization. Treatment was partially successful. Itard, the physician who treated Victor over a 5 year period, was devoted to developing educational methods aimed at improving the quality of life for handicapped children (Malson, 1972). These efforts began a trend toward efforts to care for disadvantaged youth.

The USA and Europe were leaders in the development of the modern mental health movement as we know it. Much of the early clinical work focused on identifying children with learning issues. Most famously, Alfred Binet and Theodore Simon set out to develop an intelligence quotient test whose purpose was to distinguish children with intellectual disabilities from typically developing children (Boake, 2002). Later Lewis Terman, a professor at Stanford University, adapted the scale for an American population. These developments constituted the beginning of the psychological testing movement (Mulberger, 2017).

A corollary of these developments was the development of scales to assess adaptive behavior. These scales have been established as a means of evaluating another dimension of human intelligence. They have largely been used to differentiate people with typical cognitive development from persons with intellectual disabilities. Also, since these scales tap into a variety of skills such as self-help, challenging behaviors, social skills, and communication, they have been important for developing treatment goals and for evaluating intervention outcomes.

The father of the adaptive behaviors scales was Edgar Doll. The first rudimentary attempts to tap into these skills involved a score card he developed in the 1920s. By 1936 Doll had developed the Vineland Social Maturity Scale. This test had 117 items scored on a Likert format. Since that time, numerous other measures that are similar have been developed to measure adaptive behavior and developmental milestones.

The development of assessment methods specific to children has continued, and the pace of these developments has quickened with time. Beginning with intelligence and achievement testing, the child assessment literature has resulted in general scales that measure a broad range of disorders or problems such as the Child Behavior Checklist to more recent measures specific to individual disorders. Thus, scales that only measure depression, phobias, autism, functional assessment of challenging behaviors, social skills, and ADHD have been published. Often several scales exist to address each of these problem areas. Meyer and colleagues (2001) concluded that for clinical psychologists, assessment is second only to psychotherapy in professional importance. This underscores how high a priority these developments have become.

The term psychotherapy is more restrictive than treatment. This latter label will be the focus of this volume. Treatment here is defined not just by psychotherapy methods such as cognitive behavioral therapy. Also, covered here are educational method and variations of applied behavior analysis, as well as some focus on pharmacotherapy. This latter approach has been used primarily with severe psychopathology such as pediatric bipolar disorder.

Early History of Treatments

As noted earlier, Witmer is credited with developing the first treatment clinic for children in 1897 at the University of Pennsylvania. The focus was on behavioral (e.g., aggression, tantrums, noncompliance) and school-based learning problems. However, the greatest early factor leading to the child mental health movement centered on juvenile delinquency. The general view of the judicial system a century ago was that because youthful offenders were still developmentally immature, they had different needs than adult offenders (Grisso, 2007). It was also recognized that these individuals had great potential to get their lives back on track given their very young age.

Judge Baker in Massachusetts ran a juvenile court in the early 1900s. His view was that these children had gotten into trouble largely due to poor home and school environments. A clinic named after Judge Baker was established at Harvard University to provide outpatient care for children with mental health needs. The clinic, which is still in operation at the time of this writing, gradually expanded to include residential programs and programs designed to treat a wide range of mental health and educational concerns. As such, this clinic is representative of the evaluation of the child mental health field. Clinicians and researchers now generally agree that comorbid or even multiple comorbid conditions can be present for one child. Thus, comprehensive care includes the involvement of multiple professions to provide holistic treatment.

Exploring Specific Disorders

Intellectual disabilities, behavior problems, and juvenile delinquency have been identified and treated for over a century. However, many of the more specific neurodevelopmental disorders and specific form of psychology are of much more recent origin. For many years, most of the neurodevelopmental disorders were simply lumped into the diagnostic label mental deficiency (Wolff, 2004). Researchers in the mental health field now realize that this diagnostic area is far more complex than originally believed. There are hundreds of genetic causes of intellectual disabilities. More disorders and causes will undoubtedly be discovered in the near future. This fact applies to a number of well-recognized conditions such as autism, ADHD, depression, and anxiety disorders as well.

For example, the origins of the modern definition of autism and Asperger's disorder date to the 1940s (Asperger, 1944; Kanner, 1943). These researchers were believed to have observed and categorized this disorder independently. However, momentum built slowly. Initially, the condition was described in children with little recognition that it is a lifelong disorder. Also, autism was considered rare. Recognized in the Diagnostic and Statistical Manual of the American Psychiatric Association, the definition has evolved since then, and autism is now considered to be a common ailment, occurring in 1 out of 66 people according to the American Center for Disease Control.

ADHD is of similarly recent origins. While symptoms of inattention and overactivity have been described since the mid-1800s, the first official description of the condition was in the DSM-II (Wolraich, 2006). This manual was published in 1968. Treatment dates back a bit further to Charles Bradley, a physician who reported on the positive effects of stimulant medications for children.

From these early beginnings, ADHD has come to be one of the most extensively studied childhood disorders (Goldman, Genel, Bezman, & Slanetz, 1998). Additionally, research has expanded to adults, since more recently the disorder has been conceptualized as a lifelong condition. The diagnosis has become so prevalent that ADHD now accounts for up to half of children in some mental health populations (Cantwell, 1996). These are remarkable numbers given that ADHD was first described in the DSM in 1980 (American Psychiatric Association, 1980). Since that time, a steady increase in the use of medication has occurred, along with dramatic increases on add-on medications to stimulants in the form of atypical antipsychotic medications. This latter trend, in our view, is not particularly helpful.

Depression in children is another disorder that is now receiving considerable attention. As with autism and ADHD, the recognition of this problem has been of recent origin. Lefkowitz and Burton (1978), for example, in a frequently referenced paper noted some skepticism regarding the existence of this condition in children. A rapid change in views on childhood depression occurred. By 2007, Bhatia and Bhatia asserted that at a specific time, as many as 15% of children and adolescents presented with some symptoms of depression. These authors also underscore the need for screening and early detection. Lefkowitz and Burton (1978) also decry the lack of instruments to establish that depressive symptoms were independent of normal childhood development. Within a few years, well-established assessment methods such as the Child Depression Inventory were in wide use (Bhatia & Bhatia, 2007). Some differences do exist in adult versus child symptoms. For example, prepubertal children exhibit more psychomotor agitation and somatic complaints. Thus, in fairly short order research on the topic had proliferated (Cicchetti & Toth, 1998).

Anxiety had by 1997, according to Dadds, Spence, Holland, Barrett, and Laurens, been identified as a significant problem requiring more attention from researchers and clinicians. Viken (1985) stated that it was the most common mental health concern among children, and Mattison and Hooper (1992) noted that the disorder was related to significant and wide-ranging social impairments. Numerous studies using behaviorally based intervention, most notably cognitive behavior therapy (CBT), have demonstrated the efficacy of psychologically based interventions. Early intervention and preventative programs aimed at children who present risk factors for childhood and adolescent anxiety disorders have also proven to be useful in heading off anxiety or remediating the symptoms when they are present. These efforts, early on, can pay positive dividends in terms of moderating adult anxiety disorders as well (Chorpita & Barlow, 1998).

Researchers, in general, have accepted a developmental model of psychopathology. That is, symptom complexes do not just rapidly appear. Rather, various risk factors collude to gradually develop complex symptom clusters. Also, the professional mental health community has come to realize that co-occurrence of various mental health and neurodevelopmental disorders is very common. Estimates are that 70% of person with autism also meet criteria for intellectual disabilities. Depression and childhood anxiety disorders also overlap a good deal. Again the rates of comorbidity are very high. A range of 20–70% has been reported with the actual number perhaps somewhere in between (Angold, Costello, & Erkauli, 1999).

The notion of different age norms and symptom differences at various stages of childhood, along with high rates of comorbid disorders, has changed the thinking about how childhood mental health and neurodevelopmental disorders are assessed and treated. The field has evolved from addressing one off disorders to the recognition that multiple disorders and age-related symptom presentation may vary considerably.

Approaches to Child Mental Health

Initially, and for most of recorded history, the causes of mental health and neurodevelopmental conditions were attributed to supernatural causes and were usually lumped together. This approach was delayed for a time by Hippocrates who posited a biological explanation revolving around substances and their imbalance in the body. The advent of the middle ages saw a return to the notion of external forcers aimed at punishing individuals and/or their parents reemerged.

Freud introduced modern thinking regarding mental health issues. He popularized the notion that these disorders had environmental causes which followed a developmental course. Research on biochemical causes and treatments would follow in the 1950s, and soon after the rapid development of genetic factors which contribute to mental health and neurodevelopmental factors followed.

As the knowledge base regarding causes of mental health issues in children matured and the knowledge base began to expand exponentially, service models and how to deliver services expanded accordingly. Early in the chapter, we noted the juvenile justice system and its import on youth services. However, other equally powerful forces were also at work. One of these trends was the institutionalization movement of the late 1800s through the 1960s and 1970s. Large congregate facilities for persons with mental health needs and separate facilities for people with intellectual disabilities across the USA and Europe and across the lifespan were constructed. With time the institutionalization movement gave way to the notion that persons should be integrated into general society to the extent possible. For persons with intellectual disabilities, this trend was called normalization. In the school environment, it was referred to as mainstreaming.

The last few decades have seen additional expansion and change of mental health systems. Egger and Emde (2011), for example, describe the development of diagnostic and classification systems for early childhood. Developments of criteria and means of classifying mental health concerns have been critical to the development of more comprehensive care by providing a common diagnostic language for identifying children in need of care.

Mental health has also been a concern of national governments. The American National Mental Health Act appeared in 1946 (Cutler, Bevilacqua, & McFarland, 2003). The National Institute of Mental Health followed shortly thereafter. Another significant advancement supported by the federal government occurred in 1963 when the Community Mental Health Centers Construction Act was passed. This resulted in outpatient mental health clinic in counties and possibly throughout the USA. Eventually, by the 1970s, the range of services provided included inpatient, outpatient, consultation, education, and emergency services across the age spectrum including children.

Stephan, Weist, Kataoka, Adelsheim, and Mills (2007) describe how schools are taking on a greater and greater role in the delivery of child mental health services. One of the major current focuses is to expand the role of primary and secondary schools in screening, identifying, and treating mental health problems of children and adolescents. Another focus has been to better coordinate between the family, the community mental health, and the educational system. It is generally believed that imbedding mental health in this holistic manner can be useful in decreasing the considerable stigma that is associated with mental health considerations. Dealing with stigma and substance abuse receives particular emphasis. Weist, Lowie, Flaherty, and Pruitt (2001) emphasize that school and community programs are critical for expanding the type and amount of mental health services that can be provided. Thus, integrating all the major environments in which the child lives has become a goal of intervention. This approach has been combined with the notion that holistic care also involves including multiple disciplines to meet the complex nature of current intervention. One of the greatest challenges in implementing this service model is coordination. Often parents are overwhelmed with the number of treatments, both validated and not, which are available.

Professional services that exist to assist the families in this critical task are needed.

Trends and Topics

The area of childhood education and mental health is a rapidly evolving topic. A few of these important developments are noted as a means of adding context to relevant developments in the field.

International developments have been a catalyst for issues being addressed in the child mental health literature. For example, Chaves and colleagues (2017) write about the need for health care for refugees to Australia. They argue that within a month of arrival, children should have a tailored assessment and initial treatment plan. Turner and Mohan (2016) also discuss child mental health services. The focus of their paper was on the stigma and attitudes of child mental health services among Asian-Indian parents living in the USA.

Another interesting paper on global child mental health is described by Schneider, Okello, and Lehmann (2016). They looked at the increase in health-care publications internationally over the last 10 years. They note a sevenfold increase over this time period with half of the papers addressing Africa; Asia was the topic of a third of the paper, while only 11% focused on Central and South America. Most of the papers from this latter group focused on emerging nations, particularly Brazil. Most papers were focused on general health issues such as maternal health, neonatal care, and reproductive health care. Only 4% of the papers were aimed at mental health, showing that this topic is not a priority at this time for underdeveloped countries.

In the USA, another emerging trend is the focus on mental health issues within the ethnic minority community (Vega & Rumbaut, 1991). These authors list a number of groups under consideration, which reflect a broad international heritage. One factor being addressed involved large epidemiological studies which can help elucidate the scope and nature of mental health problems. The Center for Disease Control is a federal agency that has been instrumental in studying this issue. Obviously, this information is critical for planning service provision and establishing priorities.

Self-mutilation among adolescent psychiatric inpatients has also received the attention of researchers and clinicians in the adolescent age group. Nock and Prinstein (2004) note that adolescent begin these behaviors at early ages with adolescence being a particularly strong risk factor. The problem is considered to be very serious and pervasive among adolescents. For psychiatric adolescent inpatients, rates of 40–60% for self-mutilation have been reported. The etiology of this self-mutilation is often believed to be automatic reinforcement.

Functional assessment to determine environmental factors that maintain challenging behavior has become a major topic of study within the child mental health and developmental disabilities literature. Using these methods, which involve observation, checklists, and manipulating environmental variables, has proven to be very useful. Common maintaining factors include inadvertent social or tangible reinforcement, escape from an undesirable environment or task, and automatic reinforcement. This latter maintaining variable suggests that the behavior is reinforcing in and of itself (see self-mutilation above).

Transitioning children to adult mental health services as they age has also been a topic of discussion. Reid and Schraeder (2017) discuss this topic and note that many adolescents disengage from the system during this transition period. These authors note that this failure to transition is particularly acute for persons experiencing anxiety or depression where symptoms often wax and wane.

Comorbidity of conditions has also become a major area of interest (Ormel et al., 2017). This topic has become one of the most heavily researched and reported on in recent years. Comorbid internalizing disorders predicted psychological outcomes and drug use, while externalizing problems predicted health outcomes, according to these authors.

Caron and Rutter (1991) have also addressed the comorbidity issue. Their article underscores how thinking on this topic has changed in recent decades. They note that for many years, medical students were taught to use only one diagnosis when possible (Kendell, 1975). Caron and Rutter (1991), to their credit, note that comorbid mental health conditions are very common in childhood mental health. They also stress that failing to recognize comorbidities can result in incorrect assumption about the nature of the child's problems. We would also add that failure to recognize comorbidities can result in insufficient and/or poorly executed treatment.

Several other topics have been trending in recent years and are worth mentioning. Tzoumakis and colleagues (2017) discuss the impact on young children that parents with a history of legal offenses can have on their children. They posit that there is a strong correlation between these parental problems and childhood aggression.

Child sexual abuse has also become an important topic for study (Chiesa & Goldson, 2017). These authors note that detecting physical signs of abuse may be very difficult. They also note that fluids or other physical signs on clothing are more likely to be the most likely evidence and need to be detected within 72 h of the offense. Obviously, developing accurate means of detecting sexual abuse of children and then providing effective interventions are very important. Better technologies and procedures for detection are needed.

Another important area that has become a focal point of the child mental health movement in the past few decades is developmental psychopathology. It is now recognized that mental health problems are expressed in different ways at different ages. Also, various disorders have onsets that vary across the lifespan. Autism spectrum disorders appear very early in life, while schizophrenia does not. Fergusson, Horwood, and Ridder (2005) provide one example of ongoing research in this area. They conducted a 25-year-long longitudinal study of 7–9-year-olds who had displayed disobedience, defiance of authority, fits of temper, aggression, irritability, property destruction, stealing, cruelty to others, and other antisocial behaviors which were collectively described as conduct disorders. These persons were followed up at 21–25 years of age. The sample was at particular risk for convicting crimes, mental health problems, substance dependence, and difficulties with partners' relationships. Thus, how childhood problems manifest themselves in adulthood has been a central focus of the developmental psychopathology literature.

Academic skills constitute another important area that continues to receive a great deal of attention. As mentioned early on in this chapter, academic problems and juvenile delinquency were among the earliest topics addressed in modern child psychology. Children with mental health problems and/or developmental disabilities such as autism or intellectual disabilities are at particular risk for problems in this area (Nelson, Benner, Lone, & Smith, 2004). These concerns have led to the development of specialized supports and programs to deal with these disorder-specific concerns (Jent, Brown, Davidson, Cruz, & Weinstein, in press).

Mental health professionals such as school and clinical psychologists are also important for coordinating services. Jent and colleagues (in press) note that a variety of services may be provided by these professionals such as developing psychologically based interventions. Treatments include token economies, self-control procedures, means to enhance concentration, goal-setting, and related methods that can enhance academic performance on overall adjustment to school and home environments. Helping parents navigate this complex process is also a role often assumed by the mental health professional. The development of school guidelines at the local, state, and federal level have also helped to enhance and bolster these evermore complex and comprehensive treatment models.

Conclusions

Modern history regarding the treatment of developmental disabilities and mental health issues in children is of recent origin. The filed has adopted the notion of evidence-based treatment. This move has been a very positive one since there are so many unsubstantiated treatments that have been aimed at children. The 1970s and 1980s saw the beginning of a rapidly expanding research base across a host of topics. Educational and learning-based treatments (operant and classical condition) and the focus on cognitively based treatments, particularly cognitive behavior therapy, have become very popular. Also, the use of psychotropic drugs has grown exponentially. The number of drugs given to one child has increased as have dosage levels. Children are being prescribed these medications at younger and younger ages. Often the research support for these medication practices is minimal.

Overall, the resources allocated toward treating childhood mental health conditions and neurodevelopmental disorders are growing. Emerging nations still devote the bulk of their resources to general health as compared to mental health concerns. However, while the mental health field is still not on a par with general health concerns, that priority is changing. From the massive amount of information covered in this volume, it is apparent that childhood adjustment and learning is becoming a greater priority with time.

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Developmental Psychopathology and the Epidemiology and Expression of Psychopathology from Infancy Through Early Adulthood

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Contents

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What Is Developmental Psychopathology?

Developmental psychopathology is a multidisciplinary field that examines how biological, psychological, and socio-contextual factors interact to determine trajectories of continuity and discontinuity in adaptive and maladaptive functioning over the life course (Cicchetti & Toth, 2009). Development is conceived of as the progression and organization of biological, social, affective, and cognitive structures toward increased differentiation and hierarchical integration and is cumulative (Gottlieb, 1991; Sroufe, 2009). Thus, in any transition or stage of reorganization, prior structures are assimilated into subsequent structures through hierarchical integration. In other words, current adaptation is a product of current circumstances (environment, epigenetics) and prior circumstances (environment, genes) and adaptations (past development). So while early challenges accumulate over the life course which may overload coping abilities for increasingly complex demands, social contexts may change biological processes such as through epigenetics, changes in the neuroendocrine system, and neural processing of social cues (Pollak, 2015). Further, each developmental stage has its particular challenges or tasks. For example, among the developmental challenges during adolescence is adaptation to the physical changes of puberty,

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exploration of sexuality, increased responsibilities and liberties, and identity exploration. Difficulties handling these challenges specific to adolescence are risk factors for the development or maintenance of psychopathology during this stage and are likely to be moderated by other factors, particularly prior adaptation and current circumstances.

Developmental psychopathology focuses on both normal and abnormal development as mutually informative. Psychopathology can only be understood in reference to normal development, especially since many psychiatric disorders are not qualitatively different from normal experience but rather quantitatively different. For example, the symptoms of attention deficit hyperactivity disorder (ADHD) include "often has difficulty sustaining attention in tasks or play activities," "Often leaves seat in situations when remaining seated is expected," and "often blurts out an answer before a question has been completed" (APA, 2013). To judge if the frequency is often enough to constitute abnormal behavior, one must know the frequency that is normal for these behaviors at each developmental period. Similarly, a criterion of the newly incorporated disruptive mood dysregulation disorder specifies that "*the temper outbursts are inconsistent with developmental level*." Thus an understanding of developmentally appropriate temper outbursts is essential to diagnosis. Conversely, given that psychopathology is conceived of as an exaggeration of the normal condition, understanding abnormal development can provide important insight into normal development as well (Toth & Cicchetti, 2010).

Transitions, or key life turning points, for example, school entry or pubertal maturation, are considered times when protective and risk factors may act to change developmental risk trajectories to a more adaptive or maladaptive pathway and individuals may particularly benefit from therapeutic interventions during these transitions (Elder, 1985; Toth & Cicchetti, 1999). An important principal of developmental psychopathology is that there are multiple pathways to pathology termed *equifinality* and any particular risk factor leads to multiple outcomes termed *multifinality*. To exemplify, a teenage girl suffering from depression may have developed depression as a consequence of early sexual abuse, current school bullying, genetic vulnerability due to having a short allele of the HTTTP genotype, or early pubertal maturation or a combination of any of the former, whereas an individual with early sexual abuse may develop during adolescence depression, conduct disorder, substance abuse, or another disorder or no disorder at all when faced with pubertal development and new interactions with the opposite sex, depending on genetic vulnerabilities, resilience factors, how the traumatic situation of sexual abuse was handled at the time, current peer group characteristics and dynamics, etc.

Understanding the continuity and discontinuity of developmental pathways is important for understanding the natural course of disorder and changes and similarities of symptoms throughout development. Continuity of disorder does not mean simply the persistence of the disorder over time. Substantial comorbidity and fluidity of psychiatric diagnosis especially in children and adolescents have been reported (Costello, Copeland, & Angold, 2011; Wittchen, Lieb, Pfister, & Scuster, 2000). Thus the concept of homotypic continuity versus heterotypic continuity has been useful, *homotypic* continuity referring to a disorder predicting itself over time (i.e., separation anxiety disorder predicting later separation anxiety disorder) and *heterotypic* continuity referring to a disorder predicting a different disorder over time (i.e., social anxiety disorder predicting later alcohol use disorder) (Costello et al., 2011).

In this chapter, therefore, we aim to discuss the epidemiology and expression of psychopathology, both in terms of diagnostic categories and dimensionally, from infancy through emerging adulthood from a developmental psychopathology perspective. It is important to note that development does not end with emerging adulthood, but the developmental stages of adulthood are not the topic of this book. We will first discuss the developmental tasks and demands of each stage. Then the epidemiology in terms of prevalence and risk factors by developmental stages will be discussed. Three specific types of disorders, anxiety disorders, depression, and attention deficit hyperactivity disorder, will be exemplified over the course of childhood and adolescence.

Psychopathology in Infancy

Infancy, or the first 2 years of life, is the period of most rapid physical development (after the prenatal period). Developmental tasks of infancy include, among others, gaining motor control to hold one's head, sit, crawl, stand, walk, grasp, and point; early language development and other cognitive abilities such as object permanence and becoming aware that one's thoughts and experiences are distinct from those of other people emerge; social attachment is formed including distinguishing the primary caregiver from others, forming a secure attachment to the primary caregiver, and fear of strangers, both of which lead to normative stranger and separation anxiety; finally emotional development includes learning to trust, quieting when comforted, self-soothing, smiling to show pleasure, etc. The hypothalamic-pituitary-adrenocortical (HPA) axis, which has an important role in stress regulation and in the development of psychopathology, is particularly responsive to external signals from in utero and in the first 3 months of life, whereas from the fourth and fifth months of life, the HPA axis becomes more regulated and less reactive to small changes in stimulation suggesting a possible period of sensitivity to adverse environments in the first few months of life (Doom & Gunnar, 2013).

While psychiatric disorders per se are rarely manifested or diagnosed in infancy (with exception of some neurodevelopmental disorders), disturbances in meeting the developmental tasks of this stage and experiences in infancy may influence or be early markers of later psychopathology. For example, insecure attachment, abuse and neglect, inadequate cognitive stimulation, low birth weight, premature birth and birth complications, as well as genetic factors may impact the developmental trajectories of psychopathology (Brinksma et al., 2017; Fearon, Bakermans-Kranenburg, van Ijzendoorn, Lapsley, & Roisman, 2010; Groh, Roisman, van Ijzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Humphreys & Zeanah, 2015; Montagna & Nosarti, 2016). Infant temperament and attachment, in particular, are two factors that have been studied in terms of predicting later psychopathology. For example, the EDEN Mother-Child Cohort Study (Abulizi et al., 2017) which followed mother-child pairs from 24 to 28 weeks of pregnancy over 5 years found that infants' emotional temperament predicts emotional difficulties, conduct problems, and symptoms of hyperactivity/inattention at age 5.5, specifically active temperament predicting conduct problems and shyness predicting emotional problems. Various mechanisms have been proposed to explain the association between temperament and psychopathology: the risk model, the spectrum model, and the scar-effect model (Rettew & McKee, 2005). The risk model considers temperament and psychopathology as qualitatively distinct. Certain temperaments contribute to a greater likelihood of developing a specific disorder. Conversely, the spectrum model states that psychiatric disorders are really extremes of temperament and thus are not taxonomically distinct. Finally the scar-effect model posits that temperament is an effect or consequence of the psychiatric disease. Rettew and McKee, upon reviewing the literature on this theme, conclude that various mechanisms are viable to explain these associations and that conclusions from individual studies tend to vary by the trait-disorder combination studied. However, they conclude that the most reasonable model is the risk model. Regardless of which model better explains these associations, early identification of temperamental risks could lead to preventive interventions to promote more adaptive and less pathological developmental trajectories, particularly parent-child psychotherapy, for which there is evidence of effectivity in infants (Barlow, Bennett, Midgley, Larkin, & Wei, 2015).

Similarly, insecure attachment styles have been found to be a risk factor for future psychopathology. Two meta-analyses (Fearon et al., 2010; Groh et al., 2012) found that insecure attachment styles, particularly disorganized and avoidant attachment styles, were associated with externalizing problems in childhood and an avoidant style with internalizing problems. Cassidy, Jones, and Shaver (2013) suggest that a promising explanation for the mechanisms of association is via emotion regulation as a mediator given the relation between early attachment and emotion regulation and stress responses and the role of emotion dysregulation and the HPA axis irregularities in many psychiatric disorders. Conversely, a secure attachment can buffer HPA axis reactivity in infants and toddlers (Hostinar, Sullivan, & Gunnar, 2014).

Few epidemiologic studies have been conducted to estimate the prevalence of psychopathology in infancy. One of the few studies, the Copenhagen County Child Cohort, which comprised all children born of mothers in a particular county of Copenhagen in the year 2000, reports that for children 0–10 months of age, the most common problems are feeding (30%), sleep (20%), defecation (16%), gross motor function (14.1%), general development (13%), infant language (11.7%), mother-children relation (10.1%), and the least frequent are tactile reactions (2.1%), parents way of speaking about the child (3.7%), parents perception of contact with the child (4.0%), and parents handling and care (4.2%) (Meete Skovard, 2010). A subsample was evaluated at age one and a half using both International Classification of Diseases (ICD-10) and Diagnostic Classification Zero-to-Three (D.C.: 0–3) diagnoses. The prevalence of any disorder was 18%, the most frequent being parent-child relationship disturbances (8.5%) and regulatory disorders (7.1%). Furthermore, impairments in neurocognitive functions, language development, disturbances in the child's contact and communication, and relationship problems at 0–10 months predicted any mental health disorder at 18 months. Neurodevelopmental disorders were associated with pre- and perinatal biological risks and were predicted by deviant language development and impaired communication in the first 10 months of life, whereas risk factors for emotional, behavioral, eating, and sleeping disorders were parent-child disturbances and parental psychosocial adversities. Parent-child interventions are the most promising for this stage of life especially given that parent-child relationship problems in the first 10 months of life were associated with more than twice the risk of a child disorder at 18 months.

Psychopathology in Preschool/Toddlerhood

The developmental tasks of the preschool years or toddlerhood, a period from approximately 2–4 or 5 years of age, include continued language development, locomotion, fantasy play, self-control, and sex-role identification toward the end of the stage or beginning of the next. Temper tantrums are common, attention span is short, and they begin to express new emotions such as pride, shame, and jealousy.

Psychopathology at this stage is often a maladaptive extreme of normative fears, emotional lability and reactivity, stubbornness, activity levels, and attention deficits. Table 1 shows the Global Burden of Disease Study (GBD) estimates for mental and substance abuse disorders and self-harm by age group for the year 2015 around the globe for both sexes combined. Disability-adjusted life years (DALYs) an indicator that combines both the mortality and morbidity attributed to a disease and years lived with disability (YLDs) are presented for distinct age groups from toddlerhood through emerging adulthood. As can be seen on the table, for youngsters aged 1–4, mental and substance use disorders account for 3.08% of YLDs and 0.51% of DALYs with an additional 0.32% for self-inflicted injuries and interpersonal violence. The three disorders that contribute most to disability in this age group are autistic spectrum disorders (2.21%), idiopathic developmental intellectual disability (0.56%), and anxiety disorders (0.25%). These aforementioned estimates correspond to the percent of burden attributed to these disorders of all medical illnesses. However, for prevalence estimates of mental disorders, there are several community epidemiologic studies that have been conducted on preschool children

Table 1 Global burden of disease 2015 estimates[a] of years lived with disability and disability-adjusted life years due to mental disorders from toddlerhood through emerging adulthood

Age group	Years lived with disability (YLDs) attributed to mental and substance use disorders (%)	Disability-adjusted life years (DALYs) attributed to mental and substance use disorders (%)	Disability-adjusted life years (DALYs) attributed to self-harm and interpersonal violence (%)
1–4	3.08	0.51	0.32
5–9	10.32	5.00	0.45
10–14	20.34	11.81	1.59
15–19	27.60	14.89	6.15
20–24	31.81	16.16	8.03

[a] Estimates from the Global Burden of Disease Study interactive visualization tool https://vizhub.healthdata.org/gbd-compare/

(e.g., Egger & Angold, 2006; Gleason et al., 2011; Keenan, Shaw, Walsh, Delliquadri, & Giovannelli, 1997; Lavigne et al., 1996; Wichstrom & Berg-Nielsen, 2014) which report prevalence rates ranging from 10.5% to 21.4% for any disorder, the most common disorders being oppositional defiant disorder (ODD) in some studies and generalized anxiety disorder (GAD) in others. However these studies generally do not include autism spectrum disorders or intellectual disability.

Research suggests that infant and toddler psychopathology is not transient such that of children who were studied when they were between 12 and 40 months of age, 49.9% had persistent psychopathology a year later which was predicted by co-occurring problems, high family life disruption, and parenting distress (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006). Similarly another study reported that more than 50% of children who at age 2–3 had a psychiatric disorder continued to have a disorder 4 years later with greatest stability for disruptive disorders (Lavigne et al., 1998). A more recent study found that anxious-fearful symptoms and hostile-aggressive behavior in preschoolers were associated with twice the risk of emotional difficulties at age 10–12 (Slemming et al., 2010). While an important proportion of toddlers with psychopathology have persistent psychopathology, it is important to remember that approximately half do not, such that protective factors and resilience are equally important to developmental pathways.

Psychopathology in School-Aged Children

School entrance marks an important developmental transition with increased demands for behavioral control and sustained attention. The developmental tasks of school-aged children include cognitive tasks like achieving concrete operations, friendship development, skill learning, self-evaluation, and cooperation. Once children begin school, they become exposed to bullying, a common and chronic stressor in school-aged children with important mental health consequences (Moore et al., 2017). Child maltreatment and childhood adversities in general are important risk factors for the development of childhood psychopathology.

Mental and substance use disorders in children aged 5–9 account for 10.32% of YLDs and 5.00% of DALYS with an additional 0.45% of DALYS due to self-harm and interpersonal violence (Global Burden of Disease Study, 2015). The three types of disorders that account for the greatest burden of disability in this age group are conduct disorders (3.12%), autism spectrum disorders (2.63%), and anxiety disorders (2.54%). In the Great Smoky Mountains Study, a community survey of children from the Southeast of the United States found that between 8.3% and 19.5% of 9–12-year-olds met criteria for any 3-month disorder (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Rates were highest for 9–10-year-olds, descending thereafter until age 12 when rates begin to increase steadily there afterward. By age 16, 36.7% of children had experienced at least one disorder.

Some diagnostic continuity has been found from preschool to school-aged children (Slemming et al., 2010) and school-aged children to adolescence (Copeland et al., 2013). An analysis of three prospective longitudinal studies covering the ages 9–32 found that having any childhood disorder (those developing between 9 and 12 years of age) was associated with more than a threefold increase in odds for having a disorder at any other point in time. While homotypic and heterotypic continuity was observed, the most persistent disorders were behavioral disorders, particularly ADHD, which tended to predict themselves over time, but not later internalizing disorders, and anxiety and depressive disorders tended to predict each other (Copeland et al., 2013).

Children with intellectual disabilities may be at particular risk for additional psychopathology. A 14-year longitudinal study of children and adolescents with intellectual disabilities found that 41% at wave I when they had an average age of 12 met criteria for comorbid psychopathology and this rate declines slightly to 31% by early adulthood (Einfeld et al., 2006). While there were no initial differences in comorbid psychopathology by level of intellectual disability, those with more mild intellectual disability and boys had a sharper decrease in comorbid psychopathology with age than those with severe or profound intellectual disability.

Due to the greater dependence upon the family during childhood than adolescence, the results of one study found that family predictors were more strongly associated to childhood internalizing symptoms (compared to adolescent internalizing symptoms), whereas peer victimization was equally related to both childhood and adolescent internalizing problems (Haltigan, Rosiman, Cauffman, & Booth-LaForce, 2017). Many studies have found gene-environment interactions predicting children's mental health, particularly for interactions with child maltreatment and peer victimization and polymorphisms like the monoamine oxidase A, 5-HTTLPR, and BDNF, among others, though results have been mixed (Bellani, Nobile, Bianchi, van Os, & Brambilla, 2012; Benjet, Thompson, & Gotlib, 2010; Kim-Cohen et al., 2006).

Psychopathology in Adolescence

Adolescence is the next most rapid period of growth in human development after infancy, requiring adaptive coping mechanisms, which can alter the course of psychopathological development. The developmental tasks of adolescence include adaptation to pubertal maturation (i.e., secondary sex characteristics), achieving formal operations, emotional development, greater importance of the peer group, sexual exploration, psychological autonomy from parents, sex-role identity, internalized morality, and vocational decisions among the most important. Adolescents must contend with greater freedoms which test their decision-making and expose them to risky situations while at the same time greater demands of responsibility.

The global burden of mental and substance use disorders increases substantially in adolescence, accounting for 20.34% of YLDS in those aged 10–14 and 27.6% of those aged 15–19. DALYs attributed to mental and substance use disorders are 11.81% in those aged 10–14 and 14.89% in older adolescents aged 15–19. The three types of disorders that cause most disability in 10–14-year-olds are conduct disorders (6.35%), anxiety disorders (5.16%), and depressive disorders (4.11%). In older adolescents aged 15–19, depressive disorders account for the greatest amount of disability (9.46%), followed by anxiety disorders (5.67%) and conduct disorders (4.21%); substance use disorders, bipolar disorder, and schizophrenia also begin to contribute to disability at this age. DALYs attributed to self-harm and interpersonal violence are estimated at 1.59% in 10–14-year-olds and climb to 6.15% of 15–19-year-olds (Global Burden of Disease Study, 2015).

Prevalence estimates of any psychiatric disorder in community surveys of adolescents range from 12% (Farbstein et al., 2010) to 50% (Shaffer et al., 1996), with an average prevalence rate of 21.8% (Costello et al., 2011), and vary according to measurement method, diagnostic system, informant, ages included, diagnoses included, and prevalence time period (lifetime, 12 months, 6 months, or current). From childhood to adolescence, there are an increase in rates of depression, substance use disorders, and some anxiety disorders (like panic disorder and agoraphobia) but a decrease in other anxiety disorders (like separation anxiety disorder) and attention deficit hyperactivity disorder (Costello et al., 2011). Anxiety disorders are the most common during this stage especially specific phobia and social phobia followed by mood disorders and behavioral disorders, while substance use disorders begin to emerge at this stage (Benjet, Medina-Mora, Borges, Zambrano, & Aguilar-Gaxiola, 2009; Merikangas et al., 2010).

In the Great Smoky Mountain Study (Copeland et al., 2013), where homotypic and heterotypic continuity of disorders from childhood to adolescence was studied, homotypic continuity from childhood to adolescence was found to be strongest for substance use disorders and lowest for anxiety disorders. With regard to heterotypic continuity, childhood depression predicted adolescent anxiety disorders, whereas childhood anxiety disorders predicted adolescent depression and adolescent substance use disorders.

Because adolescents are among the most physically healthy, compared to other age groups, most no longer go for checkups with pediatricians, and there are few services specially aimed at adolescents. They require an adult (e.g., parent, teacher) to recognize a problem and take them to treatment, but are less easily taken to treatment if they do not wish it than children. As a result they are less likely to be seen in the health sector. Thus it is important to take preventive interventions and treatment strategies to them, and the most promising avenues for such interventions are strategies online and on mobile devices where adolescents are active and technologically literate and may be more easily engaged.

Psychopathology in Emerging Adulthood

Among the primary tasks of early adulthood is the transition from school to work and may also include marriage and childbearing, though in many developed countries and among higher SES individuals in some developing countries, the age of assuming adult roles has increased contributing to a prolonged period of emerging adulthood. This early adult period is a highly heterogeneous life stage with a diversity of life trajectories in terms of educational status and attainment, employment, economic independence, living or not with the family of origin, etc. Arnett (2000) has proposed calling this stage emerging adulthood with five defining psychological characteristics: instability, possibilities, self-focus, in-betweenness, and identity exploration. Bynner (2005) however argues that this stage of life is more greatly influenced by structural and social factors such as employment and education opportunities. These factors are likely to play an important role in mental health trajectories.

Mental and substance use disorders account for nearly a third (31.81%) of YLDs in emerging adults aged 20–24 and 16.16% of DALYs, while self-harm and interpersonal violence account for 8.03% of DALYs, with the greatest burden for depression (16.76%), anxiety (4.87%), and drug use (3.32%) disorders (Global Burden of Disease Study, 2015). An 8-year prospective two-wave panel study that evaluated youth between ages 12 and 17 at wave I and between 19 and 26 at wave II found an incidence of 37.9% for any disorder, the greatest incidence for substance use disorders, specifically alcohol abuse, and the lowest incidence for anxiety disorders given that most individuals who will have an anxiety disorder have already developed one and there are few who have first onsets during this period (Benjet et al., 2016). However, this latter finding is contrary to the finding of Copeland et al. (2014) that anxiety disorders had a large increase in the transition to adulthood. The incidence of substance abuse disorder is salient during this transition and is often preceded by other types of psychopathology in earlier stages of development (Costello, 2007).

Like adolescents, emerging adults are among the physically healthiest in society and are less likely to have contact with the health sector, but unlike adolescents they no longer require an adult to identify their problem and take them to treatment.

Anxiety Disorders from Childhood Through Adolescence and Emerging Adulthood

Most anxiety disorders have very early ages of onset; phobias and separation anxiety disorder have median ages of onset between 7 and 14 years of age, whereas generalized anxiety disorder, panic disorder, and posttraumatic stress disorder have later ages after childhood (Kessler et al., 2007). Phobic disorders can be difficult to distinguish from the normative development of fears during childhood. Fear is a necessary and protective emotion that is part of normal development with evolutionary relevance. The object of one's fears changes throughout development. Young infants are fearful of loud noises and sudden movements; in the second half of the first year of life, infants begin to fear strange objects and persons, heights, and separation from attachment figures. Toddlers fear being alone, the dark, and animals; as children mature their fears extend to abstract and imaginary stimuli like monsters, natural phenomenon, bad people, and being kidnapped; early adolescents begin to fear world situations like war, economic difficulties, and questions related to self-image; older adolescents continue to have social fears, sexual fears, and fears regarding personal achievement (Robinson & Rotter, 1991). While many of these fears are transitory during development, some may become maladaptive and persistent. An 8-year longitudinal study from adolescence through emerging adulthood found specific phobia to persist in almost 18% of individuals with this disorder at baseline which was predicted by age of onset of the disorder in adolescence (versus childhood), parental neglect, having a first-degree relative with specific phobia, and economic adversities (Albor, Benjet, Méndez, & Medina-Mora, 2017). Additionally non-comorbid-specific phobia in adolescence predicted the development of other anxiety disorders and substance use disorders in emerging adulthood. A particular difficulty in the treatment of phobias for adolescents is that research has found that adolescents have an attenuated extinction response compared to children and adults (Pattwell et al., 2012) and thus are less likely to benefit from exposure-based treatment which relies on fear extinction principles and is the only evidence-based treatment for phobias.

Copeland and colleagues (2014) showed a U-shaped curve for the 3-month prevalence rates of any anxiety disorder from age 9 to 26, with high rates in early childhood, sharply decreasing in middle childhood and then increasing again in adolescence through emerging adulthood. Females had higher rates than males in mid-adolescence and emerging adulthood. However the overall pattern of anxiety disorders over development varied by specific anxiety disorder. Separation anxiety disorder that was common in childhood becomes rare in early to mid-adolescence, whereas generalized anxiety disorder was uncommon in childhood and increased in adolescence, and agoraphobia and panic disorder were uncommon in childhood and adolescence and increased in emerging adulthood. Specific phobia and social phobia were constant across this period. While some disorders like separation anxiety disorder appear to be time-limited and may represent temporary fears that are resolved with development, others appear to be persistent.

Depression from Childhood Through Adolescence and Emerging Adulthood

While the first episode of major depressive disorder (MDD) is often during adolescence, common symptoms of depression such as sadness, irritability, and sleep problems and full MDD can emerge much earlier. Because crying, irritability in the form of tantrums, and difficulty with sleep are frequent in young children, determining when these normative emotional experiences become pathological can be challenging. Bufferd, Doughterty, and Olino (2017) mapped the frequency and severity of depressive behaviors in preschool-aged children providing useful information for making this distinction.

They found that sadness, irritability, and tearfulness/sensitivity were normative, whereas low interest/pleasure, talking about death/suicide, low self-worth, appetite/weight changes, and difficulty concentrating/making decisions were not normative in preschool-aged children. For example, tearfulness had to occur 32 times over 14 days, and tantrums had to occur 9 times over 14 days to be considered clinically relevant, whereas low interest/pleasure had to occur only 3–4 times and low self-worth 2 times over 14 days to be considered severe.

The prevalence of depression increases with age. In a community sample of 3-year-olds, the prevalence was estimated at 1.8% (Bufferd et al., 2017). In children 9–12, prevalence rates have been estimated at 2.8% (Costello et al., 2003), and in adolescents the 12-month prevalence of MDD ranges from 4.8% to 7.5% (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015; Benjet et al., 2009), with important sex differences emerging in adolescence which remain throughout the rest of the life course with females generally presenting twice the prevalence of MDD than males. A longitudinal study from age 8 to 18 found a surge in MDD in adolescence, particularly from age 14, predicted by S carriers of 5-HTTLPR, higher peer chronic stress over 3 years, the interaction of these two factors moderated by age, and finally female gender and particularly females with greater chronic peer stress (Hankin et al., 2015).

In another longitudinal study, an earlier onset of MDD was predicted by parental MDD and antisocial behavior, child negative emotionality and externalizing behavior, and child maltreatment; on the other hand, lower positive emotionality, childhood maltreatment, and trait anxiety predicted a recurrent course of MDD from late childhood into adulthood (Wilson, Vaidyanathan, Miller, McGue, & Iacono, 2014).

Preschool, childhood, and adolescent-onset depression shows both homotypic and heterotypic continuities. Preschool depression is a predictor of later childhood depression as well as later childhood anxiety disorders and ADHD (Hankin, 2015). Persistent and recurrent MDD throughout childhood and adolescence include genetic factors such as shortened telomerase length in interaction with stressful/adverse environments and HPA dysregulation.

Attention Deficit Hyperactivity Disorder Throughout Childhood, Adolescence, and Emerging Adulthood

While high levels of activity can be observed in infancy, symptoms of attention deficit hyperactivity disorder are generally first recognized during the preschool period or upon school entrance when the demands for attention and impulse control are increased. Childhood prevalence rates of ADHD are estimated between 5% and 7% and fall to 3–4% among adolescents and even lower in adults (2.8%) (Fayyad et al., 2017; Polanczyk et al., 2007). Longitudinal studies of the persistence of the disorder over the life span present a wide variety of estimates from 4% to 76% persisting with full disorder from childhood to adulthood and depend upon informant source among other important differences between studies (Caye et al., 2016). Consistent risk factors for persistence include the severity of ADHD, receiving treatment (presumably because only the most severe receive treatment), and comorbid conditions particularly comorbidity with conduct disorder and major depressive disorder (Caye et al., 2016).

The relative importance of symptoms also changes throughout childhood, adolescence, and adulthood. Inattentive symptoms are more stable than hyperactive or impulsive symptoms. During preschool, hyperactivity peaks and is the most common ADHD symptom and then declines throughout childhood (Olson, 2002). Inattentive symptoms increase, become more noticeable as children enter school, and remain stable (Hart, Lahey, Loeber, Applegate, & Frick, 1995). Martel et al. (2016) found that the ADHD symptom structure became more differentiated over development, in other words there was a progressive differentiation of symptoms as individuals age. During preschool, all symptoms clustered tightly together in a single cluster suggesting that during preschool those with ADHD manifest similar difficulties with all symptoms. During childhood, the symptom structure most closely resembled the two-domain symptom structure defined in the DSM-5, two clusters, a tight cluster of inattention symptoms and a separate but more disperse cluster of inattention and hyperactivity-impulsivity symptoms. During adolescence three clusters emerge, inattention and impulsivity forming two separate and tightly formed clusters and a separate but less central cluster of hyperactivity symptoms. By adulthood symptoms become most differentiated, forming four distinct clusters: mental effort, disorganization, motor overactivity, and verbal impulsivity. Martel and colleagues suggest that impulsivity is most salient during adolescence possibly because of the underdevelopment of the prefrontal cortex in combination with greater freedom than children to make decisions, whereas verbal impulsivity emerges as salient in adulthood, possibly due to verbal impulsivity being the last aspect of impulsivity to be reined under voluntary control. Despite these changes in symptom structure across development, two symptoms, "often easily distracted" and "difficulty sustaining attention," were core symptoms at each stage. And while there is substantial evidence that ADHD lessons with age, it is unclear whether this is a true remission or only a reflection of the developmental insensitivity of diagnostic criteria (Faraone, Biederman, & Mick, 2006).

Conclusion

Psychopathology is expressed from infancy onward, with both homotypic and heterotypic continuities, as well as discontinuity, across developmental periods depending upon the complex interplay of biological, psychological, and socio-contextual factors. Despite only 13.3% meeting criteria for a psychiatric disorder in any given 3-month period in childhood, over 60% met full diagnostic criteria at some point by the age of 21, and another 21.4% had subclinical symptoms in the Great Smoky Mountains Study (Copeland, Shanahan, Costello, & Angold, 2011). This highlights the *normality* of *abnormality* or rather the fluctuations in emotional and behavioral adaptation as individuals face different challenges throughout the course of development. While the high prevalence estimates reported in community surveys may engender incredulity in some, or criticisms as to the medicalization of normal suffering and the human experience, this perspective discounts the suffering of those who experience distress and fails to promote actions to alleviate their distress or to problem solve. So whether you accept the epidemiologic panorama which suggests that most people at some point in development will have sufficient symptoms to meet diagnostic criteria for a psychiatric disorder or whether you consider this the universality of human suffering, given that we have the means to alleviate suffering for many of these *conditions* and alter the course of developmental trajectories, we have the responsibility to do so. The most effective means for treatment will be the topic of subsequent chapters.

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An Introduction to Applied Behavior Analysis

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Contents

What Is Applied Behavior Analysis?

Applied behavior analysis (ABA) is one of the three branches of the science of behavior analysis, the other two being the experimental analysis of behavior and behaviorism, or the philosophy of behavior (Cooper, Heron, & Heward, 2007). As a science, ABA can be described as a systematic approach to understanding behavior of social interest. ABA is deeply rooted in the influential work of individuals such as Edward Thorndike, John Watson, Ivan Pavlov, and B.F. Skinner, to name a few. In 1968, Baer, Wolf, and Risley outlined *some* of the defining characteristics research in ABA should exhibit in their seminal paper "Some Current Dimensions of Applied Behavior Analysis." While there are many examples of applied behavior analytic research prior to Baer et al. (e.g., Allen, Hart, Buell, Harris, & Wolf, 1964; Ayllon, 1963; Ayllon & Azrin, 1965; Ayllon & Michael, 1959; Etzel & Gerwitz, 1967; Sherman, 1963; Wolf, Risley, & Mees, 1963), its publication, along with the establishment of the *Journal of Applied Behavior Analysis*, is commonly cited as what established the field of ABA.

Baer, Wolf, and Risley (1968, 1987) urged research in the field of ABA to be applied, behavioral, analytic, technological, conceptually systematic, effective, and generalizable; applied in the sense that the subject matter is selected due to its importance to the individual, community, and/or society. ABA research is behavioral in that the subject matter is observable, objectively defined, and measurable. Research demonstrates the analytic dimension when there has been a believable demonstration that the intervention, or independent variable, is solely responsible for changes in the behavior in question, or the dependent variable. This dimension is typically

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assessed through the research design used in the study. ABA research is technological when the procedures are described completely to allow the possibility of replication. To be conceptually systematic, research in the field of ABA provides descriptions of interventions and changes in behavior that align with relevant principles of behavior analysis. Baer et al. (1968, 1987) considered research that has demonstrated effects that have practical value and are meaningful to the participants as effective. Generality is demonstrated when the results are lasting and occur across different contexts (e.g., environments, people, times of day, with different materials).

An additional important component of ABA, while not included in Baer et al. (1968, 1987)'s description of some of the dimensions of ABA, is social validity. The importance of which was discussed by Wolf (1978). Judgments on social validity often involve inquiry on three factors: (1) the significance of the goals selected, (2) the appropriateness of the procedures utilized, and (3) the importance of the effects demonstrated (Wolf, 1978). Unlike most measures within behavior analytic work, social validity is often subjective (e.g., done through questionnaires, rating scales, and interviews). Social validity measures combined with objective measures allow researchers and practitioners to measure the effectiveness and social acceptability of interventions.

As a practice, ABA refers to the application of behavior analytic principles to improve socially important behaviors, for example, the use of shaping to expand the food repertoire of an individual exhibiting food selectivity (e.g., Koegel et al., 2012). In this example, shaping, an empirically evaluated behavioral technique, is employed to improve an assumed socially relevant difficulty. While the clinical application of ABA may not require the experimental rigor common to research in ABA, it still should align with the dimensions outlined at its conception. In practice, the principles of ABA have been employed across a wide spectrum of challenges. Some examples include, but are not limited to, the treatment of developmental disabilities, such as autism spectrum disorder (ASD; e.g., Lovaas, 1987; Ivar Lovaas, Koegel, Simmons, & Long, 1973), as well as gerontology (e.g., Green, Linsk, & Pinkston, 1986), education (e.g., Hall, Lund, & Jackson, 1968), juvenile delinquency (e.g., Phillips, Phillips, Fixsen, & Wolf, 1971), nonhuman welfare (e.g., Dorey, Rosales-Ruiz, Smith, & Lovelace, 2009), healthcare (e.g., Lichtenstien, 1997), addiction (e.g., Silverman, Roll, & Higgens, 2008), relationships (e.g., Sanders, 1999), and sustainability (e.g., Bekker et al., 2010).

Basic Principles of ABA

As mentioned previously, ABA-based procedures are derived from the principles of the science of behavior analysis to allow for socially significant behavior change to occur. Behavior can be defined as:

> That portion of an organism's interaction with its environment that is characterized by detectable displacement in space through time of some part of the organism and that results in a measureable change in at least one aspect of the environment. (Johnston & Pennypacker, 1993, p. 23)

The principles of behavior analysis began their development from early work on respondent and operant conditioning. In respondent conditioning, behavior is elicited through a conditioned or unconditioned stimulus. For example, presenting food, an unconditioned stimulus, elicits salivation, an unconditioned response. If a light is paired with the onset of food, eventually the light alone will elicit salivation. While respondent conditioning has been utilized within ABA-based procedures and should be considered in some contexts, the principles of operant behavior are more common within practice.

Within the operant conditioning paradigm, behavior is changed through manipulating antecedents and consequences (i.e., what comes before and after the behavior in question). Antecedent manipulation involves changes to the stimulus conditions prior to the potential onset of the targeted behavior. Consequent manipulation involves reinforcement and punishment. Reinforcement occurs when a stimulus change occurs contingent upon a behavior that results in a corresponding increase in the probability of similar behavior occurring in similar situations in the future. Punishment occurs when a stimulus change occurs contingent upon a behavior that results in a corresponding decrease in the probability of similar behavior occurring in similar situations in the future.

What follows are brief descriptions and research examples of some procedures that utilize the principles of ABA to modify behavior. This list is not meant to be exhaustive, but rather a sample of some commonly used procedures within practice and research. Additionally, the research examples selected for each procedure were done to simply provide an example of the procedure used in the professional literature. These examples are not meant to be representative of a review of the body of literature as a whole for any given procedure.

ABA-Based Procedures

Discrete Trial Teaching

One of the most common approaches to teaching within a behavior analytic framework is discrete trial teaching (DTT; Lovaas, 1981, 1987). This systematic procedure is commonly used to teach a variety of skills. Each discrete trial consists of three primary components: (1) a discriminative stimulus (e.g., an instruction from the interventionist), (2) a response by the learner, and (3) a consequence (i.e., reinforcement or punishment) provided by the interventionist. An optional, but common, fourth step involves providing a prompt, prior to the learner's response, that increases the likelihood of the learner responding correctly. Other important components which have been explored within experimental evaluations of DTT include inter-trial intervals, methods of data collection, and establishing operations (EO; Keller & Schoenfeld, 1950; Michael, 1988). Researchers have demonstrated that DTT has been an effective approach to teach a variety of skills such as receptive and expressive labels (e.g., Conallen & Reed, 2016; DiGennaro-Reed, Reed, Baez, & Maguire, 2011), conversation skills (e.g., Ingvarsson & Hollobaugh, 2010), and play and social skills (e.g., Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002; Shillingsburg, Bowen, & Shaprio, 2014).

In a recent specific example, Conallen and Reed (2016) used a DTT approach to teach several children (ages 6–9 years), diagnosed with autism, to label the emotions of others. Situational cards were placed in front of the participants that depicted various scenarios that are likely to occasion a specific emotion (e.g., a boy at a birthday party). The participant was then given a picture of a boy displaying a happy, sad, or angry facial expression and asked to match the card to the situational card. Following the match-to-sample condition, the researchers then presented each participant with a situational card and asked a question related to that card (e.g., "It is his birthday, how does he feel?"). The participants answered by selecting the picture of the boy displaying an emotion (i.e., happy, sad, or angry). Conallen and Reed found that the procedure was successful at teaching the participants to label emotions within this context. For a more in-depth description of DTT, we refer the reader to Ghezzi (2007), Leaf and McEachin (1999), Lerman, Valentino, and LeBlanc (2016), Smith (2001), and Leaf, Cihon, Leaf, McEachin, and Taubman (2016).

Prompting

To minimize errors, increase correct responding, and increase the rate of reinforcement, prompts are often provided to assist the learner. Prompts are any antecedent behavior the interventionist engages in that alters stimulus conditions to increase the likelihood of the desired response (Green, 2001; Grow & LeBlanc, 2013; MacDuff, Krantz, & McClannahan, 2001; Wolery, Ault, & Doyle, 1992). There are many ways an interventionist can provide a prompt, which include, but is not limited to, pointing to the correct response (e.g., Soluaga, Leaf, Taubman, McEachin, & Leaf, 2008), physically guiding the learner to the correct response (e.g., Leaf, Sheldon, & Sherman, 2010), reducing the number of choices in the field (e.g., Soluaga et al., 2008), verbally modeling the correct response (e.g., Leaf, Sheldon, & Sherman, 2010), or placing the target stimulus closer to the learner (e.g., Soluaga et al., 2008).

Although researchers have shown that prompting can be effective across multiple populations and behaviors, it may be difficult for clinicians to know when to prompt, fade prompts, and what prompts to provide. Thus, researchers have evaluated various prompting systems to help guide clinicians to effectively utilize prompts. One way to provide and fade prompts is to develop a prompting hierarchy. One method is known as least-to-most prompting which starts with interventionist providing the least amount of assistance and gradually increasing the assistance based on learner responding. A second hierarchical prompting system is known as most-to-least prompting which starts with the most assistive prompt (e.g., full physical guidance), and, over successive trials or sessions, the interventionist reduces the level of assistance. When using hierarchical prompting systems, professionals typically determine the number of steps in the prompting hierarchy, what types of prompts will be provided, the level of assistance, the criteria to fade or reintroduce prompts, and what types of reinforcers will be utilized for unprompted and prompted responses.

A second way to provide and fade prompts is based on manipulation of the time until a prompt is provided. One common way to do this is to implement a prompting system referred to as a progressive time delay. During initial teaching with progressive time delay prompting, the interventionist presents a set number of simultaneously prompted trials (i.e., 0 s delay). After a set number of simultaneously prompted trials, the interventionist implements the time delay trials. The amount of time systematically increases (e.g., from 1 to 2 s delay) until a terminal time criterion is met. A second way to provide prompting in a time-based system is known as the constant time delay prompting system. During initial teaching with constant time delay, the interventionist provides immediately prompted trials (i.e., 0 s delay). After a set number of immediate prompted trials or sessions, the interventionist implements time delay trials (e.g., 5 s delay). In time delay trials, the interventionist provides an instruction to the learner (e.g., “Touch the ball”) followed by a brief time delay, typically ranging from 3 to 5 s, for the learner to respond to the instruction.

There are many other types of prompting systems which include graduated guidance (e.g., MacDuff, Krantz, & McClannahan, 1993), simultaneous prompting (e.g., Leaf et al., 2010), and no-no prompting (e.g., Leaf et al., 2010). The aforementioned studies typically have strict rules and protocols for interventionists to follow. In contrast, flexible prompt fading (FPF; Soluaga et al., 2008) is a prompting system which does not provide interventionists with strict protocols of when to prompt and when not to prompt, but, instead, provides guidelines. In doing so, the interventionist makes changes based upon in-the-moment assessment of several variables (e.g., current learner responding, affect, responses to previous prompts; Leaf, Cihon, Leaf, et al. 2016; Leaf, Leaf, McEachin, et al. 2016). Within FPF the interventionist can use any and all prompt types with the goal of keeping the learner averaging 80% correct responding. In doing so, the interventionist should always implement the least assistive prompt whenever possible and fade prompts as quickly as possible. To determine what prompt to provide, the interventionist must factor in many variables including the learner’s history, recent responding, any undesired behavior, length of teaching session, what prompts typically have been successful, and what reinforcers are currently motivating.

Researchers have shown that FPF has been successful in teaching receptive and expressive labels (e.g., Soluaga et al., 2008). Soluaga et al. (2008) provided the first study to measure FPF in which the researchers compared a time delay prompt to FPF with five individuals diagnosed with ASD. Time delay and FPF were effective, but FPF was more efficient. Additional studies have shown that FPF was more effective than most-to-least prompting (e.g., Leaf, Leaf, Alcalay, et al. 2016) and error correction (e.g., Leaf et al., 2014).

Incidental Teaching

Incidental teaching is a procedure commonly used to expand language utilizing the principles of behavior analysis. Incidental teaching has been used to teach conversation skills (e.g., Hart & Risley, 1975), play skills (e.g., Wong, Kasari, Freeman, & Paparella, 2007), complex language (e.g., Hart & Risley, 1978), social skills (e.g., McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992), receptive labels (e.g., McGee, Krantz, Mason, & McClannahan, 1983), and early reading skills (e.g., McGee, Krantz, & McClannahan, 1986).

Hart and Risley developed incidental teaching procedures in 1968 while working with children from low-income families to increase the complexity of their children's language. Hart and Risley (1975) defined incidental teaching as "the interaction between an adult and a single child, which arises naturally in an unstructured situation, which is used by the adult to transmit information or give the child practice in developing a skill" (p. 411). Hart and Risley (1968) found that the incidental teaching method expanded children's verbal communication skills and generalized into other settings.

Incidental teaching consists of four components: (1) environmental arrangement, (2) child initiation, (3) elaboration, and (4) reinforcement. Incidental teaching should take place in the learner's natural environment, but the environment should be arranged so that the learner needs to initiate and request desired items, activities, and any other materials (McGee et al., 1983). Incidental teaching focuses on the learner's interests and is dependent on the learner's initiations. Once the environment has been arranged appropriately, the interventionist should wait for the learner to initiate. The nature of the initiation will vary for each learner, which could be a gesture toward an item or activity, a one-word request, a manual sign, a full sentence, etc. The interventionist may then target an elaboration of the learner's request. This could be in the form of a question (e.g., "What color paint?") or a vocal model (e.g., "I want the giraffe"). The form of the elaboration should also be individualized for the learner. The goal is the learner then imitates the expanded model or provides the expanded response based on the prompt provided by the interventionist. After the learner provides the expanded response, the interventionist should immediately provide the requested item/activity. The requested item/activity should function as a reinforcer and increase the likelihood of the expanded vocal response occurring on future occasions.

Teaching language through incidental teaching has several potential benefits including greater generalization compared to other procedures, less prompt dependence, and a variety of interventionists can easily implement the procedure, including parents, teachers, and caregivers (McGee, Krantz, McClannahan, 1985, 1986; McGee, Morrier, & Daly 1999).

Token Economies

A token economy is a type of reinforcement system in which the interventionist provides some form of tokens (e.g., check marks, points, stickers) contingent upon the learner engaging in a targeted response(s). Once the learner earns enough tokens, she/he exchanges the tokens for a preferred item or activity (e.g., toy, edible, game) which presumably functions as a reinforcer. Since the acquisition of tokens is paired with the delivery of a preferred item or activity, the tokens function as a conditioned reinforcer. This is considered as a bridge in the gap to reinforcement as the delivery of tokens marks the occurrence of the desired behavior, but no preferred item or activity will be accessed until the learner has acquired a certain number of tokens. The application of token economies has a long history in research and clinical practice within the field of ABA.

Ayllon and Azrin (1965) conducted a seminal study in which they used a token economy to evaluate the effects of extrinsic reinforcement on behavior that was presumed to be intrinsically motivating. The study consisted of six experiments examining the effects of a token economy and other operant procedures on the behavior of adult patients, identified as psychotic, who resided in a state hospital. The researchers implemented a token economy throughout all six experiments in which tokens could be exchanged for privacy, leave from the ward, social interaction with staff, devotional opportunities, recreational opportunities, and commissary items. The dependent variables across the six experiments were selection and engagement in various jobs inside and outside of the hospital. The contingent application of the token economy system effected choice of job as well as the patient's performance on the job.

Since Ayllon and Azrin's (1965) seminal study using a token economy, there have been several investigations across multiple populations (e.g., developmental disabilities; Harchik, Sherman, & Sheldon, 1992; juvenile delinquency; Phillips, 1968) and targeted responses (e.g., decreased symptoms of depression; Hersen, Eisler, Alford, & Agras, 1973; increased activity levels for chronic pain patients; Ritchie, 1976) on the implementation of token economies. In one study, Charlop-Christy and Haymes (1998) evaluated two variations of token economies for three individuals diagnosed with autism. One variation used the participants' perseverations as tokens (e.g., if the perseveration was cars, then small toy cars were used as tokens). The second variation used stars as tokens. The percentage of correct responding during performance tasks was higher when perseverative objects were used as opposed to stars. In a more recent study, Dotson, Richman, Abby, Thompson, and Plotner (2013) evaluated a class-wide token economy paired with the teaching interaction procedure to teach job-related skills to eight adults with various developmental disabilities (e.g., intellectual disability, Down syndrome, and autism). The combination of the two procedures was successful in improving the work-related behavior for all participants.

The research on token economies has helped lead to the procedures widespread clinical use. There are some variables that clinicians should consider when implementing a token economy that are worth noting. First, as with any reinforcement system, what behavior will be reinforced through the token economy must be determined. Second, the form tokens will take must be selected (e.g., points, stickers, check marks). Third, which preferred activities will be available for exchange (e.g., toys, breaks, social praise, edibles). Fourth, how many tokens must be earned before an exchange can occur. Fifth, if tokens can also be lost (i.e., response cost; described later); sixth, how to fade the token system; and, finally, how the token economy will be introduced should be planned. The final decision can often be the most important decision as properly introducing the token system is essential for its success. Leaf, McEachin, and Taubman (2012) have provided training materials on how to introduce the token economy. Leaf and colleagues' recommendation is to start with delivering tokens for a simple behavior (e.g., the learner placing his or her hands in the lap) and gradually expanding in complexity. Additionally, Leaf and colleagues recommended starting with the learner initially only earning one token and then expanding to more tokens before an exchange occurs. After these decisions have been made by the clinician, she/he can begin to implement the token economy.

Response Cost

Another procedure which can be utilized to reduce the rate of undesired behavior is response cost. Response cost consists of the removal of a reinforcing event contingent upon demonstration of an undesired behavior. This procedure is commonly used within a token economy (described earlier) in which the interventionist removes tokens (e.g., points, stickers); however, response cost can occur in the absence of a token system (e.g., removing certain tangible reinforcers contingent upon the learner engaging in an undesired behavior). Phillips et al. (1971) conducted a seminal study in which the researchers evaluated the effectiveness of a response cost system. In their study, all participants were part of Achievement Place, a community-based treatment facility, and were considered predelinquent youths. All youths participated in a token economy, in which participants could earn points for engaging in appropriate behavior and exchange points earned for various reinforcers (e.g., snacks, TV, allowances). Within this study, the researchers showed that a token economy with response cost could increase punctuality for meetings and answering questions correctly about an event that was just observed (e.g., watching the news). Since this study, there have been many evaluations of response cost which have included evaluating response cost with typically developing individuals (e.g., Tiano, Forston, McNeil, & Humphreys, 2005) and individuals diagnosed with attention deficit hyperactivity disorder (ADHD; e.g., McGoey & DuPaul, 2000), intellectual disabilities (e.g., Myers, 1975); ASD (Jowett, Dozier, & Payne, 2016), developmental disabilities (e.g., Piazza, Fisher, & Sherer, 1997), and emotionally disturbed learners (e.g., Sprute & Williams, 1990).

Before a clinician uses response cost, there are several considerations that must be taken into account. First, decide if response cost will be paired with systematized reinforcement system such as a token economy. Second, decide what behavior will result in a loss. Third, decide on the cost (e.g., loss of a specific duration of time, loss of three tokens versus one token). This is an important consideration, as the clinician needs to ensure that the cost is high enough to have an effect on the target behavior, but not too great resulting in prolonged lapses in engaging in appropriate behavior. Finally, decide if the contingencies will be discussed with the learner before implementation. If the learner has the prerequisite skills required, discussing the system with the learner may result in faster behavior change. However, for some learners, discussing the contingencies may not be appropriate and should be avoided.

Differential Reinforcement

Differential reinforcement procedures are common for developing new behavior and decreasing the probability of undesired behavior. Broad definitions of differential reinforcement vary from "reinforcing one response class and withholding reinforcement for another response class" (Cooper et al., 2007, p. 470) to "provide the strongest reinforcers for the best behaviors or performance" (Leaf & McEachin, 1999, p. 34). Differential reinforcement procedures have demonstrated effectiveness across a wide variety of populations and target behaviors. Four common differential reinforcement procedures include differential reinforcement of other behavior (DRO), differential reinforcement of low rates of behavior (DRL), differential reinforcement of incompatible behavior (DRI), and differential reinforcement of alternative behavior (DRA).

DRO Within DRO, a reinforcing event is delivered contingent on the absence of a specific topography of response (Reynolds, 1960; Weiher & Harman, 1975). The delivery of the reinforcing event occurs based upon the absence of the targeted response for a specified duration of time or if the targeted response is not occurring at a specified time. There are several distinctions among DRO procedures based upon how the delivery of the reinforcing event is determined that are beyond the scope of this chapter (see Cooper et al., 2007 for a detailed description). The effectiveness and variables affecting the effectiveness of DRO procedures have been well documented within the research literature.

For instance, in a recent study, Heffernan and Lyons (2016) examined the effectiveness of a DRO procedure to decrease the frequency of nail biting for a 4-year-old boy diagnosed with ASD. Prior to the onset of intervention, the researchers conducted a functional behavior assessment (FBA) and a preference assessment. Heffernan and Lyons identified several items that may provide similar sensory feedback to nail biting (e.g., containers of dry rice and pasta to run his fingers through) that could potentially serve as reinforcers. Initially, the preferred items were available following 20 s without nail biting. The interval was reset each time nail biting occurred. The intervention was successful at decreasing the frequency of nail biting and, throughout the course of the intervention, the interval was increased to

60 min. For a detailed review of recent applied literature utilizing DRO procedures, we refer the reader to Jessel and Ingvarsson (2016).

DRL Ferster and Skinner (1957) first described DRL as delivering a reinforcing event contingent upon the lapse of a minimum amount of time without the occurrence of the target behavior and subsequent increasing of the periods of time between responses to further reduce the target behavior. Another variation of DRL may also involve a predetermined criterion level of responding that must not be exceeded during a specified timeframe to receive access to a reinforcing event (e.g., no more than three occurrences of a target behavior in 10 min regardless of the time between responses). Thus, DRL may not completely suppress the targeted response but rather work toward systematically decreasing the target behavior to more appropriate or acceptable levels. Since Ferster and Skinner's first description, the DRL procedure has been utilized clinically and evaluated empirically within the literature.

In one example, Austin and Bevan (2011) used a DRL procedure to reduce the frequency of requests for interventionist attention with three young children in an elementary school classroom in South Wales. Baselines were taken for all three participants to determine individual target rates. To begin each session, boxes signifying the number of times the participant could request attention were outlined on an index card, plus one additional box. For instance, if the targeted rate was three, that participant had four boxes on her index card. Each time the participant requested attention, a box was checked. At the end of each session, the interventionist delivered a reinforcer if the participant requested interventionist attention less often than the targeted rate (i.e., if all the boxes were not checked). The results of a reversal design showed that the DRL was effective at decreasing the rate of requests for attention for all three participants.

DRI DRI differs from the DRO in that it specifies the response topography upon which the delivery of reinforcement will be contingent. Within this procedure, reinforcement is contingent upon the occurrence of a predetermined response topography that is incompatible with the undesired behavior that is targeted for decrease, however, not necessarily functionally equivalent. For example, if head hitting with one's hand is the undesired behavior, hands in lap or in pockets could be selected for reinforcement because they are incompatible with head hitting. Recent reviews of the empirical literature have shown that DRI procedures are less common among differential reinforcement procedures and that positive treatment effects are commonly only observed when the DRI is paired with other procedures (Chowdhury & Benson, 2011).

For example, Neufeld and Fantuzzo (1987) examined the effectiveness of a DRI procedure to decrease the frequency of self-injurious behavior (SIB) for three adults at a state hospital. The incompatible behavior selected during the intervention was placing rings onto a peg which was related to the participants' current habilitative programming and incompatible with the SIB. Reinforcement was delivered at 10 s intervals for engaging in the incompatible task. This DRI procedure was only partially effective as the rate of SIB still occurred at variable rates across all three participants. However, when paired with contingent application of a helmet in combination with the DRI procedure, SIB was reduced to near zero levels for all three participants.

DRA DRA is similar to the DRI in that it specifies a response upon which reinforcement is contingent. However, unlike the DRI, the response selected within the DRA is not necessarily incompatible with the undesired behavior. Consider the head hitting example used in the description of the DRI above. Alternative responses for head hitting that are not necessarily incompatible with head hitting may be requesting squeezes to the head, resting hand on the head, or asking for a break. DRA and DRO procedures are the most commonly used differential reinforcement procedures used among the literature (Chowdhury & Benson, 2011).

In one example within the literature, Rehfeldt and Chambers (2003) utilized a DRA procedure to decrease the frequency of perseverative verbal behavior and increase the frequency of appropriate verbal behavior for a 23-year-old male diagnosed with autism and mental retardation. There was no single appropriate verbal response selected for reinforcement; rather, all appropriate verbal responses were candidates for reinforcement. Attention and eye contact (presumed reinforcing events) were delivered contingent upon engaging in appropriate verbal behavior. The results indicated that the DRA procedure was effective at increasing the frequency of appropriate verbal behavior and decreasing the frequency of perseverative verbal behavior.

While differential reinforcement is commonly used for the reduction of the rates of undesired behavior, it is also used to strengthen response classes and is a key component of shaping (described later). For an in-depth description of the differential reinforcement procedures described here, we refer the reader to Cooper et al. (2007), Chowdhury and Benson (2011), and Sulzer-Azaroff and Mayer (1977).

Time-Out from Reinforcement

Time-out from reinforcement is a procedure which is used to decrease the rate of undesired behavior. When implementing time-out, the interventionist removes or delays reinforcement for a certain period of time contingent upon the learner engaging in undesired behavior. For example, if one wants to reduce screaming while playing a video game, one may pause or remove the video game for a brief period of time. It should be noted that time-out from reinforcement does not necessarily mean moving an individual from one area to another, as is commonly done in mainstream society. Instead, time-out refers to temporarily removing access to reinforcement, the specifics of which are dependent on the nature of the reinforcement.

In a seminal study, Bostow and Bailey (1969) evaluated the implementation of a brief time-out procedure to decrease undesired behavior for residents in a large state hospital. A 58-year-old woman, in a wheel chair, who engaged in frequent loud vocalizations and swearing behaviors participated in the first experiment. The researchers implemented a 2 min time-out procedure plus a DRI (described previously). The time-out procedure consisted of moving the participant to the corner of the room and placing her on the floor. The results of the study showed that the time-out procedure resulted in an immediate change in the participant's behavior, with loud vocalizations occurring at near zero rates. The same procedure was used in the second experiment with a 7-year-old boy who engaged in frequent aggressive behavior. The results replicated those from the first experiment with the rate of aggression decreasing immediately and occurring at near zero rates. Since this study, there have been numerous investigations of time-out to decrease the severity of aberrant behavior across various populations including typically developing children (e.g., Miller & Kratochwill, 1979), individuals diagnosed with ASD (e.g., Donaldson & Vollmer, 2011), individuals diagnosed with attention deficit disorder (ADD) and ADHD (e.g., Fabiano et al., 2004), individuals diagnosed with developmental disabilities (e.g., Mace & Heller, 1990), and individuals diagnosed with intellectual disabilities (e.g., Ritschl, Mongrella, Presbie, 1972).

There are several variables for clinicians to consider before implementing a time-out procedure. First, define what behavior will result in time-out from reinforcement. In considering this, the function of the behavior is important. The clinician must ensure that the learner is not placed in a time-out when the function of the behavior is to escape their present environment, as this would have the opposite effect and would likely reinforce the behavior. Second, and perhaps most importantly, the clinician must ensure that the time-in environment is reinforcing. If the time-in environment is not reinforcing, then the cost for leaving that environment will not result in the desired behavior change. Third, decide the duration of time-out. Research on the amount of time a learner remains in time-out has been mixed with some studies showing that a shorter duration is more effective (e.g., Pendergrass, 1971) and some studies showing a longer duration is more effective (e.g., White, Nielsen, & Johnson, 1972). Fourth, decide the criteria for leaving time-out (e.g., waiting for the learner to refrain from engaging in undesired behavior). Fifth, decide if time-out is to be exclusionary (i.e., the individual removed from all elements of the environment) or non-exclusionary (i.e., only partial elements of the environment removed). It is very important to ensure that all state laws, federal laws, and ethical codes are being followed in making such decisions. Finally, decide what procedures (e.g., differential reinforcement, token economies, prompting) to implement in conjunction with time-out to ensure that the individual learns appropriate replacement behaviors.

Shaping

Shaping is usually described as differentially reinforcing (described previously) successive approximations toward a terminal response or goal (e.g., Cooper et al., 2007; Skinner, 1953). This leads to the common view that shaping is a linear process in which the reinforcement of an approximation leads to another and another until the terminal response is obtained. For instance, when using shaping to improve upon selective eating, it is common to develop a set of steps leading to consumption of a food (e.g., touch, pick up, move toward mouth, touch to lips, hold between teeth, bite down, chew, swallow). However, others have described the shaping process as a method to expand general response classes, which, in turn, provide the shaper with more responses from which to select and the learner with more responses in which to engage (Bernal, 1972; Cihon, 2015). Take the aforementioned approach to address food selectivity as an example. A nonlinear shaping approach, such as Bernal (1972), would focus on expanding critical classes of responding (e.g., tolerating, interacting, tasting). Shaping is frequently used within practice and evaluated empirically to develop or expand upon a number of response classes.

In a classic demonstration, Wolf et al. (1963) used shaping to teach a 3-year-old boy to wear glasses. The researchers started by placing empty frames (i.e., without lenses) around the room which, if the boy picked up, held, or carried the frames, a reinforcer would be delivered. Reinforcement was then delivered for bringing the frames closer to his eyes. Once the boy was putting his glasses on independently, the prescription lenses were introduced. Reinforcement was gradually faded, and the boy wore his glasses for approximately 12 h each day. Ricciardi, Luiselli, and Camare (2006) provided a more recent demonstration in which shaping was used to increase the frequency of approach responses to electronic animated figures (e.g., dancing Elmo® doll) with an 8-year-old boy diagnosed with autism. Preferred items were available for maintaining the targeted distance from the animated figures. The distance started at 6 m and gradually increased in steps to 1 m from the figures. The criterion distance was decreased upon success with staying within the criterion distance for 90% of intervals across two consecutive sessions. The results showed that the shaping procedure was successful at increasing approach responses to previously avoided electronic animated figures.

Teaching Interaction Procedure/Behavioral Skills Training

Two procedures that use instruction, modeling, practice, and feedback to teach a wide variety of skills are behavioral skills training (BST; Miltenberger, 2012) and the teaching interaction procedure (TIP; Phillips, Phillips, Fixsen, & Wolf, 1974); however, some components between the two procedures differ. BST begins with the interventionist outlining the components of the targeted skill. The interventionist provides a model during or after this instruction. Following the model, the learners are provided with an opportunity to practice. The interventionist provides feedback during or after the practice. A TIP begins with the interventionist labeling and identifying the skill. Next, the interventionist provides meaningful rationales, followed by breaking the skill down into smaller steps (i.e., a task analysis of the targeted skill). The interventionist then demonstrates the correct and incorrect way to engage in the targeted skill. Following this demonstration, the learner is provided with opportunities to identify why the demonstration was correct or incorrect. Next, the learner practices the targeted skill, while the interventionist provides feedback. This last step continues until the learner meets a specified criterion. The overlap of the components within BST and the TIP often leads to confusion (Leaf et al., 2015). The differences have been discussed at length elsewhere (e.g., Leaf et al., 2015) and will not be discussed here; however, the authors encourage interested readers to look at the corresponding literature.

BST and the TIP have been well documented to teach a wide variety of skills to a wide variety of learners. For instance, Gunby and Rapp (2014) used BST to teach three children (ages 5–6 years) diagnosed with autism to engage in behavior to prevent abduction from strangers. The intervention consisted of (1) a discussion of the safety response and potential lures, (2) video models of potential scenarios and safe responses, and (3) opportunities to practice the safety skills, followed by (4) feedback based on practice opportunities (corrective and reinforcing). The skills were also probed within a high probability instructional sequence for each participant. A multiple baseline across participants showed that BST was effective for teaching abduction prevention skills for all three participants.

In another recent evaluation, Ng, Schulze, Rudrud, and Leaf (2016) examined the effectiveness of a modified TIP to teach four individuals (9–15 years old) diagnosed with an ASD various social skills. At the time of the study, each participant had an IQ score less than 75. Targeted social skills included providing help, negotiating, giving a compliment, passing the phone, responding to offers of help, requesting without grabbing, and responding to comments. All teaching sessions occurred in a small group instructional format. The TIP was modified to include the use of demonstrations of the rationales, picture prompts for identifying situations in which to engage in the skills, picture prompts to identify the steps of the skills, and only providing demonstrations of the correct way to engage in the targeted skill to avoid the potential of imitating undesirable examples. The modified TIP was effective in teaching the targeted skills for all four participants.

Functional Analysis

The analog functional analysis methodology developed by Iwata, Dorsey, Slifer, Bauman, and Richman (1982, 1994) has become the standard approach when it comes to assessing and treating aberrant behavior. Iwata et al. (1982, 1994)'s approach to treating aberrant behavior first experimentally manipulates antecedents and consequences, in an analog setting, that may affect the occurrence of aberrant behavior, determining the function that maintains the aberrant behavior and then proceeding to treatment based upon these results. Once the function of the aberrant behavior is determined, an intervention is developed to teach a replacement behavior for the aberrant behavior(s). It is common for targeted replacement behaviors to be functional communicative responses (e.g., Carr & Durand, 1985; Hanley, Sandy Jin, Vanselow, & Hanratty, 2014) which are commonly targeted using differential reinforcement, while the aberrant behavior is put on extinction (Tiger, Hanley, & Bruzek, 2008).

To determine the likely function of aberrant behavior, Iwata et al. (1982, 1994) used four analog conditions which were systematically alternated. Each condition manipulates antecedent events that precede aberrant behavior and the consequences that follow. The attention condition assesses if the aberrant behavior is maintained by social positive reinforcement. In the attention condition, the therapist ignores the individual while typically occupying themselves with another activity (e.g., reading a magazine, cleaning, etc.). Once the individual exhibits aberrant behavior, the therapist provides attention. In the escape condition, the environment is arranged to assess if negative reinforcement is the maintaining function. In this condition, a task demand is continually presented; if the individual engages in aberrant behavior, the task demand is delayed for a certain period of time. The alone condition in an analog functional analysis is used to determine if the aberrant behavior is maintained by automatic reinforcement. In the alone condition, the therapist and any other materials are not present in the room. Additionally, no programmed consequences are provided contingent on aberrant behavior. The play condition serves as a control condition. Within the play condition, attention is given noncontingently on a predetermined schedule, no task demands are placed, and free access to toys is available. Another condition commonly used in an analog functional analysis is the tangible condition. Similar to the attention condition, the tangible condition is used to determine if positive reinforcement is the controlling contingency. In the tangible condition, a preferred item and/or activity is present in the room with the therapist which, contingent on aberrant behavior, is provided to the individual (Rooker, Iwata, Harper, Fahmie, & Camp, 2011).

Since the landmark Iwata et al. study (1982, 1994), research in the area of analog functional analyses has become a staple within behavior analytic research. Many different topics of research have stemmed from the initial research on the functional treatment of aberrant behavior including descriptive assessments (Anderson & Long, 2002; Lerman & Iwata, 1993; Touchette, MacDonald, & Langer, 1985), anecdotal assessments (Smith, Smith, Dracolby, & Pace, 2012; Iwata, DeLeon, & Roscoe, 2013), brief functional assessments (Bloom, Lambert, Dayton, & Samaha, 2013), interview-informed synthesized contingency analysis (IISCA; Hanley et al., 2014), and functional analyses via telehealth (Wacker et al., 2013).

Functional Communication Training

Functional communication training (FCT) is an intervention in which appropriate communicative behavior is taught as a replacement for aberrant behavior (Cooper et al., 2007). For an FCT intervention to be successful, a functional assessment must first occur to determine the function of the aberrant behavior. After the function is determined, an appropriate communicative response can be taught that serves the same function as the aberrant behavior.

For example, in Carr and Durand's (1985) hallmark study, four children with developmental disabilities were taught desired requests for escape from task demands (negative reinforcement) or teacher attention (positive reinforcement). Carr and Durand developed several conditions to determine the social function of each participant's aberrant behavior (i.e., attention or escape from a demand). Once the functions were determined, Carr and Durand identified a communicative response that would serve as a replacement behavior for each of the participant's aberrant behavior. To assess the importance of functionally equivalent replacement behavior, the experimenters taught each participant an irrelevant communicative response that did not result in similar consequences to the aberrant behavior. Functionally equivalent communicative responses were taught through verbal prompts and differential reinforcement. The aberrant behaviors for each participant decreased once the functional communicative response was taught and the irrelevant communicative responses were not effective in reducing aberrant behavior.

Since Carr and Durand (1985), FCT has been used to reduce a wide variety of aberrant behaviors including aggression, self-injurious behavior, vocal disruptions, property destruction, elopement, body rocking, pica, and inappropriate sexual behavior (Durand & Carr, 1991; Fisher et al., 1993; Fyffe, Kahng, Fittro, & Russell, 2004; Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998; Wacker et al., 1990). FCT has also been shown to be effective across a wide range of populations including adults (Wacker et al., 1990) and children diagnosed with developmental disabilities (Durand & Carr, 1991), children with cerebral palsy (Durand, 1999), children with traumatic brain injury (Fyffeet al. 2004), typically developing children (Hanley, Heal, Tiger, & Ingvarsson, 2007), and children diagnosed with autism (Sigafoos & Meikle, 1996), among others.

When implementing FCT several variables should be considered. First, the function of the individual's aberrant behavior should be identified. This could be done through anecdotal assessments, descriptive assessments, or experimental functional analyses. After the function, or hypothesized function, of the aberrant behavior is determined, a functionally equivalent communicative response should be selected. Interventionists should consider response effort, the speed of response acquisition, and if the response taught will be recognized and reinforced in other environments (Tiger et al., 2008). When teaching the functional communicative response, the initial teaching location, the type of prompting system, how to fade prompts, and how to promote generalization should also be considered depending on the learner's skill level (Tiger et al., 2008). Finally, the interventionist should decide if the aberrant behavior in question will be put on extinction, if the aberrant behavior will be reinforced during teaching, or if punishment will be utilized (Tiger et al., 2008).

Chaining

Chaining is a procedure used to teach new responses by linking a sequence of discrete responses together to form a new behavior (Cooper et al., 2007). In a behavioral chain, each discrete response produces a stimulus change which then serves as a reinforcer for the response that produced it and serves as a discriminative stimulus for the next response in the chain (Cooper et al., 2007). Chaining procedures have been used to teach shoe tying for individuals with ASD (Rayner, 2011), a sequence of dance moves (Slocum & Tiger, 2011), janitorial skills for individuals with intellectual disabilities (Cuvo, Leaf, & Barakove, 1978), adding with a calculator and accessing a computer program (Werts, Caldwell, & Wolery, 1996), and swallowing liquids (Hagopian, Farrell, & Amari, 1996), among many others.

To teach a behavioral chain, a task analysis of the necessary steps in the chain must happen first. A task analysis involves breaking down a complex skill (e.g., shoe tying) into smaller units in sequential order (Cooper et al., 2007). In order to ensure the task analysis is correct and complete, the interventionist should validate the task analysis by observing the completion of the task by individuals who are fluent with the task, consulting experts, or performing the skill using the task analysis (Cooper et al., 2007; Sulzer-Azaroff & Mayer, 1977).

Teaching a behavioral chain is typically done through forward chaining or backward chaining. Forward chaining is when each response in the behavioral chain is taught sequentially. For example, if hand washing was taught through forward chaining, then the first step taught would be turning the faucet on, then putting hands under the water stream, pumping the soap on to hands, rubbing hands together, etc. until hand washing was completed. Backward chaining is when the instructor completes the initial responses in the behavioral chain except for the terminal response in the behavioral chain. Reinforcement is then delivered contingent upon the learner completing this final response. For example, if backward chaining were used to teach shoe tying, then the interventionist would complete all the responses in the chain except for the last step (i.e., pulling the bow tight). If the learner pulls the bow tight, then reinforcement would be delivered. The interventionist would then teach the learner the second to last step in the behavioral chain (i.e., pulling loop through). The learner would then be responsible for completing the last two steps in the behavioral chain. This process would be repeated until the learner is completing all the responses in the behavioral chain independently.

When using chaining procedures in a clinical setting, there are several variables to consider, for instance, the length of the behavioral chain and length of the discrete responses. Depending on the learner's skill level, longer chains with more complex individual responses may be too difficult for the learner to master (Sulzer-Azaroff & Mayer, 1977). Utilizing responses already in a learner's repertoire, or closer to the learner's repertoire, may lead to faster acquisition of a behavioral chain.

Conclusion

ABA has come a long way in the past 50 plus years. Our forefathers (e.g., B.F. Skinner, Donald Baer, Montrose Wolf, Todd Risley, James Sherman, Ivar Lovaas, Sid Bijou, Ted Ayllon, and Nate Azrin) and foremothers (e.g., Judith Leblanc, Barbara Etzel, Sandra Harris, Beth Sulzer-Azaroff, Rosalie Rayner, Mary Cover Jones) laid a strong foundation of methodology which can be used to develop desired behavior and decrease undesired behavior. Today the number of professionals going into the field of ABA continues to rise (Carr, Howard, & Martin, 2015), and the procedures based upon these principles are implemented in a wide variety of settings (e.g., home, school, clinic, university, residential, hospital, and community settings). Although many professionals in the field of ABA work with individuals diagnosed with ASD, ABA-based procedures are effective for a wide variety of populations. When the principles of ABA were first explored, they were being implemented with juvenile delinquents (Phillips et al., 1971), typically developing individuals (Hersen et al., 1973), and children with intellectual disabilities (Ayllon & Azrin, 1968).

There is no question that the field of ABA has made tremendous improvements in the lives of many individuals; however, there still remain areas in which the field may improve upon. For instance, with the growing need for well-trained behavior analysts, it is imperative that education and training is thorough, ongoing, and comprehensive (Ellis & Glenn, 1995; Shook, Ala'i-Rosales, & Glenn, 2002). As one can determine based on the content of this chapter, ABA and its applications are broad and require sophisticated repertoires. Dependent upon the behavior analyst's cliental, education and training should include the relevant procedures described throughout this chapter in addition to the principles of ABA, in-the-moment assessment, critical thinking, clinical judgment, and problem solving.

ABA is a broad field with broad applications. The procedures described in this chapter are simply an introduction to effective procedures in the field. These and many other procedures based upon the science of ABA continue to make socially significant gains in the lives of individuals around the world. There is no doubt that the field of ABA will continue to make meaningful contributions to society with a strong adherence to the core principles of the science and continued development of meaningful solutions to societal challenges.

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Cognitive Behavioral Therapy

Robert D. Friedberg and Micaela A. Thordarson

Contents

Introduction

Cognitive behavioral therapy (CBT) with youth is a well-recognized and widely adopted form of treatment. March (2009) argued that "psychiatry will move to a unified cognitive-behavioral intervention model that is housed within neuroscience medicine" (p. 174). CBT bridges the research practice gap well. One of its strengths is a practical theory which facilitates the translation of bench science to bedside clinical applications. The approach is action-oriented and is committed to a problem-solving stance.

This chapter offers an overview of CBT with youth. We begin with a discussion of the historical roots and theoretical underpinnings and, next, the empirical findings supporting CBT for depression, bipolar disorders, anxiety, obsessive-compulsive disorder, trauma, disruptive behavior disorder, and autism spectrum disorder. The elements, or golden nuggets of treatment, which are common to all forms of CBT are described in the third section.

Historical Roots and Theoretical Foundations

Contemporary CBT is rooted in learning theory and information processing models. Classical, operant, and social learning theory paradigms provide the conceptual foundations for intervention strategies. Classical and operant principles load heavily on the behavioral (B) part of the CBT equation. Historically, classical conditioning formed the basis for understanding the development and treatment of anxiety and enuresis in children (Benjamin et al., 2011). Bandura (1977b) referred to classical conditioning as learning by antecedent determinants to emphasize

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the crucial role of prediction in determining behavior. Simply, in classical conditioning, individuals learn which stimuli come to signal unconditioned responses. The basic notion states individuals learn that through repeated pairings with an inborn, pre-wired cue (unconditioned stimulus), a previously neutral stimulus (conditioned stimulus) comes to elicit a reflexive, vestigial response. Benjamin et al. (2011) credit classical conditioning with providing the basis for processes such as extinction and habituation as well as interventions such as counterconditioning and exposure.

Operant learning paradigms are often referred to as Skinnerian learning models or learning by consequent determinants (Bandura, 1977b). The four basic procedures (positive reinforcement, negative reinforcement, response cost, punishment) are familiar to most clinicians working with children. The operations explain how behavior is initiated, maintained, increased, and reduced through contingencies. These processes are fundamental to contingency contracting and most parent training/child management protocols.

Social learning theory also significantly shaped CBT with youth. Bandura's (1977a) notions of self-efficacy, reciprocal determinism, and observational learning are embedded within current practices (Benjamin et al., 2011; Dobson & Dozois, 2010; Scarpa & Lorenzi, 2013). Building young patients' self-efficacy is integral to good CBT. According to Bandura (1986), "perceived self-efficacy is defined as people's judgments of their capabilities, to organize and execute courses of action required to attain designated types of performance. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses" (p. 391). Self-efficacy theory (Bandura, 1977a) states that genuine confidence in one's coping capacity is most reliably determined by performance attainments. Essentially, this forms the basis for homework assignments and exposure treatment as well as many other CBT procedures.

Albert Ellis and Aaron Beck pioneered cognitive approaches with adults and profoundly shaped the application of the approach with youth. Ellis's rational emotive cognitive behavioral therapy (RECBT) and Beck's cognitive therapy (CT) both posit that behavioral and emotional difficulties are associated with faulty thinking. Describing RECBT, Gonzalez et al. (2004) explained that "at the core of faulty thinking are rigid and absolute beliefs (e.g., must, oughts) and their derivatives (e.g., awfulizing)" (p. 222). DiGuiseppe's (1989) work on self-instruction and Bernard and Joyce's (1984) seminal text paved the way for RECBT applications with youth.

Gonzalez et al. (2004) completed a meta-analysis evaluating RECBT's effectiveness. Their meta-analysis covered published studies from 1975 to 1998 and included 1021 children. Overall, they found the grand weighted Z was 0.50 across all the studies, reflecting that children treated with RECBT scored better than 69% of their cohorts on various outcome measures. More specifically, RECBT had its greatest impact on disruptive behavior disorders.

Aaron T. Beck stamped an indelible mark on CBT with youth. Most modern cognitive behavioral approaches are grounded in Beckian theory. In particular, Beck's formative notion that an individual's information processing system is hierarchically ordered consisting of cognitive processes, products, and structures is powerful (Beck & Clark, 1988; Ingram & Kendall, 1986). Cognitive distortions were a major advance and are recognized even by clinicians who are not CBT-inclined.

The content-specificity hypothesis (CSH) is certainly a less well-known component of Beckian CBT but nonetheless a clinically powerful one (Beck, 1976; Clark, Beck, & Alford, 1999; Jolly, 1993; Jolly & Dyckman, 1994; Jolly & Kramer, 1994). The CSH posits that unique cognitive content differentiates distinct emotional states. Simply, the same cognitions do not denote various feelings. Daily thought diaries and cognitive restructuring depend on a full appreciation of the CSH. The cognitions that typify several emotional states are listed in Table 1. Finally, many specific clinical procedures and processes with youth such as guided discovery, collaborative empiricism, session structure, and rational analyses are founded on Beck's work.

Phil Kendall's work catalyzed modern CBT with youth. Impulsivity was a prime target in Kendall and colleagues' initial work (Kendall & Braswell, 1985; Kendall & Finch, 1976; Kendall & Wilcox, 1980). In an early single-case study, Kendall and Finch (1976) reported that CBT resulted in improvement on measures assessing impulsivity in a 9-year-old boy. Further, in a group comparison study, Kendall and Finch (1978) found that CBT was associated with better performance on the Matching Familiar Figures Test and improved teacher ratings of impulsive behavior in the classroom.

Kendall is arguably most well-known for his cutting-edge Coping Cat protocol. The Coping Cat (Kendall, 2012; Kendall, Furr, & Podell, 2010; Kendall & Hedtke, 2006) is a widely used and empirically sound approach for treating anxious children. Coping Cat has been implemented and tested in the USA, Canada, Australia, and the Netherlands (Beidas, Podell, & Kendall, 2008). The treatment package effectively integrates skill acquisition and application through the FEAR rubric (feeling frightened, expecting bad things to happen, attitudes and actions that help, results and rewards). The protocol has been investigated through three major randomized clinical trials (RCT) (Kendall, 1994; Kendall et al., 1997; Kendall, Hudson, Gosch, Flannery-Schroeder, & Suveg, 2008) and obtained very strong results.

Table 1 Content-specificity hypothesis

Mood state	Specific cognitive content
Depression	Negative view of self
	Negative view of others/experiences
	Negative view of the future
Anxiety	Overestimation of the probability of danger
	Overestimation of the magnitude of the danger
	Neglect of rescue factors
	Ignoring coping resources
Anger	Hostile attributional bias
	Labeling others
	Sense of complete unfairness
	Violation of personal imperatives
Panic	Catastrophic misinterpretation of normal bodily sensations
Social anxiety	Fear of negative evaluation

Modular CBT (mCBT) represents a natural evolution in child psychotherapy (Chorpita & Weisz, 2009; Friedberg, McClure, & Garcia, 2009). mCBT is a transdiagnostic approach that distills and aggregates common powerful CBT interventions into meaningful units. The *Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or Conduct Problems* (MATCH-ADTC) includes 33 empirically supported procedures for treating children and adolescents. MATCH-ADTC is gaining both popular appeal and empirical support (Bearman & Weisz, 2015; Chorpita & Daleiden, 2009; Chorpita et al., 2011, 2015; Weisz & Chorpita, 2012; Weisz, Krumholz, Santucci, Thomassin, & Ng, 2015).

Decades of precise theory building provides CBT with a robust yet flexible conceptual platform. Pioneers such as Bandura, Skinner, Beck, Kendall, and Chorpita paved the way for the empirical study of underlying principles supporting the theory. The theoretical foundations remain a reliable platform from which to launch multiple clinical interventions.

Empirical Findings

Foundational CBT research heavily investigated the efficacy and effectiveness of the model. It was critical to determine whether CBT could successfully address the psychological needs of young patients. As protocols were tested, results were replicated: CBT works. At this point, CBT is shown to be a broadly effective treatment for children and adolescents with psychological disorders.

Mood Disorders

Depression CBT is a well-established treatment for depressive disorders in youth (David-Ferdon & Kaslow, 2008; Weersing, Jeffreys, Do, Schwartz, & Bolano, 2016). CBT reduced the intensity and severity of depressive symptoms as well as improved overall functioning (Weersing et al., 2016; Weisz, McCarty, & Valeri, 2006). Young patients treated with CBT also used less medication and sought fewer outpatient visits with their pediatricians (Clarke et al., 2005; March & Vitiello, 2009). CBT decreased suicidal ideation in a time-effective manner (Weersing et al., 2016). Neither age, gender, nor ethnicity influenced the effectiveness of CBT for young patients (Weisz et al., 2006). Treatment was equally successful when delivered in either individual or group format (David-Ferdon & Kaslow, 2008). Recent effectiveness studies showed that CBT continued to perform well in school and community settings (David-Ferdon & Kaslow, 2008; Eiraldi et al., 2016; Weersing et al., 2016). CBT's performance across a variety of contexts and conditions underscores its empirical strength.

Most often, CBT is compared to or combined with antidepressant medications in studies of youth depression. The Treatment for Adolescent Depression Study (TADS; TADS Team, 2004), a major, multisite trial, randomly assigned 439 adolescents ages 12–17 to be treated with sertraline, a 12-week course of CBT, a combination (medication and CBT), or a pill placebo. Data collected posttreatment initially suggested that depression was best treated by either medication alone or a combination of medication and CBT. However, by week 18 (6 weeks after the conclusion of therapy), patients in the CBT group demonstrated improvement in depressive symptoms equal to those in the medication conditions. Indeed, CBT patients showed steady gains up to 36 weeks after the conclusion of care (TADS Team, 2009). Although initially seeming to demonstrate the superiority of medication, TADS revealed the power of CBT to effectively and enduringly treat depression in adolescents.

The Treatment of Resistant Depression in Adolescents (TORDIA; Brent et al., 2008) project, another major clinical study, sought to evaluate the added benefit of including CBT in treatment after adolescents failed to respond to a 2-month trial of an SSRI. Of the 334 adolescents between the ages of 12 and 18, some were assigned to one of two medication-only groups, and others were assigned to a new medication plus CBT condition. Regardless of the medication used, the addition of CBT produced enhanced functioning and greater decreases in depressive symptomology (Brent et al., 2008). CBT clearly addresses the impairments and deficits observed in depression more effectively than medication alone.

Although comparable in cost and acute outcome in many trials (Domino et al., 2009), CBT is still considered the best option to treat mild to moderate depression (Melvin et al., 2006) and an essential addition for the treatment of severe depression (March & Vitiello, 2009). Medications may at times demonstrate a reduction in depressive symptoms faster than CBT (TADS Team, 2004). However, antidepressants reach the upper limit of effectiveness in a relatively short period of time (12–18 weeks), and gains are not often sustained after the completion of treatment (i.e., discontinuation of use) (TADS Team, 2009). Benefits observed from a completed trial of CBT are maintained for a year or more after the completion of treatment (Weisz et al., 2006; Weersing et al., 2016). Vitiello et al. (2009) determined CBT was an influential component of treatment for adolescents who recently attempted suicide. Kennard et al. (2008) studied whether treatment with CBT after successful response to an antidepressant served to protect against relapse. Youth who received CBT were eight times less likely to experience a return of clinically significant symptoms of depression. Furthermore, youth treated with CBT show continued improvement beyond the completion of therapy (TADS Team, 2009).

Bipolar Disorder

Although experienced at significantly lower incidence than unipolar depression, bipolar disorders create debilitating impairments in functioning and yield significantly poorer prognosis (Pavuluri, Naylor, & Janicak, 2002). As such, effective treatments are desperately sought by families of children diagnosed with bipolar disorders. CBT packages adapted to specifically address family variables are shown to produce meaningful outcomes for youth diagnosed with bipolar disorder.

Research demonstrates substantial decreases in symptoms of mania, depression, aggression, ADHD, and psychosis, as well as improvements in sleep disturbance, global functioning, parenting skills, and family flexibility for youth treated with CBT (MacPherson, Weinstein, Henry, & West, 2016; Pavuluri et al., 2004; Pavuluri, Birmaher, & Naylor, 2005). CBT for bipolar disorders addresses symptoms, deficits, and family functioning to give young patients the tools they need to alter the trajectories of their lives.

Anxiety Disorders

CBT stands as the most steadfastly well-established treatment for youth with anxiety disorders (Higa-McMillan, Francis, Rith-Najarian, & Chorpita, 2016; Seligman & Ollendick, 2011). Age, gender, symptom severity, and ethnicity do not moderate treatment outcomes (Kendall & Peterman, 2015; Walkup et al., 2008). CBT for child anxiety disorders reduces symptom severity, improves global functioning, enhances social functioning, and reduces sleep-related problem behaviors (Higa-McMillan et al., 2016; Pereira et al., 2016; Peterman et al., 2016; Walkup et al., 2008). CBT is an equally effective intervention when delivered in group, individual, and family formats (Bennett et al., 2016; Kendall & Peterman, 2015).

Effect sizes range from 0.99 to 1.31 by some estimates (Scaini, Belotti, Ogliari, & Battaglia, 2016). Bennett et al. (2016) completed an overview of systematic reviews and reported odds ratios ranging from 3.27 to 7.85 in favor of CBT when compared with passive controls. In other words, children who participated in CBT conditions were three to seven times more likely to show significant reduction in anxiety symptoms after treatment.

The Child/Adolescent Anxiety Multimodal Treatment Study (CAMS; Kendall et al., 2016; Walkup et al., 2008) was a massive multisite RCT studying the treatment of childhood anxiety that used Coping Cat in the CBT conditions. Walkup and colleagues randomly assigned 488 youth ages 7–17 to either CBT, sertraline, combination treatment, or pill placebo conditions. At posttreatment, the combination condition outperformed either monotherapy with respect to symptom reduction or diagnostic remission. Both sertraline and CBT alone surpassed placebo in effectiveness. No adverse events related to suicide occurred; however, there were a number of reported undesirable side effects for sertraline (e.g., fatigue, insomnia, restlessness, and sedation; Walkup et al., 2008). The CAMS arbitrarily shortened treatment from 16 to 14 sessions to better fit the study. Furthermore, "posttreatment" measures were completed at week 12, neglecting the final two sessions for CBT conditions. No follow-up data was provided. Given the results of parallel trials for youth depression, it is reasonable to conclude that information collected in the months that followed treatment would reveal superior long-term outcomes for CBT when compared with pharmacological interventions. Despite methodological flaws, CAMS continues to serve as definitive support of CBT as an effective treatment of childhood anxiety.

The FRIENDS program (Shortt, Barrett, & Fox, 2001) was designed as a 10-week family CBT program based on Coping Cat and modified in response to parent and child feedback. One-session treatment (OST) (Ollendick et al., 2015; Ost, 1997) addresses specific phobias in a single prolonged-exposure session. Social effectiveness training (SET-C; Beidel, Turner, & Morris, 2000) is an intensive program for youth with social phobia that combines group and individual sessions with a heavy emphasis on exposures and skill generalization.

Brief cognitive behavioral therapy (BCBT) is a natural extension of the Coping Cat approach (Beidas, Mychailyszyn, Podell, & Kendall, 2013). BCBT shortens the 16-session Coping Cat protocol to eight sessions and distills the approach down to the essential elements (psychoeducation, problem-solving, cognitive restructuring, exposure). According to Beidas et al., "BCBT was developed primarily in response to a need for treatments whose dissemination and implementation are more feasible in the community given existing barriers to care" (p. 34). BCBT steps both parents and children through the well-established FEAR (feeling frightened, expecting bad things to happen, attitudes and actions that help, results and reward) plan. In their single-case study report, Beidas and colleagues documented significant reductions in all clinical indices. In an open pilot study evaluating initial outcomes and feasibility with 26 children ages 6–13 years, the results showed very favorable outcomes (Crawley et al., 2013). BCBT was seen as feasible, acceptable, and beneficial to vulnerable youth.

Obsessive-Compulsive Disorder

CBT is widely recognized as *the* effective psychosocial treatment for obsessive-compulsive disorder (OCD) in youth. In meta-analyses, the only studies included in the review are those that involve CBT and medication singly or in combination (Barrett, Farrell, Pina, Peris, & Piacentini, 2008; Ost, Riise, Wergeland, & Hansen, 2016; Wu, Lang & Zhang, 2016). Although many protocols include 12–16 sessions, one study reported that 38.3% of patients were considered responders and 13.7% had already achieved remission at the midpoint of a 14-week program (Torp & Skarphedinsson, 2017). Age, gender, and medication use prior to initiation of CBT did not moderate outcomes (Piacentini, Bergman, Jacobs, McCracken, & Kretchman, 2002). Research indicates 40–85% remission rates (Barrett et al., 2008) and marked reductions in symptoms in the US and international samples (Wu et al., 2016). Treatment gains appeared durable, persisting 15 months or more (Barrett et al., 2008). Two major clinical trials investigated comparative efficacy of CBT and medication to treat OCD in young patients.

The Pediatric OCD Treatment Study (POTS; POTS Team, 2004) randomized 112 youth ages 7–17 to 12 weeks of medication management, CBT, combination, or placebo. In the posttreatment evaluations, the combination condition demonstrated the greatest response, while CBT and medication alone were equivalent and both better at reducing symptoms than placebo. However, combination and CBT alone conditions produced equal numbers of patients in remission after 12 weeks.

POTS II was conducted to extend the findings of the first study (Freeman et al., 2009). Youth ages 7–17 who failed a medication trial were assigned to an augmented medication trial, medication management plus basic instruction in CBT strategies, or medication management plus a complete CBT package (Freeman et al., 2009). The majority of patients (68.6%) who received a complete course of CBT were considered responders to treatment, more than double the response rate of medication alone or medication with the addition of CBT strategies (30% and 34%, respectively; Franklin et al., 2011). Youth who receive CBT drop out of treatment much less often than those who were treated with medication only (Ost et al., 2016). Combination treatment does not consistently demonstrate any benefit beyond that accomplished by CBT alone (Ost et al., 2016).

Posttraumatic Stress Disorder

Similar to OCD, CBT is the single most effective treatment for children who experience posttraumatic stress disorder (PTSD). Dorsey et al. (2016) reviewed 37 published studies of treatment of PTSD in youth and concluded CBT is the only well-established treatment for this population. Across CBT protocols to treat PTSD, there are four common elements: psychoeducation, relaxation and emotion regulation skills, exposure, and cognitive restructuring (Dorsey, Briggs, & Woods, 2011). Two branded CBT packages (Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) and Cognitive-Behavioral Intervention for Trauma in Schools (CBITS)) boast extensive efficacy and effectiveness. Trauma-Focused CBT (TF-CBT; Cohen, Deblinger, Mannarino, & Steer, 2004) is a 12-week individual intervention that includes parents; and Cognitive-Behavioral Intervention for Trauma in Schools (CBITS; Stein et al., 2003) is a 10-week group intervention designed for delivery in the school setting.

TF-CBT was originally developed and tested on children with PTSD who suffered sexual abuse (Cohen et al., 2004). Over time, TF-CBT has been tested with youth who experienced sexual and physical abuse, neighborhood violence, assault, and natural disaster (Cohen et al., 2004; Dorsey et al., 2016). TF-CBT reduced symptoms of PTSD and comorbid depression in both children and participating parents/caregivers (Neill, Weems, & Scheeringa, 2016; Nixon, Sterk, & Pearce, 2012). TF-CBT also created clinically significant reductions in behavioral problems, overall anxiety levels, and feelings of shame as well as improvements in functioning (Cohen et al., 2004; Cohen, Mannarino, Kliethermes, & Murray, 2012; Dorsey et al., 2014). Studies investigating the effectiveness of TF-CBT typically include youth who are ethnically and racially diverse, who are in single-parent households or in foster care placements, and whose families earn below the federal poverty income level (Dorsey et al., 2016; Scheeringa, Weems, Cohen, Amaya-Jackson, & Guthrie, 2011). Age, gender, ethnicity, and severity of symptoms did not impact success of treatment (Dorsey et al., 2016). Youth in foster homes who completed TF-CBT were less likely to run away and experienced fewer changes in placement over time (Cohen et al., 2012). The addition of medication to therapy provides no further emotional or behavioral benefit (Cohen, Mannarino, Perel, & Staron, 2007). TF-CBT plainly generalizes across a wide-ranging group of youth; thus, future efforts must attend to dissemination of services and eliminating barriers to care.

CBITS demonstrates comparable results albeit with fewer studies. Stein et al. (2003) enrolled 126 sixth-grade students from local public school in their initial CBITS trial. At the completion of the program, students displayed fewer symptoms of PTSD and depression and lower levels of impairment (Stein et al., 2003). Youth who participated in CBITS also demonstrated higher academic achievement by the end of the year (Kataoka et al., 2011). CBITS also successfully treated symptoms of PTSD and depression in a school on a rural Native American reservation (Morsette et al., 2009). Jaycox et al. (2010) capitalized on the ease of accessing services in the school-based model and provided treatment to students affected by a major natural disaster (Hurricane Katrina). Children were treated with either CBITS or TF-CBT; the outcomes following therapy were equivalent, illustrating the comparable relative effectiveness of the protocols (Jaycox et al., 2010). In conclusion, CBT is a powerful tool to mollify symptoms and deficits associated with PTSD in children.

Disruptive Behavior Disorders

In a review of 86 studies of psychosocial treatments of disruptive behavior disorders (DBD), McCart and Sheidow (2016) identified the well-established and probably efficacious models CBT spectrum approaches. CBT protocols for DBD reduce substance use, caregiver report of externalizing behaviors, difficulties completing homework, aggression, and impulsive behaviors (Boyer et al., 2016; Eyberg, Nelson, & Boggs, 2008; Froelich, Doepfner, & Lemkuhl, 2002 Hogue et al., 2015). The most rigorously studied treatments involve youth who are incarcerated, on probation, and/or displaying severe degrees of antisocial behaviors (McCart & Sheidow, 2016). Typically, CBT is conducted in individual, group, or family formats (Eiraldi et al., 2016; Henggeler et al., 2009; Hogue et al., 2015; Shin, 2009).

Lochman and Wells (2002, 2003) developed the 12-week CBT Coping Power group program (CPP) to be delivered in schools to youth displaying DBD symptoms. In the pilot study, younger students (fourth grade) were identified early by teachers as high risk for developing a DBD due to higher levels of observed aggression and impulsivity. Students then participated in CPP the following year. Students who participated in the program exhibited lower levels of aggression, substance use, and hostile attributions (Lochman & Wells, 2002, 2003). Participants also showed higher social functioning and improved problem-solving skills. Gains were maintained at 1-year follow-up (Lochman & Wells, 2003). Eiraldi et al. (2016) delivered CPP to youth with a primary diagnosis of DBD in urban school for students between the kindergarten and eighth grade levels. Over half (59%) of the group members displayed significant reductions in problem behaviors; both symptoms of oppositional defiant disorder and ADHD were addressed by CBT. CBT adequately addresses the symptoms of DBD and proves able to divert youth from a risky trajectory.

Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that is characterized by impairments in social functioning, communication, emotion regulation, dysregulated behaviors, sensory sensitivity, and rigidity (American Psychiatric Association, 2013). ASD is also often accompanied by comorbid conditions, the most common of which is anxiety (Joshi et al., 2010). Accordingly the bulk of studies apply CBT to comorbid ASD and anxiety disorders. White et al. (2010) created a CBT program that emphasizes acquisition of social skills while simultaneously addressing symptoms of anxiety. The treatment package included a combination of individual and group therapy. Outcome data indicated a clinically significant reduction in the symptoms of anxiety as well as improvements in social and overall functioning (White et al., 2010, 2013). Parents reported they particularly liked homework assignments and being included in treatment (White et al., 2010). Sofronoff, Attwood, and Hinton (2005) reported that parents of children with ASD and anxiety observed increased friendships, higher confidence, and improved emotional regulation skills in their children after treatment with CBT.

CBT is also used to treat sensory sensitivity often seen in youth with ASD. Edgington, Hill, and Pellicano (2016) noted that after treatment with school-based CBT, youth with ASD were able to apply their coping skills to reduce distress in response to sensory input. Moreover, the learning generalized to contexts other than school settings. Children who participated in treatment reported they liked learning more about how to communicate when sensory input was distressing them (Edgington et al., 2016).

In conclusion, CBT effectively treats deficits associated with ASD, conditions that co-occur with ASD, and does not require excessive substantial modification. Wolters, de Haan, Hogendoorn, Boer, and Prins (2016) stated that little to no special adaptation to conventional CBT is needed to treat comorbid conditions accompanying ASD. Moreover, they concluded that symptom severity does not moderate treatment effectiveness.

CBT with Youth: The Golden Nuggets

There are several core elements, or golden nuggets, which characterize CBT with young patients (Chorpita & Weisz, 2009; Friedberg & Brelsford, 2011; Nangle et al., 2016; Scarpa & Lorenzi, 2013). The essentials include emphasis on measurement-based care, adhering to session structure, adopting a therapeutic stance, as well as deploying psychoeducation, cognitive, and behavioral interventions.

Measurement-Based Care

Scott and Lewis (2015) parsimoniously described measurement-based care as the steady, routine tracking of treatment process, progress, and outcome using reliable and valid measures. “Let the data be your guide” is a familiar CBT aphorism. Collecting and using data to inform case conceptualization, collaborative clinical decision-making, and treatment planning is a long-standing tradition.

Numerous authors claim MBC offers multiple advantages to clinicians and patients (Bickman, 2008; Chorpita et al., 2011; Chorpita, Bernstein, & Daleiden, 2008; Chorpita & Daleiden, 2014; Chorpita, Daleiden, & Bernstein, 2016; Gondek, Edbrooke-Childs, Fink, Deighton, & Wolpert, 2016; Jensen-Doss, 2015; McLeod, Jensen-Doss & Ollendick, 2013). Overall, MBC shows favorable results in promoting treatment effectiveness, efficiency, and collaborative involvement in therapy (Gondek et al., 2016).

MBC typically involves collecting data on functional improvements, reductions in symptom scores, and patient satisfaction ratings (Scott & Lewis, 2015). Functional outcome metrics are generally seen as the most persuasive type of data (Chorpita, 2014). Functional indicators include outcomes such as reductions in medication dosages, visits to school nurses, hospitalizations, incarcerations, and school suspensions. Tracking outcomes via symptom scores is relatively a commonplace in clinical practice. Beidas et al. (2015) provided comprehensive, low-cost, and psychometrically sound methods for charting progress. Patient satisfaction ratings round out choices for practitioners applying MBC. Most practitioners elect to use some combination of functional improvement, symptom, and patient satisfaction instruments. These measures are regularly administered at intervals (1 week, 2 weeks, monthly, etc.) collaboratively defined by clinicians and patients. Generally, the acuity and severity determine how frequently these indices are readministered.

Session Structure

There is a long-standing emphasis on applying a characteristic session structure in CBT (Beck, 2011; Beck, Rush, Shaw,& Emery, 1979). CBT sessions include components such as mood check-ins, homework review, agenda setting, processing session content, homework assignment, and eliciting feedback.

Mood check-ins can be conducted formally and/or informally. Formal mood check-ins may involve patients completing a short symptom checklist such as the Beck Depression Inventory (BDI-2; Beck, 1996) or Children's Depression Inventory-2 (CDI-2; Kovacs, 2010). Mood check-ins could also be accomplished simply by asking the patients how they are feeling. Homework review addresses patients' completion of self-help tasks between sessions or patients' non-compliance with tasks. Agenda setting is a collaborative process where items of concern to both the patient, family, and therapist are listed, and time is allocated to discussing the identified topics. After agendas are established, session content is therapeutically processed with an eye toward balancing content, structure, and process. Homework is assigned based on session content. Finally, the patients' perception of the treatment process and the particular clinician is elicited.

Therapeutic Style and Stance

There are three central therapeutic processes that flow through the course of CBT. These cornerstones include collaborative empiricism, guided discovery, and practicing flexibility within fidelity. The three clinical postures oxygenate CBT's lifeblood.

Collaborative empiricism (CE) (Beck et al., 1979) explicitly addresses therapeutic relationship issues in CBT with youth. CE involves forming partnerships between children, families, and clinicians. The empiricism part of the CE equation refers to the data-driven nature of treatment. CBT is tied to its phenomenological moorings and relies on measures that monitor treatment progress. Clinical improvement is regularly assessed, and feedback on therapeutic headway is provided to patients. As Kendall et al. (1992) cogently explained, CBT uses an empirical approach to evaluate the accuracy of beliefs. Patients and therapists become thought detectives sorting through clues to evaluate patients' assumptions. Guided discovery is the process built by therapists and patients to collect and consider data. Socratic dialogues and behavioral experiments are employed to cast doubt on children's beliefs rather than absolutely refuting or disputing them (Padesky, 1993).

Flexibility within fidelity is a clear guiding principle in CBT with youth (Kendall & Beidas, 2008; Kendall, Gosch, Furr, & Sood, 2008). Simply, good CBT balances solid footing in social learning theory and CBT-based clinical practices with creativity. Innovative applications of traditional methods must be grounded in a coherent conceptual model informed by learning theory in order to avoid going rogue. Indeed, conceptualization is seen as the nucleus of CBT with youth (Friedberg, 2015). Clinicians who practice flexibility within fidelity clearly focus on cognitive and behavioral mechanisms of change. Finally, Kendall and colleagues (Kendall & Beidas, 2008; Kendall et al., 2008) asserted a focus on action-oriented treatment, and experiential application of techniques tether flexibility to a faithful adherence to CBT tenets.

Psychoeducation

Psychoeducation involves teaching patients and their caregivers about symptoms, treatment alternatives, and course of treatment (Ong & Caron, 2008). In their review, Nangle et al. (2016) noted that psychoeducation empowers patients, instills hope, enlists collaboration, normalizes distress, and fosters engagement in treatment. Piacentini and Bergman (2001) asserted that psychoeducation should be accessible and understandable to patients and their families. Friedberg et al. (2009) wrote, "the patient's task includes reading and personalizing information rather than simply adopting it" (p. 56).

Psychoeducation is not a one-shot intervention. Rather, it should be part of ongoing treatment. There are multiple ways to deliver psychoeducational material including pamphlets, books, websites, DVDs, games, TV shows, movies, music, and other media. The various distribution options enable flexibility and responsiveness to individuals' particular contexts (e.g., age, gender, ethnicity, language, reading ability). Friedberg and colleagues (Friedberg et al., 2009; Friedberg, Gorman, Wilt, Biuckians, & Murray, 2011) offer practitioners a plethora of psychoeducational resources to use with young patients and their families.

Cognitive Interventions

A variety of cognitive interventions distinguish a CBT approach. Problem-solving, self-instruction, as well as rational analysis techniques such as tests of evidence, decatastrophizing, and reattributional methods all play a role in the treatment regime. These methods vary in complexity and their demand for in-depth rational analysis.

Problem-Solving According to the seminal paper by D'Zurilla and Goldfried (1971), "problem solving may be defined as a behavioral process, whether overt or cognitive in nature, which (a) makes available a variety of potentially effective response alternatives for dealing with the problematic situation and (b) increases the probability of selecting the most effective response from among these various alternatives" (p. 108). Problem-solving methods are listed in the ten most frequently used procedures in clinical practice with youth (Chorpita & Daleiden, 2009). In general, problem-solving approaches aim to increase young people's alternatives and choices. Crawley, Podell, Beidas, Braswell, and Kendall (2010) stated that teaching children to "solve problems allows the children to gain confidence in their ability to resolve daily struggles that once may have seemed hopeless" (p. 379).

While there are a variety of problem-solving rubrics, they all share basic properties (Chorpita & Weisz, 2009). The core components include clearly defining the problem, brainstorming possible solutions, identifying the long-term positive and negative consequences, choosing the best alternative, and evaluating the outcome of the new strategy. Many problem-solving interventions also include self-reward components for successfully implementing the process.

Self-Instruction Self-instruction earned its empirical stripes with impulsive youth (Meichenbaum & Goodman, 1971). Meichenbaum and Goodman found that self-instruction was effective in changing impulsive children's behavior as measured by psychometrics such as performance IQ, cognitive impulsivity, and motor activity. More specifically, the impulsive youth employed self-instruction to orient, organize, regulate, and self-reward their behavior.

Self-instruction is a relatively straightforward method used to change young patients' habitual internal dialogues. Self-instruction works to replace or exchange inaccurate dysfunctional thoughts with counter-thoughts that propel more adaptive functioning (Meichenbaum, 1985). Effective self-instruction provides young patients with a medium for translating distressing internal instant messages into hopeful and adaptive mental dispatches. Friedberg and McClure (2015) offered several guidelines for self-instructional interventions with children and adolescents. First, self-instruction should be action-oriented, and children's attention is directed toward behaving in a more productive fashion. Essentially, proper self-instruction involves making a "calming yet strategic statement" (Friedberg & McClure, 2015; p. 160). Additionally, self-instruction balances acceptance of distress with plans for coping. Finally, self-instruction includes a self-reward component.

Rational Analysis Rational analysis procedures are based on the Socratic method**.** Socratic methods are rooted in the vestigial philosophies of Socrates who argued that self-discovery is an elemental human endeavor (Overholser, 2010). The goal of the Socratic method is for young patients to come to their own conclusions. McLachlan, Eastwood, and Friedberg (2016) wrote that "Socratic questions facilitate children's appreciation of hidden possibilities" (p. 106). Tests of evidence, reattribution, and decatastrophizing are three major categories of rational analysis.

Tests of evidence (TOE) are staples in CBT with youth. Logical analysis is front and center in these procedures. When completing a TOE, patients and therapists look for facts supporting the belief and facts disconfirming the belief and form conclusions based on mindful deliberations regarding the confirming and contradictory evidence.

While TOE focuses on facts, reattribution centers on the explanations for facts. Reattributional methods emphasize there are always multiple explanations for events. Inaccurately jumping to conclusions, overestimation of personal responsibility for negative events, and absolutistic thinking are mitigated by this procedure. Similar to TOE, there are Socratic steps in reattribution. First, alternate explanations are built (e.g., "what's another way of looking at this?"). Next, the believability or plausibility of the new explanations is assessed. Finally, young patients derive a new conclusion. Consequently, the procedure fosters flexibility in thinking and consideration of multiple alternatives.

Decatastrophizing targets children's overestimation of the magnitude and probability of various perceived dangers (Kendall et al., 1992). Decatastrophizing is generally accomplished via a series of Socratic questions including "What's the worst that could happen?", 'What's the best that could happen?", and "What is the most likely thing to happen?" (Beck, 2011). Friedberg and McClure (2015) recommended adding a problem-solving component to the procedure.

Rational analysis procedures are complex interventions and are difficult for the novice to learn quickly. However, there are many useful workbooks/texts that break down this challenging procedure into simple steps. The rational analysis interventions can be made more accessible to patients and clinicians through scaffolding exercises. Various workbooks break rational analysis into understandable steps for youth (Friedberg, Friedberg, & Friedberg, 2001; Kendall & Hedtke, 2006; Stallard, 2002).

Behavioral Interventions

Relaxation Relaxation training is a very common cognitive behavioral technique. The procedures and its variations are listed as the second most regularly used method for treating anxiety and the ninth most customarily employed procedure for depression (Chorpita & Daleiden, 2009). In fact, relaxation is part of the many empirically supported protocols for treating a variety of disorders (Nangle et al., 2016). Nangle et al. asserted that "relaxation training involves teaching effective ways to reduce physiological arousal related to tension and stress, thereby helping clients achieve this freedom" (p. 114). Relaxation procedures can be relatively simple involving controlled diaphragmatic breathing or more complicated including muscle tensing/relaxing cycles and images (Masters, Burish, Hollon, & Rimm, 1987). Additionally, Masters et al. explained that relaxation can be implemented singly or in combination with other techniques. Regardless, the goal for relaxation is providing young patients with a greater sense of self-efficacy and self-control.

Contingency Contracting Tolin (2016) parsimoniously defined contingencies "as the context in which a behavior occurs" (p.26). Antecedents to and consequences of the behavior are essential components. Positive reinforcement, negative reinforcement, response cost, and punishment represent contingencies. Accordingly, contingency management techniques are based on operant conditioning principles and reflect explicit agreements between caregivers and children that are designed to increase desirable behaviors (Wells & Forehand, 1981). These interventions specifically spell out desired behaviors, their consequences, and the contexts in which these actions are expected to take place. Caregivers (e.g., teachers, parents) are taught to give clear, specific requests, reinforce compliance, and apply response cost procedures to noncompliant actions. Verbal praise, tangible rewards, time-out, removing rewards and privileges, and ignoring are prototypical procedures.

Pleasant Event Scheduling/Behavioral Activation Behavioral activation and pleasant activity scheduling are often used interchangeably. Both work to increase young patients' opportunities for positive reinforcement and decrease avoidance (Dimidjian, Barrera, Martell, Munoz, & Lewinsohn, 2011; McCauley, Schlordedt, Gudmudsen, Martell, & Dimidian, 2011; Mendlowitz, 2014). Activity scheduling, problem-solving, and social skill training are often included in behavioral activation (Kanter, Rusch, Busch, & Sedivy, 2009). Clinicians work with young patients to collaboratively identify sources of positive reinforcement that are currently lost or avoided. Then, they develop a plan for patients to re-engage in these pleasant activities. When obstacles emerge, patients apply problem-solving skills to address these barriers. If social deficits prevent engagement in pleasant activities, social skills training is applied to these areas.

Social Skills Training Matson, Matson, and Rivet (2007) defined social skills as "interpersonal responses with specific operational definitions that allow the child to adapt to the environment through verbal and non-verbal communication" (p. 685). Social skills training (SST) is an ubiquitous group of interventions applicable to depression, anxiety, and autism spectrum and disruptive behavior disorders. Krumholz, Ugueto, Santucci, and Weisz (2014) explained that "SST typically addresses interpersonal engagement, building and maintaining friendships, communication and negotiation, assertiveness, and dealing with bullying" (p. 260). In order to accomplish these goals, a multicomponent treatment package is indicated including behavioral skill training, social perception instruction, teaching social problem-solving skills and self-regulation, as well as contingency management (Spence, 2003).

SST includes modeling, role-playing, providing positive and constructive feedback, problem-solving obstacles, and assigning homework (Nangle et al. 2016). Laugeson and colleagues (Laugeson & Frankel, 2011; Laugeson, Frankel, Gantman, Dillon, & Mogil, 2012) recommended that SST protocols fit instruction to individual circumstances and include homework assignments. Additionally, they emphasized that the skills must be ecologically valid so that strategies match what youth who are successful in negotiating interpersonal situations do in similar contexts.

Experiments/Exposures Behavioral experiments and exposures are experiential learning opportunities in CBT (Kendall, Robin, Hedtke, Suveg, Flannery-Schroeder, & Gosch, 2006). Friedberg (2015) stated, "During exposures and experiments, patients face down what they have previously avoided owing to their anxiety, shame, depression, age or any other distressing emotion" (p. 530). Behavioral experiments and exposures change emotional reactions, behavioral tendencies, problem-solving strategies, and obdurate beliefs (Rouf, Fennell, Westbrook, Cooper, & Bennett-Levy, 2004). Genuine self-efficacy is nurtured through these performance attainments because children obtain real-time disconfirming

Table 2 Sample creative exposures and the problems they target

Creative exposure	Target problem
Operation game (Peterman et al. 2015)	Intolerance for uncertainty, distress tolerance
Pop up monkeys (Friedberg et al. 2009)	Intolerance for frustration, overvalued sense of control
Easter egg hunt (Peterman et al. 2015)	OCD
Improvisational theater games (Friedberg et al. 2009)	Social anxiety, tolerance for uncertainty
Sharing the Persian flaw (Friedberg et al. 2009)	Perfectionism

evidence regarding their predictions and assumptions (Bandura, 1977a). These methods place less emphasis on verbally mediated intervention and rely heavily on action.

The core procedures in exposures include creating a hierarchy, collaboratively implementing the exposure in a stepwise manner, and processing/debriefing the experience (Nangle et al., 2016). Most experiments and exposures are titrated from the least to most distressing. Behavioral hierarchies are collaboratively created, and children work their way up the rungs of the ladder in a stepwise fashion. There are many creative ways to design and implement exposures (Friedberg et al., 2009; Kendall, Robin, Suveg, Flannery-Schroeder, & Gosch, 2006; Peterman, Read, Wei, & Kendall, 2015). Table 2 lists several creative experiments/exposures and the targeted problems.

Conclusion

> *From a small seed, a mighty trunk will grow.*
> Aeschuylus

Aeschylus's words describe the evolution of CBT. CBT began as a small seed and now provides a mighty trunk that supports clinical applications with emotionally distressed youth in a variety of settings. Theory-building, empirical findings, and effective intervention packages combine to make CBT a first-rate treatment approach.

Pioneers such as Skinner, Bandura, Beck, Ellis, Kendall, and Chorpita have forged new trails. However, the work is not finished. CBT is continuing to evolve from these initial paths to construct vehicles carrying innovative treatments to young patients and their providers in various contexts. Integrating CBT into primary care, developing technology-assisted procedures, and discovering cost-effective ways to deliver these interventions represent exciting new frontiers.

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Parent Training Interventions

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Contents

Over the past several decades parent training has become an increasingly popular intervention to address children's behavior problems. While the broader dissemination of these programs is relatively new, the origin of evidence-based parent training interventions dates back to the 1960s (Kotchick, Shaffer, Dorsey, & Forehand, 2004). At that time, a paradigm shift was starting to occur in regard to the delivery of child therapy services. Rather than therapists only working directly with the child, there was growing interest in therapists training parents in the use of specific behavioral strategies that they could, in turn, use to change their child's behavior. That shift was based, in large part, on early findings regarding the effectiveness of behavior modification techniques in changing child behavior (e.g., Williams, 1959) and, subsequently, evidence that parents could be taught to use such techniques effectively with their own children (Hawkins, Peterson, Schweid, & Bijou, 1966; Wahler, Winkel, Peterson, & Morrison, 1965). This trend led to the development of various parent training interventions that utilized the triadic model (Tharp & Wetzel, 1969) in the delivery of services. This model involves the use of a therapist (consultant) to teach the parent (mediator) to reduce a child's (target) disruptive behavior (McMahon & Forehand, 2003).

Historically, the primary focus of most parent training interventions has been to reduce children's disruptive behavior. This focus was

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initially influenced heavily by Patterson (1982) and his research regarding the role of coercive parent-child interactions in the development and escalation of children's disruptive behavior. Patterson's model of reciprocal influences helped explain how children's disruptive behavior can escalate while parent management tactics become more punitive and coercive (e.g., nagging, yelling). Ineffective parenting, especially in regard to child compliance to parental directions during the preschool years, was considered a primary catalyst for the development of these coercive parent-child interactions (McMahon & Wells, 1998). The identification of specific aspects of parent-child interactions that were related to the development and escalation of children's disruptive behavior (e.g., reinforcing disruptive behavior, the use of ineffective parental directions, and the failure to adequately reinforce appropriate behavior) allowed these specific behaviors to be targeted by behavioral parenting training interventions.

In addition to the contributions of Gerald Patterson, Constance Hanf (Reitman & McMahon, 2013) also had a profound impact on the early development of behavioral parent training programs. She developed an innovative, two-stage parent training model in the late 1960s (Hanf & King, 1973) that targeted young children's disruptive behavior and included extensive modeling, role-playing, and parental practice of skills with therapist feedback. The primary skills taught to parents in her program included attending, rewarding, ignoring, giving clear instructions, and time-out. Several of Hanf's former trainees and colleagues made different modifications to her program and have spent the past 40+ years studying their own "Hanf-Model" programs. These programs have become some of best known and validated behavioral parent training programs in use today. The "Hanf-Model" parent training programs include Sheila Eyberg's *Parent-Child Interaction Therapy* (PCIT), Rex Forehand and Robert McMahon's *Helping the Noncompliant Child* (HNC), Carolyn Webster-Stratton's *Incredible Years* (IY), Russell Barkley's *Defiant Children* (DC), and Charles Cunningham's *Community Parent Education (COPE) Program.*

Example of a Hanf-Model Program: Helping the Noncompliant Child (HNC)

In order to provide a more thorough understanding of the types of teaching strategies utilized and skills taught in the Hanf-Model, what follows is an overview of the *Helping the Noncompliant Child* (HNC) program (Forehand & McMahon, 1981; McMahon & Forehand, 2003). Of the current Hanf-Model parent training programs, HNC is the most similar to Hanf's original program. HNC targets young children (3–8 years old) who exhibit high levels of noncompliance to parental directions. This clinic-based program involves a therapist working with individual families. The child attends all sessions with their parent(s). The primary goals of the program are to improve child compliance to directions and to decrease disruptive behavior through teaching parents more appropriate ways of interacting with their child.

The intervention consists of two major phases. During Phase 1, differential attention skills are taught to improve the parent-child relationship as well as increase desirable behaviors. Phase 2 involves compliance training skills that assist parents in dealing with noncompliance and other problematic behavior. The instructional format for each session follows a standard process which includes didactic instruction and discussion of a specific skill, the therapist demonstrating the skill through modeling and role-playing, the parent practicing the skill with the therapist, the skill being introduced to the child, the parent subsequently practicing the skill with the child while the therapist provides cues/feedback, and finally a homework assignment given to allow the parent to practice/utilize the skill at home.

Skills addressed in the program include attending, rewarding, ignoring, giving directions, and time-out. Phase 1 of the program involves teaching parents the effective use of the skills of attending, rewarding, and ignoring. Phase 2 involves teaching parents to give effective directions and how to use time-out appropriately. The clinical program typically takes 8–12 sessions to complete. The number of sessions varies from family to family because HNC uses a competency-based approach which requires parents to achieve a certain level of competence with a skill before the next skill is introduced. Details regarding the specific skills are provided below.

Phase 1 (Differential Attention Skills)

Attending Attending is a skill that parents can use to help increase their child's desirable behaviors. It also helps lay the groundwork for a more positive parent-child relationship. After discussing, modeling, and role-playing the skill with the parent(s), the therapist helps the parent master the skill through practicing it in what is called the "child's game." This is a time where the child selects the play activity (e.g., playing with blocks) and the parent is nondirective. The parent is taught to simply describe a child's activity while eliminating directions and questions addressed to the child. This practice allows the parent to master the skill of attending that will later be used to increase desirable behavior. This skill is the focus of the intervention until the parent demonstrates competence. This competence is assessed using specific behavioral criteria recorded during a structured observation.

Rewarding The second skill involves teaching the parent to praise or reward the child's positive behavior. This skill is taught using the same instructional procedures and is practiced using the "child's game." The types of rewards that are taught consist of labeled verbal (e.g., "I really like it when you pick up your toys!") and physical (e.g., hug, pat) rewards. Parents are taught to focus on and reward prosocial behaviors rather than negative behaviors. The parent has to demonstrate competence before the next skill is introduced.

Ignoring The third component of the initial phase of the program involves teaching a parent to ignore minor unacceptable behavior, such as whining and fussing. Again, the standardized instructional procedures are used. The parent is taught an ignoring procedure that involves no eye, physical, or verbal contact when minor unacceptable behaviors occur.

Differential Attention Plans After the parent has mastered the skills of attending, rewarding, and ignoring, the therapist assists the parent in targeting specific child behaviors to increase using differential attention. Parents use the skills taught in Phase 1 to implement differential attention plans with guidance provided by the therapist.

Phase 2 (Compliance Training Skills)

The second phase of the program consists of teaching parents two primary components of disciplinary skills: how to give effective instructions to the child and how to use a time-out procedure appropriately.

Giving Effective Instructions Parents are taught the elements of giving effective instructions/commands to their child. The parent practices giving instructions to their child within the "parent's game." Unlike the "child's game" which is used to teach Phase 1 skills and involves the parent being nondirective, the "parent's game" involves the parent taking direction of the activities (e.g., the parent issues frequent instructions/commands while directing the activity). The therapist provides feedback to the parent regarding the directions being issued (e.g., how they could be improved). The parent is also taught to attend to or praise their child's compliance to their directions.

Time-Out Parents are taught a specific time-out procedure to use with their child. The child is also informed about the time-out protocol within the session. The therapist provides guidance to the parent regarding various issues related to time-out. The therapist then helps the parent utilize a clear instruction sequence that guides the parent in how to consistently manage compliance and noncompliance to parental directions.

Standing Rules Once the parent is effectively implementing the clear instruction sequence at home, the use of standing rules is introduced. Standing rules are typically "If…then…" statements (i.e., rules that specify the consequences for specific behavior). The therapist assists the parents in developing appropriate standing rules.

Extending the Skills The therapist discusses with the parent how they can use the skills they have been taught to manage their child's behavior outside of the home and also to address other behaviors that have not been directly targeted during the course of the program. The goal is to teach the parent a series of skills that they can utilize over time to address various behavioral issues that may arise in the future.

Widely Disseminated Parent Training Programs

Parent-Child Interaction Therapy (PCIT)

PCIT (Brinkmeyer & Eyberg, 2003; McNeil & Hembree-Kigin, 2010), as a Hanf-Model program, is similar in many ways to the *Helping the Noncompliant Child* (HNC) program. Both programs focus on young children with disruptive behavior, have two phases, and are delivered to individual families by a therapist. The two phases in PCIT are (1) child-directed interaction and (2) parent-directed interaction. Training is provided through didactic instruction, modeling, role-playing, and coaching. In PCIT, children attend most, but not all, of the sessions with their parents. Only the parents attend a single teaching session at the beginning of each phase. During these teaching sessions, the parents are taught all of the skills for that phase (whereas in HNC the skills are taught sequentially within each phase). PCIT also emphasizes the role of traditional play therapy as part of their child-directed interaction phase. There is extensive evidence supporting the effectiveness of PCIT (see Brinkmeyer & Eyberg, 2003).

The Incredible Years (IY)

IY training series (Metinga, Orobio de Castro, & Matthys, 2013; Webster-Stratton & Reid, 2003) is a comprehensive program that has intervention components for parents, teachers, and young children (2–8 years old). IY is an extremely well-evaluated program (see Webster-Stratton & Reid, 2003). The goals of the parent training component are to promote parent competencies and strengthen families. This is a videotape modeling and group discussion program. The BASIC parenting training program takes 26 h to complete (13 weekly 2 h group sessions). The videotapes used in the program contain 250 short vignettes (1–2 min each) of modeled parenting skills. The vignettes are show to groups of 8–12 parents with a therapist leading group discussion. The program focuses on teaching parents how to enhance the parent-child relationship through the use of child-directed interactive play, the use of praise, and the use of incentives. The program also teaches parenting techniques such as monitoring, ignoring, use of effective directions, time-out, and natural and logical consequences. Webster-Stratton has also developed the ADVANCE parent training program (Webster-Stratton & Reid, 2003). This is 14-session videotape-based program that can be used following completion of the BASIC program. The ADVANCE program has four primary components: (1) personal self-control, (2) communication skills, (3) problem solving skills, and (4) strengthening social support and self-care.

Triple P

Triple P (Positive Parenting Program), developed by Sanders (Sanders, Kirby, Tellegen, & Day, 2014; Sanders & Ralph, 2004), is a unique parent training program. Developed in Australia and currently being used around the world, Triple P is a multilevel parent training program that targets children 2–12 years old. The program has five levels. Level 1 is a universal parent information strategy that makes general parenting information available to all parents through the use of various strategies including tip-sheets and promotional media campaigns. Level 2 consists of a brief one- or two-session primary healthcare-based parenting intervention targeting children with mild behavior problems. Level 3 is a four-session, more intensive parenting intervention that targets children with mild to moderate behavior problems. Level 4 is an 8–10 session individual or group parent training program targeting children with more significant behavior problems. Level 5 is an enhanced behavioral family intervention program that is utilized for significant behavior problems that are complicated by other factors (e.g., marital conflict, high stress).

These behavioral parent training programs, as well as the others that target externalizing behavior problems, continue to be the most commonly used and evaluated parent training interventions. However, there are many other types of parent training programs that utilize different strategies and target concerns other than disruptive behavior (e.g., internalizing behavior problems). Next, we will provide an overview of the empirical support for the various types of parent training programs.

An Overview of the Empirical Support for Parent Training

The empirical literature evaluating programs designed to train parents to intervene with their children's problems is extensive. To illustrate the scope of studies, a review of parent training outcomes with disruptive behaviors identified 430 studies published in peer-reviewed journals between 1974 and 2003 (Lundahl, Risser, & Lovejoy, 2006). No less than 53 reviews evaluating from 4 to 186 studies and 2 review-of-reviews have been published from 1972 to 2015. These review types varied, with 16 utilizing meta-analyses exclusively or in combination with other review strategies, 30 using the systematic/critical review methods, and 8 conducting strength of evidence[1] reviews. The reviews focused on various child populations, including ADHD (9), clinical disruptive behaviors (24), mixed clinical problems (10), and mixed clinical and general population (9). The breadth of the literature makes parent training the most studied child psychosocial intervention modality to date.

As will be demonstrated, parent training programs have shown generally positive outcomes across child and parent behavior, as well as parent perception and well-being. The strength of the evidence supporting certain types of parent training rivals that of other evidence-based treatments. However, parent training also shares in some of the disappointments and challenges common within the broader child psychotherapy enterprise, such as problems retaining families in treatment, poor treatment engagement, and attenuation of treatment effects over time (Assemany & McIntosh, 2002). While the outcomes that will be demonstrated are a testament to the viability of training parents as a prevention or intervention modality, broadly speaking, the variability of program orientations and formats, target populations, and outcomes, as well as the variability of the research quality across studies, requires us to ask more specific questions of the literature, such as what works for whom.

In this section, we will examine the evidence of the immediate and follow-up effects of parent training treatments across populations (ADHD, disruptive behavior, other problems) and review types. In addition, we will examine the review literature related to the generalization and moderating effects of training parents to intervene with their children.

Immediate and Follow-Up Effects of Parent Training

The breadth of studies under the treatment category of parent training presents a challenge for evaluating and summarizing the evidence. Given the variability of meaningful dimensions across studies (e.g., study design, target population, treatment format, treatment length, outcome measurement), as well as the various methods of reviewing studies (e.g., systematic/critical, meta-analysis, strength of evidence), any general summary across all studies allows only for evaluation of parent training as a therapeutic treatment modality. To provide some specification, we will examine three different methods of summarizing the literature across target populations, as well as assess programs across theoretical orientations. These methods are (1) meta-analytic reviews, (2) strength of evidence reviews, and (3) systematic/critical reviews.

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[1] Strength of evidence: a type of review that uses a system for assessing the quality of studies and overall strength of evidence – often used in evidence-based practice guidelines.

Meta-analytic Reviews

Meta-analysis (MA) provides a quantitative method for summarizing studies that address similar questions. By combining multiple studies, MA can overcome some of the limitations of single studies, such as low sample size and biases related to different study design characteristics. MA facilitates interpretation of findings across heterogeneous studies by using a common metric for evaluating results – an effect size – which represents how many standard deviations the average person in the treatment group changed compared to the average person in a control or comparison group. For example, an effect size of 0.50 indicates that the score of the average person in the treatment group exceeded 0.50 standard deviations or 69% of the people in the control/comparison group. For our purposes, we will adopt Cohen's (1988) classification of the magnitude of effect sizes (*d*): 0.2 = small, 0.5 = medium, 0.8 = large. Below we will review the effect sizes reported in meta-analytic reviews across target populations.

Disruptive Behaviors

Six reviews conducted meta-analyses of parent training for children with disruptive behavior problems. These reviews included 155 studies across study design types, spanning 1966–2011, and with children from preschool through 18 years of age. Three of the reviews reported outcomes on behavioral parent training (BPT) treatments with children preschool through 18 years of age. Three reviews included outcomes for parent training treatments, regardless of theoretical orientation (see Tables 1 and 2).

The reviews that reported on BPT treatments found small to large effect sizes for child outcomes based on parent report (0.42–1.10) and

Table 1 Summary of meta-analytic reviews of parent training

Review	TX	Dates	Age	N[a]	Study designs included RTC	B-S	W-S	SS
Disruptive behavior								
Charach et al. (2013)	BPT	1980–2011	<6	16	x	x		
Maughan et al. (2005)	BPT	1966–2001	<18	79	x	x	x	x (*n* = 15)
Serketich and Dumas (1996)	BPT	1969–1992	P-E	26	x	x		
Dretzke et al. (2009)	PT	< 2006	<18	24	x			
Bradley and Mandell (2005)	PT	1990–2004	E	7	x			
Lundahl et al. (2006)	PT	1974–2003	P-E-M	63	x	x	x	
ADHD								
Lee et al. (2012)	BPT	1970–2011	2.7–14.6[b]	47	x	x		
Zwi et al. (2011)	PT	<2011	5–18	3	x	x		
Pelham and Fabiano (2008)	BPT	1997–2006	3–18	13	x	x	x	
Corcoran and Dattalo (2006)	BPT	1980–2003	<19	16	x	x		
Purdie et al. (2002)	BPT	1990–1998	E-M	4	x	x		
Child abuse								
Lundahl et al. (2006)	PT	1970–2004	NR	23	x	x	x	
Specific programs								
Thomas and Zimmer-Gembeck (2007)	PCIT	1980–2004	3–12	13	x	x		
	PPP			11				
Cedar and Levant (1990)	PET	1975–1990	NR	26	x	x		

Note: *TX* treatments, *BPT* behavioral parent training only, *PT* parent training regardless of theoretical orientation, *PCIT* Parent Child Interaction Therapy, *PPP* Triple P: Positive Parenting Program, *PET* Parent Effectiveness Training, *P* preschool age, *E* elementary age, *M* middle school age, *NR* not reported, *RTC* randomized control trials, *B-S* between-subjects (treatment and control/comparison groups), *W-S* within-subjects (one group, pretest/posttest), *SS* single subject

[a] Studies included in meta-analysis

[b] Range of mean age

Table 2 Summary of effect sizes for parent training treatments across studies and outcomes

	Child behavior PR		Child behavior DO		Parent outcome	
Review	Post	FU	Post	FU	Post	FU
Disruptive behavior						
Charach et al. (2013)	0.75	–	–	–	0.55	–
Maughan et al. (2005)	0.68/0.88[a]	0.69/0.92	0.36/0.56	0.10/0.46	–	–
Serketich and Dumas (1996)	0.84/0.73[b]	–	0.85	–	0.44	–
Dretzke et al. (2009)	0.62/0.67[c]	–	0.44	–	–	–
Bradley and Mandell (2005)	1.1/0.25[d]	–	–	–	0.88/0.25[d]	–
Lundahl et al. (2006a)	0.42/0.44[e]	0.21/0.87[f]	–	–	0.45/0.66[e]	0.25/0.64[f]
ADHD						
Lee et al. (2012)	0.65	0.30	0.68	−0.08	0.82/0.56/1.25[g]	0.75/0.24/0.56
Zwi et al. (2011)	−0.32/−.48[h]	–	–	–	–	–
Pelham and Fabiano (2008)	–	–	–	–	–	–
Corcoran and Dattalo (2006)	0.36/0.63/0.40[i]	–	–	–	–	–
Purdie et al. (2002)	0.31/0.30/0.53[j]	–	–	–	–	–
Child abuse						
Lundahl et al. (2006b)	–	–	–	–	0.60/0.53/0.51[k]	–
Specific programs						
Thomas and Zimmer-Gembeck (2007)	−1.45/−1.31[l]	−1.10[n]	0.11/−0.54	−0.43[n]	−0.76/−1.46[m]	−0.94[n]
	−0.69/−0.73[m]	−0.70[n]	−0.22/−0.61	−0.61[n]	−1.07/−0.70[m]	−0.69[n]
Cedar and Levant (1990)	0.03	0.53	–	–	0.41/0.37[o]	–

PR Parent reported, *DO* Direct observation

[a] Between subjects/within subjects

[b] Parent report/teacher report

[c] Eyberg Child Behavior Inventory (ECBI) Intensity Score/ECBI Frequency Score

[d] Parent training (PT) alone/PT with child component

[e] BPT programs/non-BPT programs

[f] BPT programs only: between-subjects designs/within-subjects designs

[g] Parent behavior questionnaire/parent behavior observation/parent perception

[h] Externalizing/internalizing outcomes

[i] Externalizing/internalizing/ADHD outcomes

[j] Across all outcomes/ADHD/cognition

[k] Abuse attitudes/emotional adjustment/child-rearing behavior

[l] PCIT: independent groups (versus waitlist) comparisons/single group pre- to posttreatment

[m] Triple P: independent groups (versus waitlist) comparisons/single group pre- to posttreatment

[n] Single group pretreatment to follow-up

[o] Parent attitude/parent behavior

small to large child outcomes based on direct observations (0.36–0.85). Parent outcome effect sizes for BPT programs ranged from small to medium (0.44–0.55).

Charach and colleagues (2013) reviewed group studies of BPT with preschool-aged children. They found medium effect sizes for child behavior outcomes based on parent report and parenting skills outcomes across studies judged to be of fair or good quality (−0.75 and 0.55, respectively). They found a medium but slightly smaller effect size for child behavior when only studies judged as good were included (−0.68).

Maughan, Christiansen, Jenson, Olympia, and Clark (2005) found medium overall effect sizes for BPT with children and adolescents across between-subjects (B-S; treatment versus control/comparison), within-subjects (W-S; one group, pre-/posttest), and single-subject designs (0.58, 0.74, 0.59, respectively). For group studies (B-S/W-S), they found medium to large effect sizes for child behavior outcomes based on parent report – both at posttreatment (0.68/0.88) and long-term follow-up (0.69/0.92). Effect sizes for child outcome based on direct observation were small to medium for posttreatment (0.36/0.56) and small for follow-up (0.10/0.46). The consistently smaller effect sizes for B-S designs relative to W-S designs suggest that later may inflate effect sizes.

Serketich and Dumas (1996) reported a large mean effect size for BPT on overall child outcome (0.86). The mean effect sizes for child outcome based on parent, observer, and teacher were 0.84, 0.85, and 0.73, respectively. The mean effect size for outcomes of parental adjustment was medium at 0.44. Moderator analyses found smaller effects sizes for studies with larger sample sizes, more accurate statistics reported, and younger subjects.

Dretzke and colleagues (2009) reviewed 24 studies of parent training programs (20 BPT programs, 4 non-BPT) for children less than 12 years of age. PT programs varied in length and format, and studies represented community and clinical populations. They reported medium effect sizes for child behavior outcomes (−0.62 to −0.67). Child behavior outcomes based on direct observation showed a low to medium effect size (−0.44).

Bradley and Mandell (2005) reviewed seven randomized groups studies (2 non-BPT, 5 BPT) and found large effect sizes on child home behavior outcomes and parenting stress for BPT programs alone (1.2, 0.88, respectively). The parent training (two non-BPT and one BPT) in combination with other treatments showed small effect sizes for child home behavior and parenting stress (0.25, 0.25).

Lundahl, Risser, and Lovejoy (2006) reviewed 63 B-S and W-S studies of parent training programs (49 BPT, 14 non-BPT). They found small effect sizes for child behavior outcomes for both BPT and non-BPT programs (0.42, 0.44, respectively) and small to medium effect sizes for parent behavior outcomes for BPT and non-BPT programs (0.45, 0.66, respectively). The BPT programs were found to have significantly higher methodological rigor than the non-BPT programs. Several factors made comparisons between BPT and non-BPT programs difficult. The majority of BPT studies used clinical samples, whereas the majority of non-BPT studies used nonclinical samples. Furthermore, programs with different theoretical orientations tend to target different outcomes.

Attention Deficit Hyperactivity Disorder (ADHD)

Five reviews conducted meta-analyses of BPT program for children with ADHD (see Tables 1 and 2). A total of 63 individual studies were included in all of these meta-analyses. Lee, Niew, Yang, Chen, and Lin (2012) conducted the most recent comprehensive review. They looked at 48 studies between 1970 and 2011 of BPT only or BPT enhanced (integrated within a package of interventions). The overall effect size was medium-large (0.72) across child behavior and parent behavior domains (questionnaire or observation). A large effect was found in 20 studies that assessed parenting perception outcomes (1.25). They found no significant differences in effect sizes between type (BPT alone versus BPT integrated with other interventions) or format of program (group versus individually administered). Higher quality studies and studies with a higher percentage of comorbid conditions were associated with lower effect sizes. A small-medium (0.35) overall follow-up effect (up to 3 years post-BPT) across child behavior and parent behavior domains (−0.08–0.75) was found based on 17 studies.

Zwi, Jones, Thorgaard, York, and Dennis (2011) reviewed three randomized control trials between 1993 and 2010 of parent training with children with ADHD ($N = 284$). Effect sizes for externalizing and internalizing behaviors were small-medium (0.32; 3 studies) and medium (0.48; 2 studies), respectively.

Pelham and Fabiano (2008) conducted a meta-analysis of 13 studies of BPT from 1997 to 2006 in the context of a broader review of psychosocial interventions for children with ADHD, expanding on a previous strength of evidence review (Pelham, Wheeler, & Chronis, 1998). BPT treatments compared to waitlist showed effect sizes that ranged from 0.47 to 0.70, with one exception (−0.02). One study showed BPT to have a medium effect (0.66) compared to nondirective/support intervention (Sonuga-Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001). BPT combined with classroom behavioral interventions compared with community (including medication) and medication treatments showed effect sizes of −0.01 and −0.24 respectively.

Corcoran and Dattalo (2006) conducted a meta-analysis of "parent-involved" cognitive-behavioral treatments (not limited to parent training) for children (0–18 years) with ADHD. They included 16 group studies between 1980 and 2003. They reported a small-medium (0.42) overall effect size across child outcomes. A medium effect size was found for internalizing symptoms (0.63), and small-medium effect sizes were found for child behavior outcomes of ADHD (0.40) and externalizing (0.36). Purdie, Hattie, and Carroll (2002) reviewed four studies of parent training with ADHD children and found small effect sizes for overall (0.31) and ADHD (0.30) outcomes and a medium effect size for general cognition (0.54–2 studies).

Child Abuse Risk

Lundahl, Nimer, and Parsons (2006) evaluated the effects of parent training programs on parent risk factors related to child abuse and documented abuse. They identified 23 studies from 1970 to 2004 that included 25 parent training treatment groups. Of the 23 studies, 17 used W-S designs. The parent training interventions used in these studies varied on a number of characteristics, including theoretical orientation (behavioral, non-behavioral, mixed), location of intervention (home, office, mixed), delivery mode (group, individual, mixed), and number of sessions. Immediately following parent training, parents showed medium improvements in outcome variables: 0.60 for attitudes linked to abuse, 0.53 for emotional adjustment, and 0.51 for child-rearing skills. Significant differences were found between the effect sizes of studies with B-S designs ($n = 6$; treatment versus control/comparison; 0.30) and studies with W-S designs (0.62) for the emotional adjustment outcome variable, suggesting, at least for this variable, that the effects are more in the small to medium range. Moderator analyses showed a negative correlation between study rigor and outcomes ($rs = -0.35$ to -0.90).

Meta-analyses Related to Specific Programs

Thomas and Zimmer-Gembeck (2007) conducted a systematic and meta-analytic review of 24 studies evaluating the Parent-Child Interaction Therapy (PCIT) and Positive Parenting Program (Triple P) programs – both BPT programs. They reviewed studies from 1980 through 2004, including children 3–12 years of age. Both PCIT and Triple P showed medium to large effects on parent-reported child behavior and clinic-observed parent behavior across study designs (B-S/W-S). Small to medium effect sizes were shown for direct observation of child behavior in the clinic for both programs.

Cedar and Levant (1990) conducted a meta-analysis of studies evaluating the efficacy of the Parent Effectiveness Training program (PET; Gordon, 1970) on the behavior and cognitive adjustment of both children and parents. PET is based on a reflective/Rogerian approach. Most of the studies were doctoral dissertations rather than peer-reviewed journal articles. They examined 26 studies from 1975 to 1990. Their analyses found no to small effects on child behavior outcomes, small-medium effects for child self-esteem and parent attitudes and behavior, and a large effect on outcomes related to parental knowledge of course content (1.10).

Summary of Meta-analytic Reviews

While the volume of studies of parent training is impressive, much of the research is of low quality, particularly among non-behavioral programs. Many of the reviews started with hundreds or thousands of studies only to be sharply narrowed by simple, reasonable inclusion criteria, and while the studies that remained were of relatively high quality, they varied on multiple, meaningful dimensions. However, overall, the MA reviews indicate that many behavioral parent training programs tend to be at least moderately effective (i.e., medium effect sizes on average). Meta-analysis provides a useful method for managing the biases and differences across multiple studies, placing MA data near the top of the evidence hierarchy; however, it is not the only method for evaluating treatments. A more recent strategy focuses more on the quality or strength of the available evidence as will be discussed in the next section.

Strength of Evidence Reviews

In response to managed care, formal efforts were made to identify empirically supported treatments (EST) to third-party payers and to inform treatment guidelines (see Chambless & Ollendick, 2001 for history of ESTs). These efforts utilized systems for evaluating and categorizing the strength of evidence (SOE) of various treatments across disorders. Treatments with the strongest level of empirical support generally involve well-designed studies (randomized control trials) showing positive results that have been independently replicated. Six reviews evaluated the SOE of BPT interventions within the context of broader reviews of psychosocial treatments for children and adolescents. Three reviews evaluated BPT interventions across various disorders (Chambless & Ollendick, 2001; Chorpita et al., 2002, 2011), two reviews evaluated BPT interventions for disruptive behaviors (Brestan & Eyberg, 1998; Eyberg, Nelson, & Boggs, 2008), and one review evaluated BPT interventions for ADHD (Pelham et al., 1998).

Disruptive Behaviors

Three research groups evaluated the strength of evidence of treatments involving parent training for children and adolescents with disruptive behaviors. Chorpita et al. (2011) reviewed studies from 1965 to 2009 and utilized a five-level system (1 = Best Support, 5 = No Support) based on the American Psychological Association (APA) Division 12 (Division of Clinical Psychology) standards to evaluate 23 different treatment approaches for children with disruptive behavior disorders. They rated BPT alone and BPT combined with a problem solving treatment to be Level I based on 41 and 3 supportive studies, respectively. BPT alone showed the highest mean effect size (0.98) of the six treatments identified as Level 1.

Eyberg et al. (2008) reviewed 15 studies from 1966 through 2007 that utilized seven different BPT treatment programs (alone or in combination with other treatments). They utilized the original APA two-level categorical system – well-established and probably efficacious (Task Force on Promotion and Dissemination of Psychological Procedures, 1995). One of the programs (*Living with Children* – the Oregon model of parent management training, Patterson, Reid, Jones, & Conger, 1975) was classified as well-established, and the other six were classified as probably efficacious (see Lonigan, Elbert, & Johnson, 1998 for definitions).

Chambless and Ollendick (2001) reviewed the results of eight different task forces that categorized the empirical support of child and adolescent psychosocial treatments across disorders. They developed their own three-point categorical system to standardize the various criteria used across task forces. The *Living with Children* program was rated Category I (highest of three categories of empirical support – at least two positive Type 1 studies – randomized control trials (RTC) with clearly described statistical methods) by at least three workgroups, and Category II (at least one positive RTC) by at least one workgroup. The Parent-Child Interaction Therapy program was rated as Category II by one workgroup. Both of these treatment programs are BPT treatments.

Attention Deficit Hyperactivity Disorder (ADHD)

Three research groups evaluated the strength of evidence of treatments involving parent training for children and adolescents with ADHD. Chorpita et al. (2011) evaluated 16 different treatment approaches for children with ADHD. They rated BPT alone, BPT with teacher training, and BPT with problem solving to be Level 2: good support based on 5, 2, and 1 supportive studies, respectively. Mean effect sizes were 0.92, 0.80, and 0.68, respectively. In the Chambless and Ollendick (2001) review, BPT was identified as a Category I treatment by one of the eight task forces.

Pelham et al. (1998) reviewed psychosocial treatments for ADHD using the original APA two-level categorical system. They reviewed 17 studies of BPT and judged BPT to meet criteria for well-established treatment for ADHD, using liberal interpretations of the APA criteria. Their review showed seven group studies contributing to the well-established criteria and five group studies contributing to the probably efficacious criteria. They found three groups studies and three single-subject studies that did not contribute to the well-established or probably efficacious criteria. In their follow-up study (Pelham & Fabiano, 2008), they added three additional studies contributing to the well-established criteria and judged BPT to clearly meet the criteria for well-established treatment.

Autism

One review (Chorpita et al., 2011) evaluated five different treatment approaches for children with autism. They rated BPT alone to be Level 4 (Minimal Support based on 1 supportive study) and a mean effect size of 0.55.

Summary of SOE Reviews

Based on these SOE reviews, BPT treatments have been judged to have the highest to middle level of empirical support for children and adolescents with disruptive behavior disorders and ADHD and minimal support for autism. The next type of review we will examine is the systematic/critical review.

Systematic/Critical Reviews

The systematic/critical review method is high on the evidence hierarchy, on par with meta-analysis. Thirty-six of the 53 reviews of parenting training utilized the systematic/critical review method alone or in combination with other review strategies. This method can be used to evaluate the evidence in support of specific treatments across conditions by summarizing the existing literature relative to treatment outcomes. The systematic/critical review method is also useful for critiquing the quality of studies, highlighting the different methods and outcomes across studies (a nuance that can get obscured in meta-analysis) and addressing specific conceptual or policy questions. Below we will highlight aspects of parent training treatments that have been addressed through the systematic/critical method, both within and across conditions and across theoretical orientations.

Parent Training Within and Across Conditions

Several early reviews evaluated parent training research across conditions (Berkowitz & Graziano, 1971; Johnson & Katz, 1973; Moreland, Schwebel, Beck, & Wells, 1982; O'Dell, 1974; Travormina, 1974; Wiese, 1992; Wiese & Kramer, 1988). For example, Graziano and Diament (1992) reviewed 186 empirical studies that evaluate the efficacy of BPT with a variety of childhood problems. In addition to problems with conduct and hyperactivity, studies have examined BPT with children with intellectual disabilities, physical disabilities, autism, overweight, enuresis, fears, and other specific behavioral problems. They concluded that the BPT showed clear positive results for conduct problems and discrete child behavior problems (e.g., enuresis, fears, weight reduction), some success with hyperactivity, and mixed results with autism and intellectual disabilities. For the latter two conditions, they suggested that BPT might be more effective in improving parent outcomes than child behavior. A RTC of parent education and skills training interventions supports this notion (Tonge et al., 2006), showing significant improvements in the functioning of parents of young autistic children following treatment relative to the control group.

Six reviews have critiqued parent training treatments within a broader review of psychosocial treatments with children with disruptive behavior problems (Behan, 2000; Bryant, Vissard, Willoughby, & Kupersmidt, 1999; Dumas, 1989; Farmer, Compton, Burns, & Robertson, 2002; Kazdin, 1987, 2001; McAuley, 1982; Webster-Stratton, 1991). While all of the reviews presented generally positive posttreatment and follow-up findings relative to other psychosocial treatments, each also critiqued areas in need of additional research.

Several studies focused their reviews specifically on parent training treatments for children with disruptive behaviors (Atkeson & Forehand, 1978; Kazdin, 1997; Miller & Prinz, 1990; Nixon, 2002). In reviewing various BPT treatment formats for children with disruptive behavior problems, Nixon (2002) concluded that parent training programs are promising but limited by methodological problems. Using a vote counting method in their systematic review of parent training treatments for children with disruptive behavior problems, Dretzke and colleagues (2009) reported that 59% of 170 child outcomes across 36 studies were statistically significant in favor of parent training treatment over controls.

Reviews of parent training interventions with ADHD populations have concluded that more systematic study is needed but that existing studies provide sufficient evidence to consider parent training an effective treatment for ADHD (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004; Kohut & Andrew, 2004; Pelham et al., 1998).

Parent Training Across Orientations

Several older reviews have examined the methodology and efficacy of parent training programs from different theoretical orientations (Dembo, Sweitzer, & Lauritzen, 1985; Mooney, 1995; Todres & Bunston, 1993, Travormina, 1974). Several differences between BPT and non-BPT studies make comparisons difficult. The majority of BPT studies were more intervention focused and used clinical samples, whereas the majority of non-BPT studies were more prevention focused and used nonclinical samples. Programs with different theoretical orientations tend to target different outcomes, making direct comparisons impossible. All of these reviews noted that few studies met the criteria for well-designed investigations, and the diverse methodologies precluded direct comparisons of efficacy. All the reviews reported mixed results, with positive findings following what would be expected from the specific theoretical orientation. For example, the Adlerian programs showed a greater percentage of positive findings in the outcome domain of parental attitudes and perceptions, while behavioral programs showed a greater percentage of positive findings on child behavior.

Moderators of Parent Training Effects

Many of the reviews examined factors that moderate the effects of parent training. In this section, we will focus on the following three factors in terms of how they relate to parent training treatment outcomes: (1) study quality; (2) contextual, child, and parent factors; and (3) program factors.

Study Quality

As far as outcome evidence specific to treatment modality, the volume of studies of parent training treatments is impressive; however, volume in itself is not an indicator of strength. The quality of study designs has been shown in many of the reviews to be a moderator of treatment effects – with a negative relationship shown between the quality of study designs and effect size (Cedar & Levant, 1990; Charach et al., 2013; Lee et al., 2012). Poor quality studies tend to inflate outcome effects. The BPT programs were found to have significantly higher methodological rigor than the non-BPT programs (Lundahl, Risser, & Lovejoy, 2006).

Contextual, Parental, and Child Factors

The role of various contextual, parental, and child factors as likely mediators or moderators of parent training outcomes has been a persistent theme discussed across the systematic/critical reviews. For example, Graziano and Diament (1992) examined the relationship between the factors of child age, child IQ, family's socioeconomic status, parental social support, parental education level, parental functioning, family stress, and ethnicity and parent training outcomes. The influence of these factors is certainly not unique to parent training but shared by all psychosocial treatments.

Factors identified in the quantitative reviews include age and financial disadvantage. One review (Lundahl, Risser, & Lovejoy, 2006) found significantly higher effect sizes for children than teens on child behavior outcomes but no differences on parental behavior or perceptions. Two other reviews that included non-BPT programs reported a positive relationship between age and positive outcomes for parent training programs in general (Cedar & Levant, 1990; Serketich & Dumas, 1996). Many of the BPT programs were developed for children, with fewer programs targeting teens; consequently, the evidence is stronger for programs targeting children younger than 12 than for those targeting teens (Chronis et al., 2004).

One study (Lundahl, Risser, & Lovejoy, 2006) found financial disadvantage to be the most salient moderator of parent training outcomes. Children and parents from non-disadvantaged families benefited more across the child behavior, parent behavior, and parental perception outcome domains compared to disadvantaged families. In addition, they found that marital status was a moderator of child behavior outcomes. Reviews of BPT treatments and BPT outcomes with disruptive behavior problems and ADHD (Assemany and McIntosh, 2002; Chronis et al., 2004) reported on the moderating effects of marital status on child behavior outcomes; studies with a higher percentage of single parents did not show as much change as studies with a lower percentage of single parents.

Program Factors

Several quantitative and systematic/critical (e.g., Chronis et al., 2004) reviews have examined the association of different parent training program features and parent training outcomes. The quantitative reviews examined the association between program format (e.g., individual versus group) and program length and treatment outcomes. Two reviews (Lee et al., 2012; Serketich & Dumas, 1996) found no differences in effect sizes for the overall child outcome and format of the treatment (individual versus group). One review (Lundahl, Risser, & Lovejoy, 2006) found no differences in effect sizes between face-to-face and self-directed interventions; however, they reported that among the 20 studies that treated financially disadvantaged families, individual parent training resulted in significantly greater improvements in child and parent behavior than group parent training; no differences were found between individual and group treatment in the parental perceptions outcome domain. One review (Lundahl, Nimer, & Parsons, 2006) found that studies whose programs were 12 or more sessions had greater improvements in parental attitudes linked to abuse compared to programs with fewer than 12 sessions and no differences in child-rearing behavior between programs with low and high number of sessions.

Although the various reviews have shown some support for child, parent, contextual, and program features as moderators of response to parent training, most analyses are post-hoc and correlational. Relatively little research has been conducted where these characteristics have been studied as independent variables, which will be needed to establish the validity of moderators.

Generalization of Parent Training Effects

It is reasonable to assume that changing parents' behavior would result in some generalization of treatment effects across time and settings and to untreated siblings. Some early, individual studies provide some support for the generalization of BPT effects to untreated siblings' observed compliance (Eyberg & Robinson, 1982; Humphreys, Forehand, McMahon, & Roberts, 1978) and deviant behavior (Arnold, Levin, & Patterson, 1975; Wells, Forehand, & Griest, 1980) at posttreatment. In one study, the improvements were maintained at a 6-month follow-up (Arnold et al., 1975). Eyberg and Robinson (1982) reported significant improvements in observed parent behavior with untreated siblings and no significant reductions in the number or intensity of negative sibling behaviors.

Two early, individual studies failed to show generalization of treatment effects from clinic to school settings (Breiner & Forehand, 1981; Forehand et al., 1979). However, McNeil, Eyberg, Eisenstadt, Newcomb, and Funderburk (1991) reported significant improvements in teacher-rated deviant behavior and observations of appropriate and compliant behaviors at school in ten children treated with a BPT program relative to controls. In this study, they selected subjects who showed high levels of behavior problems across home and school settings at pretreatment and who all showed clinically significant improvements in home behavior after treatment.

While there is some supporting evidence for generalization, confidence in the generalizability of treatment effects would be increased with additional studies with improved methodology, such as larger sample sizes, multiple outcome measures, and control groups.

Summary of the Empirical Support for Parent Training

There have been a substantial number of studies evaluating parent training programs from different theoretical orientations and across different child problems. As a whole, the research is supportive of the immediate effectiveness of parent training across many parent and child outcome domains. Data on the maintenance of effects is less consistent, with follow-up effect sizes ranging from none to large. Parent training can be considered at least moderately effective, which compares very favorably to the effects found for other psychotherapy treatments. More specifically, there is sufficient evidence to consider behaviorally oriented parent training programs efficacious in treating children with oppositional and ADHD problems.

Parent Training and Autism Spectrum Disorder (ASD)

As previously discussed, the published reviews of the data regarding the effectiveness of parenting training programs targeting children with ASD (Chorpita et al., 2011) are limited and not very strong. However, it is important to consider, when reading a review focused on limited data, whether there has been a significant growth in that area of research since the reviewed studies were conducted. In the case of ASD, there has been a significant increase of studies examining parent training in recent years. For that reason, as well as the growing concern regarding the need for additional services targeting children with ASD, in this section, we will discuss some of the recent work in regard to parent training services for this population.

To a large extent, the literature on parent training for children with developmental disorders and specifically autism has historically developed separately from the parent training literature regarding disruptive behavior disorders and ADHD (Brookman-Frazee, Stahmer, Baker-Ericzen & Tsai, 2006). Within the ASD literature, the involvement of parents in interventions for their children with ASD is long-standing. The seminal research done in the area of autism related interventions initially focused on therapist-delivered services but eventually widened to include parents in therapeutic approaches. The inclusion of parents is seen in the work done by Lovaas, Koegel, Simmons, and Long (1973; McEachin, Smith, & Lovaas, 1993) and Pivotal Response Training (Koegel, O'Dell, & Koegel, 1987; Koegel, Koegel, Harrower, & Carter, 1999).

In recent years there has been a significant increase in studies examining the effectiveness of parent training with the ASD population (Beaudoin, Sebire, & Coutre, 2014; Wallace & Rogers, 2010). As a result, parent training has recently been listed as being an evidence-based intervention by the National Standards Project (NSP) (National Autism Center, 2015). The NSP is an initiative funded by the National Autism Center to provide evidence-based guidelines for treatment in the area of ASD (National Autism Center, 2009, 2015). By a stringent review of the body of literature on ASD interventions by the NSP, there are published recommendations to guide consumers about the "strength of research support for educational and behavioral treatments for core characteristics for individuals with ASD" (www.nationalautism center.org). The initial National Standards Project (NSP) published in 2009 did not include parent training as one of the 11 evidence-based treatment approaches for ASD. By the time the 2015 edition (NSP2, 2015) was published, they judged the current research evidence justified parent training now being listed as an evidence-based treatment.

It is important to note that within the ASD literature, the term "parent training" is often not well defined (Bearss, Burrell, Stewart, & Scahill, 2015). This can lead to confusion in the literature and in clinical practice as to what is meant by "parent training" in the area of ASD. Although the NSP lists parent training as an evidence-based intervention, even when looking at the studies included in their report, the studies included for review are a wide array of parent interventions from support groups with a primary educational component all the way to in vivo individual training taught and supervised by licensed professionals. Unfortunately, the lack of clarity regarding how parent training is defined is a long-standing and still widespread issue that impacts not only the ASD literature but most areas in which a wide array of parent training/education services are provided (Long, 1997).

Parent Support Versus Parent Implementation

Fortunately, Bearss and colleagues at the Marcus Autism Center (2015) have proposed a taxonomy for classifying parent training for children with ASD. They separate parent training programs into two categories: (1) parent support (which encompasses parent education and case coordination) and (2) parent implementation (involves training parents to work with the child rather than just providing education about a specific issue). The "parent implementation" category would include interventions that most would consider to be "parent training" interventions.

Parent support services are no doubt important in helping inform and support parents who are rearing a child with ASD. For example, parents who have a child diagnosed with ASD consistently report that lack of good information about ASD is a problem (Hamilton, 2008; Lopez & Bellando, 2012). Fortunately, there has been a recent increase in evidence-based information being made more readily available to parents. Autism Speaks has created various toolkits that are available for free on their website (www.autismspeaks.org). These toolkits not only provide information about ASD but also regarding interventions for many common issues within the ASD population including sleep issues, feeding issues, toileting needs, and transition to adult services (Bellando, Fussell, & Lopez, 2015).

A recent randomized control trial conducted by Shire, Gulsrud, and Kasari (2016) examines the question of whether parenting support (i.e., parent education) yields differing outcomes when compared to parent implementation models (i.e., parent training) with an ASD population. They compared a parent-child interaction intervention (JASPER model) (Kasari, Freeman, & Paparella, 2006) to parent educational intervention (PEI) (Breton & Tonge, 2005) in regard to changes in parent-child play interactions specific to parent responsivity and child joint attention. Parent-child dyads were randomly placed in one of the two interventions. Parents in the JASPER group were found to have significantly increased their responsive behavior to their children, and parent-child joint engagement had significantly improved at the end of the 10-week training compared to the PEI group. In a related article by Kasari, Gulsrud, Paparella, Hellemann, and Berry (2015), additional analysis of data collected in the randomized clinical trial showed that parents in the PEI intervention did report a decrease in parenting stress over the 10-week program. The authors suggest that possibly a combination of the two interventions may provide optimal support for families.

A multi-site study led by the Marcus Autism Center at Emory University (Bearss et al., 2015) also compared parent training to parent education in a randomized trial. In the parent training group, 89 parents received an individually delivered intervention that focused on teaching them strategies for handling disruptive behaviors. This intervention included 11 core sessions, up to two optional sessions, one home visit, and up to six parent-child coaching sessions over 16 weeks. The 91 parents assigned to the parent education group were provided information about autism but no behavioral management strategies. This parent education intervention was provided through 12 sessions and one home visit. Two measures were used to measure change in regard to disruptive behavior and noncompliance. At week 24 the parenting training group showed a larger decline in irritable (47.7% decreased compared to a 31.8% decrease in the education group). On the Home Situation Questionnaire-PDD version (Chowdhury et al., 2010) the parent training group also showed clinical improvement (55% decline in scores compared to a 34.2% decline for the education group). The authors concluded that the parent training group was more effective in reducing disruptive behaviors than the parent education group but that the differences while statistically significant may not be clinically different.

Parent Training to Help with Medical Comorbidities Associated with ASD

ASD is associated with various comorbidities (Lajonchere, Jones, Coury & Perrin, 2012). Parent training interventions are being developed to help address some for these related problems. For example, feeding issues are a common comorbid condition for children with ASD (Williams, Dalrymple, & Neal, 2000). Johnson, Foldes, DeMand, and Brooks (2015) published a pilot study for a manualized behavioral parent training program for feeding for children with ASD aged 2–7. Parents of 14 children diagnosed with ASD were enrolled in this 16-week program that provided up to 9 individually administered sessions with a therapist trained in applied behavioral analysis (ABA). Results showed significant decreases in problems with mealtime behaviors, decreases in disruptive behaviors, and reduced parent stress.

Current and Anticipated Trends in Parent Training

In this final section of the chapter, we will discuss some current and anticipated trends in the area of parent training. While there are many trends that we could focus on, we have selected the following five areas: (1) the use of technology to enhance parent training, (2) transporting evidence-based parent training programs to other countries/cultures, (3) increasing focus on benefit-cost analysis and reducing the costs of implementing parent training programs, (4) identifying key program components and mediators of change, and (5) the potential role that genetic and biological factors may play in the future of parent training.

Increasing Use of Technology to Enhance Parent Training

There is little doubt that technology has had a profound influence on our lives over the past several decades. Technology has also had an increasing impact on the delivery of parent training services over the same time period (Long, 2004). Soon after VHS videotape technology became widely available in the early 1980s, this modality was utilized in the *Incredible Years* parent training program (Webster-Stratton, Kolpacoff, & Hollinsworth, 1988). In the 1990s CD-ROM technology was introduced and was used to deliver *Parenting Wisely,* an evidence-based self-administered interactive parent training program (Gordon, 2000). More recently, internet-based parenting programs are being developed with increased frequency (McGrath et al., 2013; Sanders, Baker, & Turner, 2012). Technologies such as podcasts (Morawska, Tometzki, & Sanders, 2014) and smartphones (Jones et al., 2014) have also been utilized effectively to deliver interventions and to enhance the effectiveness of existing evidence-based parent training programs. It is hard to predict the new technologies that will be developed over the coming decades, but it is likely that they will be used to try to improve the access, delivery, and effectiveness of parent training programs. It is also predicted that emerging technologies will be used with increased frequency to train those that deliver parent training interventions and facilitate the dissemination and scaling of evidence-based programs.

Increasing Focus on Transporting Evidence-Based Parent Training Programs to Different Countries and Cultures

There has been a long-standing concern about the relative lack of attention to the role that cultural context in behavioral parent training interventions (Forehand & Kotchick, 1996). While there is no doubt that this is an extremely important issue worthy of significant study, there is recent evidence suggesting that some evidence-based parent training interventions can be successfully implemented in other countries/cultures. A recent review (Gardner, Montgomery, & Knerr, 2016) focused on the international implementation of four parent training programs that target the reduction of child behavior problems. These four interventions (Incredible Years, Triple P, PCIT, and PMTO) were developed in the United States or

Australia and have been evaluated in ten countries within five regions of the world (Europe, Asia, North America, Middle East, and the Caribbean). The interventions transported to "western" countries demonstrated similar outcomes to those obtained in trials in their countries of origin. Surprisingly, the effects were even stronger when the interventions were implemented in the most culturally distant regions. Further, extensive cultural adaptation of these interventions did not appear necessary to effectively transport these programs to these culturally different regions. This finding conflicts with the often held belief that parenting interventions need to go through extensive adaptations if they are to be effective in different cultural contexts. The degree to which these recent findings can be generalized to other types of parent training programs and to other cultures (especially in low-income countries) is yet to be determined. However, these early findings are intriguing and suggest that many programs may be more easily transported to many countries/cultures than previously thought. Further support for this view is the extensive dissemination and acceptance of the Triple P throughout the world over the past 15 years (Sanders & Murphy-Brennan, 2010). There is little doubt that issue of effectively transporting evidence-based parent training interventions for use within other cultures will be an area of growing interest given the increasing societal focus on globalization.

Increasing Focus on Benefit-Cost Analyses and Reducing the Costs of Program Delivery

Given the escalating costs of health and mental health services, policy makers and third-party payers will increasingly be concerned with relative cost-benefit ratios of interventions. This will be especially true as the healthcare system in the United States transitions from a fee-for-service system to a value-based system. In a value-based system, payment to providers/systems will no longer be based on the number of sessions/services but rather on the value of the care they provide. As the healthcare system moves in this direction, there will be a greater focus on ROI (return on investment). Health and mental health systems of care will favor interventions that yield the greatest cost savings (e.g., reduced future mental health costs) per dollar spent on the intervention.

As an example of the importance of ROI, the US Federal Government has recently funded a major national expansion of evidence-based home visiting programs for parents with young children. The Department of Health and Human Services has provided several billion dollars for this expansion through the Maternal Infant and Early Childhood Home Visiting (MIECHV) program. This funding was a direct result of research, primarily conducted by the Nurse Family Partnership (NFP) program that demonstrated a significant ROI. As further indication that benefit-cost evaluations will play an increasing role funding decisions, the Institute of Medicine and the National Research Council (2014) recently assembled researchers to help create standards for conducting benefit-cost analyses related to prevention aspects of child, youth, and family programs.

The pressure to provide effective parenting interventions at lower costs will increase efforts that explore the effectiveness of abbreviated parent training interventions that could be implemented in different settings (e.g., integrated primary care pediatric settings). As an example Berkovits et al. (2010) examined two abbreviated versions of PCIT. One version consisted of a four-session group intervention called Primary Care PCIT, and the other version was called PCIT Anticipatory Guidance and consisted of written materials describing the use of PCIT techniques. These versions of PCIT were developed to address children's subclinical behavior problems within pediatric primary care settings. Both abbreviated versions of PCIT were found to be effective child behavioral concerns posttreatment and at 6-month follow-up, but the group intervention was not found to be more effective than the self-directed approach which was based only on utilization of written materials. These results are consistent with a study comparing different service modes for treating oppositional defiant disorder in primary care settings (Lavigne et al., 2008). They compared a 12-session group intervention utilizing the Incredible Years (IY) program (Webster-Stratton & Reid, 2003) to bibliotherapy (just reading the parenting book that accompanies the IY program). They found improvement at posttreatment as well as at 12-month follow-up but no overall treatment group effects. Additionally, Morawska and Sanders (2006) examined the effectiveness of a self-administered version of the Triple P in combination with weekly telephone support from a counselling service provider. They found this approach to improve parenting and reduce child behavior problems at 3-month follow-up.

The Helping the Noncompliant Child program has also been adapted for delivery within a parenting group format as well as for use as a self-directed written approach. The 6-week parenting group program (total of 12 h) focuses on teaching the core HNC skills as well as additional topics including creating a more positive home, improving communication, developing more patience, building positive self-esteem, and problem solving. Evaluations of this parenting group format suggest it is effective in improving parenting and in reducing child behavior problems (Conners, Edwards, & Grant, 2007; Forehand et al., 2011). The self-directed written approach involves a 5-week strategy presented in the HNC-based book *Parenting the Strong-Willed Child* (Forehand & Long, 2010). Findings from a randomized trial (Forehand, Dorsey, Jones, Long, & McMahon, 2010) indicate that when parents read the book it was associated with decreases in child behavior problems.

It is clear that various methods of teaching parents can be used to effectively use core parent training skills. A major question that needs to be answered regards what level/method of intervention is most appropriate under what conditions (e.g., level/type of child problems, parent factors, etc.). Given the importance of this issue, it is anticipated that this will be a continued focus of interest as the emphasis on benefit-cost issues and ROI increases over the coming years.

Increased Focus on Key Program Components and Mediators of Change

Given the growing number of evidence-based parent training programs, there have been efforts to identify the shared key components of effective programs. For example, Kaminski and colleagues (2008) conducted a meta-analysis of 77 parent training studies focused on young children in order to identify program content and program delivery components that were consistently associated with better outcomes. Based on this work, the Centers for Disease Control and Prevention (CDC) published the guideline *Parent Training Programs: Insight for Practitioners* (Centers for Disease Control and Prevention, 2009). They found that the program components most strongly associated with the acquisition of effective parenting skills were (1) teaching parents emotional communication skills, (2) teaching parents positive parent-child interaction skills, and (3) requiring parents to practice with their child during program sessions. The program components most strongly related to decreases in children's externalizing behavior were found to be (1) teaching parents the correct use of time-out, (2) teaching parents to respond consistently to their child, (3) teaching parents to interact positively with their child, and (4) requiring parents to practice with their child during program sessions.

The increasing focus on delivering interventions in the most cost-effective manner will be a motivating factor in expanding efforts to identify key components of effective parent training programs (e.g., Kaehler, Jacobs, & Jones, 2016). Identifying components that are, and are not, critical to effectiveness may help program developers streamline their interventions and reduce the costs of implementing the program (e.g., reducing the number of sessions necessary to achieve a specific level of outcome). It will also help address the issue of maintaining adherence (fidelity to the program's key components) while also allowing some degree of flexibility in delivering the program (Forehand et al., 2010; Mazzucchelli & Sanders, 2010).

In a related vein, it is predicted that greater attention will be focused on factors that mediate the effectiveness of parent training. To what degree do changes in parenting skills versus other factors mediate the positive outcomes of parent training programs? Surprisingly, relatively little research has examined the putative mediators of effectiveness in parent training (Forehand, Lafko, Parent, & Burt, 2014). Future studies will, no doubt, address these factors.

The Role Genetic and Biological Factors May Play in the Future of Parent Training

This final anticipated trend is much more speculative and one we may not see realized for decades. However, we do anticipate that at some point in the future genetic information may be used to help select the most appropriate parent training intervention for a given family. We also anticipate that in the future, biological indices will be used to assess the long-term impact of parent training programs on health outcomes. Let us explain the basis for this speculation.

As a result of the Human Genome Project's sequencing of the human genome, "personalized medicine" has become a rapidly expanding area of medicine. Personalized medicine involves providing customized healthcare for an individual based on knowledge of his/her specific genetic genome. Medical decisions and treatment will increasingly be made utilizing this information to optimize treatment effectiveness and outcomes (i.e., which medication/treatment has been demonstrated to be most effective for individuals with certain genotypes). Many would probably consider it a stretch to believe genetic information could be used effectively to help decide what type of parent training program might be most effective with a particular family or that parent training programs could customized for parents with specific genotypes. However, it may not be as much of a stretch as one might initially think.

Gene variants are being found to be associated with differences in behavior as the following study demonstrates. This large-scale study found that mothers with a specific genotype related to the DRD2 gene (about half of mothers) were significantly more likely to engage in harsh parenting practices when exposed to economic adversity (an economic recession) than the other mothers (Lee, Brooks-Gunn, McLanahan, Notterman, & Garfinkel, 2013). The DRD2 gene influences dopamine which has been found to be involved in regulating emotional and behavioral responses to environmental threats and rewards. Other studies have found that children with specific genotypes (also related to dopamine) to be more sensitive to both negative and positive environments (Bakermans-Kranenburg & Van Ijzendoorn, 2011). Specific gene variants (associated with serotonin or dopamine) have also been found to be related to how sensitive children are to rewards and punishments (Pedersen, 2013). Taken together, these studies suggest that a parent's genotype puts her/him at risk for negative parenting and that a child's genotype might make him/her more or less sensitive to specific parenting interventions. So as information on our personal genome becomes more readily available and known to healthcare providers, it is plausible that this information could be used in helping to determine what type of parent training program might be best for whom.

Another recent research study may also have profound implications for the future of parent training in regard to future health issues that are related to inflammation. Excessive inflammation, a chronic over-activation of parts of the immune system, has been found to be related to a number of health problems later in life (e.g., heart disease, diabetes) as well as to depression and psychosis (Khandaker, Pearson, Zammit, Lewis, & Jones, 2014). The intervention study of importance (Miller, Brody, Yu, & Chen, 2014) found that an intervention – delivered when children were 11 years old – that focused on improving parenting, parent-child communication, and helping children develop strategies for dealing stressors actually resulted in reducing inflammation. This was a randomized controlled study involving low-SES families in which the extent of inflammation was assessed 8 years after the intervention when the children were 19 years old.

Inflammation was lowest among youth who received, as a result of the intervention, more nurturing-involved parenting and less harsh-inconsistent parenting. They also found that the intervention was most effective in reducing inflammation with the most disadvantaged families. If additional studies are able to replicate these findings with different parenting training programs, a profound impact will be realized in the field. It is quite possible that specific parent training programs will be found to not only impact a child's behavior but also their future health.

Conclusion

Parent training has made tremendous advances since the early work of Gerald Patterson and Constance Hanf over 50 years ago. It continues to be a dynamic and ever-expanding intervention across different target populations around the world. The research base supporting its effectiveness also continues to expand; however, much work remains to be done. We need to better understand the moderators and mediators that impact the effectiveness of parent training programs. We need to better understand what works best for whom. Programs also need to evolve to meet the changing needs and multiple-service delivery systems within our society. We also need to continue to improve our understanding of how to more effectively disseminate programs and take them to scale.

Overall, the future of parent training continues to look bright as the field explores ways to increase the effectiveness of an approach that is still considered the treatment of choice for various child behavior problems.

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Cognition and Memory

Corey I. McGill and Emily M. Elliott

Contents

Cognitive Development

As children develop, their performance on a number of cognitive tasks improves. Generally, this is due to an increase in cognitive functioning as children age, but what elements specifically contribute to this development is still a major area of research focus. What is clear is that children become more organized and efficient with their cognitive capabilities. In this chapter we will broadly review a few areas that have been studied. These include functional improvements in attention and strategy use, as well as potential structural changes in the capacity of working memory, and the efficiency of retrieval from long-term memory.

Functional Changes in Attention and Strategy Use

Attention

One commonly asserted cause of cognitive improvements across development is a greater ability to avoid distraction from irrelevant stimuli in the environment. While attention as a construct can be broadly conceived, the focus of this section will be on *selective attention*, which we define here as the ability to selectively attend to relevant stimuli while ignoring irrelevant stimuli. The ability to select which items a child pays attention to can greatly impact their ability to focus and complete tasks in the face of external distracting stimuli.

One area of research has explored the early development of attentional processes, starting with infants. Evidence suggests that infants

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demonstrate facilitative selective attention effects very early on, and as early as 4 months old, they also begin to develop a form of selective attention that includes both orienting to a target and suppression of distractor information (Markant & Amso, 2016). For example, during a visual search task, infants are presented with a visual array, such as images of cats and dogs, and must identify a specific item in the array. During the task, infants must focus their attention to identify the target rapidly and avoid searching the same area for a target more than once. This attentional mechanism is known as *inhibition of return*, and it has been demonstrated by studying the eye movements of 4-month-old children (Markant & Amso). However, despite the impressive ability to demonstrate inhibition of return at a very young age, children continue to experience significant improvements in selective attention throughout development.

Attention Capture

There are multiple ways that attention can be oriented from one target to another. *Attention capture* is the automatic focusing of attention on a stimulus. For example, *pop-out effects* occur when a target in a visual search task has some unique visual feature, distinct from nontargets in the array. In these instances, individuals are faster to identify the unique target in the visual array than to identify the target when nontarget stimuli share many features. Additionally, the number of items in the array does not affect response time in pop-out trials, but does affect response times in control trials. These pop-out effects have been shown in both children and adults, indicating that the individual's attention is being automatically drawn to the visually distinct stimulus, even in young children (Gerhardstein & Rovee-Collier, 2002).

However, despite children showing a similar effect of attention capture when attention capture can facilitate performance and when attention capture harms performance, children perform worse than adults. For example, on *Stroop tasks*, individuals are typically asked to name the color of ink a word is written in; however, the word itself may be congruent with the ink color or incongruent with the ink color. In order to complete the task, individuals must hypothetically suppress the automatic response that occurs when reading a word and instead respond with the color the word is written in. One interpretation of this finding is that the prepotent response suppression requires that the individual control their attention and avoid the automatic processing of the irrelevant word for meaning (e.g., Wright, 2016). Children who have learned to read show significantly longer response times when compared to adults, until they reach around age 8 (Schiller, 1966). The work of Wright (2016) indicated that children were more likely than adults to commit the error of *inadvertent reading*, which occurs when participants read the written word, rather than the task of naming the color of the word. This finding was interpreted with respect to attentional control difficulties in children, relative to adults, who are better able to avoid inadvertently reading the word and maintain the task goal of naming the word color (see also Kane & Engle, 2003; MacLeod & MacDonald, 2000).

Additional support for the development of selective attention abilities in children comes from a paradigm known as the *irrelevant sound effect (ISE)*. The ISE refers to the worsened performance on serial order recall during the presence of changing auditory stimuli, relative to silence. In adults, the ISE has been shown *not* to be caused by attention capture, in part due to findings that illustrate the lack of a relationship with individual differences in a measure of attentional control (e.g., working memory capacity; Elliott & Briganti, 2012). However, when children perform serial recall, they show markedly larger effects of the irrelevant sound compared to adults. This developmental difference is thought to be caused by an attentional effect occurring in children that is not occurring in adults (Elliott, 2002; Elliott & Briganti; Elliott et al., 2016). Children are unable to avoid the distracting effects of the irrelevant stimuli; thus they demonstrate not only the typical ISE that is observed in adults but also an additional effect of attention capture. Once children mature beyond around age 7, the additional effect of attention capture during the ISE is lessened, until the magnitude of the disruptive effect on serial recall becomes adult-like (Elliott).

Additionally, children with auditory processing disorders (APD) demonstrate differential effects of auditory distractors than their typically developing peers. While typically developing children show a smaller magnitude ISE when the distracting auditory stimuli are tones, children with APD showed no difference between tones and words as auditory stimuli in the ISE paradigm (Elliott, Bhagat, & Lynn, 2007). These results suggested that children with APD process auditory stimuli differently, without the same type of differentiation between speech and tone stimuli seen in typically developing peers. Overall, the children showed significant effects of the distracting stimuli, which were irrelevant to the task. This pattern of irrelevant stimuli influencing children's performance occurs in visual stimuli as well and is not restricted to the auditory domain (e.g., Enns & Akhtar, 1989).

Thus, it is clear that while children grow, their attention develops and changes as well. For example, children and adults control attention to avoid repeated searching (Markant & Amso, 2016), and both have their attention captured by similar stimuli, as evidenced by the early onset of pop-out effects (Gerhardstein & Rovee-Collier, 2002). Furthermore, researchers have suggested that children and adolescents with a diagnosed anxiety disorder do not differ from matched controls in their performance on a basic visual search task and the pop-out effect (Lubow, Toren, Laor, & Kaplan, 2000). However, attentional processes also go through a number of changes during development. Children show larger attention capture effects to the same stimuli as adults in Stroop tasks (Wright, 2016) or even show attention capture effects where adults show none, like in serial recall tasks with irrelevant sounds (Elliott et al., 2016). Without these improvements of selective attention throughout childhood, adults would be easily distracted by environmental stimuli to a much larger degree.

Strategy Use

Another area of well-known growth and change is in the development of strategies to improve performance on cognitive tasks. Strategies like rehearsal, visual imagery, mnemonics, categorization, and others all improve/develop with experience. However, children have difficulty in transferring skills from the learning context to a new context (Clerc, Miller, & Cosnefroy, 2014), but transfer of cognitive abilities from the learned context to the real world is important for development. This becomes an issue due to changes in setting from acquisition of a strategy to use in day-to-day life. Effective cognitive strategies are often useful in a number of different settings, but these changes in setting may result in inconsistent strategy usage and/or efficacy.

Two types of similarities across situations can impact the transfer from strategy learning to strategy application. *Structural similarities* are similarities between the learned context and applied context that facilitate the transfer of a strategy. *Superficial similarities* are similarities between the learned context and applied context that do not facilitate the transfer of a strategy. For example, similar task demands would be an example of a structural similarity, while location may only be a superficial similarity. Chi and VanLehn (2012) proposed that children must evaluate a situation to determine which similarities are structural and which are superficial for successful strategy transfer. Higher cognitive demands, such as an increased working memory load within a given task, have been demonstrated to limit transfer effects, possibly by interfering with the ability to identify and categorize similarities across contexts.

However, once children identify the opportunity to apply a previously learned strategy to a new context, they still must appropriately apply that strategy. *Strategy utilization deficiency* (Miller, 1990) occurs when children can appropriately identify a strategy to use but demonstrate either no effect of the strategy on performance compared to control children who did not learn the strategy or do not show the expected increase in performance typically shown in other children.

Causes of strategy utilization difficulty include high cognitive load, low intelligence, poor metacognition, and a weak knowledge base.

Rehearsal

One example of a commonly studied strategy during development is *subvocal rehearsal*. Subvocal rehearsal is the covert recitation of relevant to-be-remembered stimuli. Flavell, Beach, and Chinsky (1966) demonstrated that before age 7, most children do not demonstrate key indicators of rehearsal. For example, kindergarten-aged children performing a serial order recall task did not verbalize during the presentation of stimuli, during the delay before recall, or during the recall period as often as second or fifth grade students (Flavell et al., 1966). Additionally, children who were identified as producing those verbalizations have been shown to perform significantly better on serial recall tasks. Training children to rehearse produced levels of serial recall that were equivalent to those rehearsing originally (Keeney, Cannizzo, & Flavell, 1967).

The hypothesis that young children do not rehearse was further supported by evidence from research on the *phonological similarity effect (PSE)*. The PSE is the lowered recall of to-be-remembered items when those items share phonological characteristics with each other, such as lists of rhyming letters like “B,” “V,” and “G,” when compared to phonologically distinct items, such as “X,” “L,” and “R.” The multicomponent model of working memory (Baddeley, 2000) proposed that the PSE is a rehearsal effect caused by phonologically similar items interfering with each other during rehearsal, because they are being coded in a verbal or acoustically based form that relies upon the sound of the item. Before age 7, children have been shown not to demonstrate a PSE (Hitch, Halliday, Schaafstal, & Heffernan, 1991). Taken with the earlier work of Flavell and colleagues (Flavell et al., 1966; Keeney et al., 1967), this finding was traditionally seen as evidence for the development of rehearsal as an effective strategy occurring around the age of 7.

Recent research, however, has begun to question this assertion of rehearsal development in young children. First, a reexamination of the PSE revealed that prior work using the raw difference between phonologically similar and dissimilar stimuli did not lead to an accurate representation of the PSE (Jarrold & Citroën, 2013). By taking into account baseline levels of recall, and reexamining the PSE as a proportional effect, it was shown that children as young as 5 demonstrated the effect. Furthermore, the effect was equivalent in magnitude to older children and adults. Additionally, even children as young as 5 have been shown to demonstrate improvements due to training on rehearsal, and those improvements are equivalent to the improvements demonstrated by 8- and 9-year-old children who are traditionally believed to demonstrate rehearsal skills without being explicitly taught (Miller, McCulloch, & Jarrold, 2015).

Finally, research examining the PSE in typically developing children, children with Down syndrome, and children with Williams syndrome revealed some unexpected findings (Danielsson, Henry, Messer, Carney, & Rönnberg, 2016). Although the verbal abilities of the children with Williams syndrome matched those of the typically developing children, the results indicated no effect of phonological similarity on recall for the children with Williams syndrome. However, both the typically developing children and the children with Down syndrome showed a significant PSE. The results of Danielsson et al. (2016) suggest that the link between phonological recoding, rehearsal abilities, and memory span performance in children with Down syndrome and Williams syndrome needs additional consideration, especially as compared to typically developing peers.

Research into strategy use in children has revealed a number of important findings regarding the ability of children to benefit from these strategies, with a large number of studies conducted in the areas of children’s rehearsal and metacognitive awareness of their own memory performance (e.g., Baker-Ward, Ornstein, & Holden, 1984; Flavell, Friedrichs, & Hoyt, 1970; Miller et al., 2015). The consensus of these studies suggests that very young children, such as 3–4-year-olds, can engage in strategic behaviors to attempt to remember information and that these behaviors reliably improve with increasing age. However, the mechanisms underlying these developmental improvements remain an area for future research. As an interventional strategy for improving memory performance, overt training of rehearsal-type skills seems to improve performance in both typically developing (Keeney et al., 1967; Miller et al., 2015) and intellectually disabled children (Belmont & Butterfield, 1971).

Structural Increases in Working Memory and Retrieval Efficiency in Long-Term Memory

Working Memory

Working memory (WM) is the currently activated portion of memory at any given time. We use WM not only to briefly store information for short-term memory tasks but also to store information from long-term memory when the environment elicits a specific memory. The complexity of WM lends itself to a number of developmental changes throughout childhood. Additionally, performance on working memory tasks has been shown to predict numerous abilities and aptitudes, including children's academic achievement on national tests (Gathercole, Brown, & Pickering, 2003), classroom behavior (Gathercole, Lamont, & Alloway, 2006), and high school grade point average (Cowan et al., 2005).

Capacity Changes in Working Memory

WM capacity is measured by identifying the amount of information an individual can hold in mind, in an immediate sense (see Cowan, 2016a, for more information on the measurement of WM capacity). One commonly utilized WM capacity measure is the *complex span task*. Complex span tasks require individuals to store the serial order of information while simultaneously processing stimuli (Foster, Shipstead, Harrison, Hicks, Redick, & Engle, 2015). For example, in the popular symmetry span task, a participant would identify the vertical symmetry of a visual stimulus and then remember the serial order of red squares on a 4 × 4 grid. This cycle would repeat until three to seven squares were displayed. The processing component of complex span tasks (e.g., the symmetry judgment) requires the individual to devote all or most of their WM resources to the task and limits the number of strategies the individual can use to recall the stored items (e.g., the serial order of the red squares).

Complex span tasks with stimuli that are designed for use in adults often produce floor effects with children, so modified tasks are used (e.g., Case, Kurland & Goldberg, 1982; Kail & Hall, 1999). The need for differential tasks suggests a distinct developmental difference in WM capacity as children age. One explanation for this change is an actual improvement in the size of WM capacity during development. As children develop, they improve on almost every measure of raw memory span from digit span (Cowan et al., 2005) to visual arrays (Kuhn, 2016). Additionally, Hitch, Towse, and Hutton (2001) demonstrated an increase in performance on two distinct complex span tasks across children aged 9–11, indicating an increase in working memory capacity as children age. As complex span tasks are thought to limit the ability for strategies, such as rehearsal, to improve memory performance, the fact that WM capacity improves during children's development may suggest that WM capacity is truly growing during childhood (e.g., Cowan, 2016b; Cowan, Ricker, Clark, Hinrichs, & Glass, 2015). However, there are other possible explanations for the improvements of WM capacity during development.

Another explanation for the increase of WM capacity is that individuals develop strategies and long-term memory representations to facilitate recall of items during WM capacity tasks. For example, adults might be able to devote a small portion of their resources on rehearsing the stored items even during the processing component of the task or use some type of semantic memory strategy to facilitate later recall. As children are in the process of discovering, perfecting, and adapting cognitive strategies to improve their memory in the real world (Clerc et al., 2014), they may also be developing strategies to facilitate memory without tapping into the processes blocked by the processing component of a complex span task. The development of these strategies would continue throughout normal development and thus result in improved performance on complex span tasks without increased capacity. Additionally, children may be relying on superficial similarities in strategy selection over structural similarities (Chi & VanLehn, 2012), resulting in inefficient strategy utilization during complex span tasks and lessening performance.

While it is clear that working memory capacity increases with development, the precise cause of this capacity change is debated. Some researchers point to an increase in the actual capacity itself (Cowan, 2016a, 2016b; Cowan et al., 2015), while others suggest that factors such as the utilization of strategies and the increased knowledge base from long-term memory lead to the improvements in memory performance (Clerc et al., 2014). Finally, the executive attention view suggests that what may appear as differences in WM capacity are actually differentially efficient processes of WM. In other words, developmental changes in WM capacity tasks may be the result of increased and improved attentional processes, which lead to an improved ability to retain information in the short term (Engle & Kane, 2004). While there is disagreement as to the cause of these improvements, many agree that the numerous connections between the processes of attention, working memory, and long-term memory are another key element of the improvements in cognitive functioning that are seen in children's development.

Long-Term Memory

With increasing life experiences come an increased number of prior memories which a developing child must store. These memories of the past are stored in *long-term memory*. However, while it is difficult to say when memories in WM move to long-term memory, most cognitive models identify the two as separate (Atkinson & Shiffrin, 2016; Baddeley, 2000; Cowan, 2016a). Long-term memory can be divided into episodic and semantic memory, and these constructs will both be discussed, as well as a suggestion to improve learning of semantic memory facts over the course of child development.

Episodic Memory

The form of long-term memory for personally experienced events is known as *episodic memory*. We are consistently acquiring new episodic memories, and these can guide the way we think and act by providing important prior information and contextual details. However, in children, episodic memories are significantly less complex (Yim, Dennis, & Sloutsky, 2013), which results in a lessened impact of episodic memories on future behavior. For example, if a child needs to access information from a particular event, like where they left their backpack when they arrived home from school, they will have a less complex representation of arriving home from school and may struggle to remember its location. Additionally, Yim et al. (2013) suggested that children may suffer from more interference from similar episodic events, so children will be less able to distinguish their episodic memory for arriving home from school today from arriving home from school yesterday.

Semantic Memory

In contrast to episodic memory, s*emantic memory* is the general knowledge of the world. Adults use this general world knowledge frequently and efficiently, but children begin with little-to-no semantic memory to draw upon. As children age, they begin to build their semantic memory through the use of *semantic networks*, or a network of interrelated concepts and ideas and their meanings. For example, a semantic network of the concept "bird" would include required features of birds (feathers, wings, etc.), characteristic features of birds (flight), and all of the known examples a person has of animals that fit into the category of birds (robin, chicken, ostrich, etc.). These semantic networks are intertwined with each other and make up a majority of long-term memory.

Possibly the most important use of semantic networks is *spreading activation* or the idea that when one item in a semantic network is activated, memory-related items also become activated to facilitate memory of that item (Collins & Quillian, 1969; Loftus, 1973). When an individual thinks about the concept of bird, it is important to also know the required and characteristic features of a bird, as well as to have examples of birds readily available in mind. However, despite the importance of semantic memory and spreading activation, in adulthood both heavily rely on language. In order to build an efficient semantic network, individuals use a linguistic system to organize the information. Despite not having language to rely on, even infants demonstrate characteristics of spreading activation (Barr, Walker, Gross, & Hayne, 2014). As children's language matures, so do the complexity and sophistication of their semantic network, and children begin to rely on lexical information more to build and access their semantic networks.

Understanding semantic memory networks can be leveraged to help to teach children to increase their ability to learn information and to integrate semantic memory details. Research by Bauer, Blue, Xu, and Esposito (2016) has demonstrated that 7–10-year-old children can learn new information at one time and then learn related but different information at a later time and can demonstrate "self-generation" of knowledge. For example, children were exposed to facts, such as "A wombat is a marsupial" and "Marsupials keep their babies in a pouch." Then later, children were asked through either open-ended questioning or forced-choice recall to answer an integration question, such as "Where do wombats keep their babies?" The results of three experiments indicated that children were able to integrate knowledge and correctly answer the integration questions under differing presentation conditions. Because the acquisition of knowledge through direct instruction is an important means of success in school children, it is important to study these other means of learning, such as the self-generation of facts from previously learned, but not previously integrated, information.

Final Conclusions and Directions for Future Research

This chapter cannot be concluded without a discussion of the recent debates regarding the training of cognitive capabilities. The central importance of working memory for many higher-order cognitive abilities has led many researchers to test the possibility of training working memory in children. If young children could be trained to increase their working memory capacity, the potential outcomes cannot be understated. However, despite the promise of this area of research, efforts have revealed a number of conflicting findings. A recent issue of *Psychological Science in the Public Interest* was devoted entirely to the issue of "brain training," which extends beyond working memory training into a larger class of training programs (Simons Boot, Charness, Gathercole, Chabris, Hambrick, & Stine-Morrow, 2016). One of the main problems within this research is determining whether or not the trained abilities can transfer to other abilities, for example, if learning in one aspect of a working memory task could transfer to an entirely new task. Furthermore, researchers have questioned if working memory training could even lead to improvements in other areas of cognition, such as general fluid intelligence. The conclusions from the Simons et al. (2016) review suggested that there was little evidence of transfer beyond the tasks being trained. However, research has suggested that the individual temperaments of the children may be an important factor in the likelihood of transfer of working memory training to other abilities (Studer-Luethi, Bauer, & Perrig, 2016). Additionally, researchers have begun to apply the concept of working memory training as an intervention for anxiety and depression (de Voogd, Wiers, Zwitser, & Salemink, 2016), but this research is at an early stage, and more work needs to be done.

The critical changes that occur in cognitive abilities over the course of child development help children to become efficient information processors as adults. Important functional improvements in selective attention abilities and strategy use are reflected in other aspects of the cognitive system and are connected to developmental improvements in working memory capacity, efficient retrieval of facts from long-term memory, and the ability to acquire new information into adulthood. These topics are rich areas for future study, and many scholars are drawing upon the well-tested paradigms within cognitive psychology to extend them to clinical populations and to expand the knowledge of the field of child development (e.g., Danielsson et al., 2016; Elliott et al., 2007; Jarrold, 2017; Lubow et al., 2000; Majerus & Cowan, 2016). Additional work is needed, with an emphasis on an interdisciplinary approach to unite researchers within the cognitive and clinical traditions.

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Handbook of Childhood Psychopathology and Developmental Disabilities: Treatment

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Contents

The Impact of Developmental Disabilities and Psychopathology on Academic and Social Outcomes

Academic skills are broadly defined as a collection of study habits, oral and written communication skills, learning strategies, analytical thinking processes, and time management tools that help students learn and acquire new information. Unfortunately, children with developmental disabilities, learning disorders, intellectual disabilities, and/or externalizing/internalizing disorders are at increased risk of poor academic outcomes and school dropout, if they do not receive appropriate instructional and behavioral interventions, modifications, and/or accommodations (Hammond, Lipton, Smink, & Drew, 2007; Nelson, Benner, Lane, & Smith, 2004). Chronic difficulties with academics also increase risk for long-term adverse outcomes during adolescence and adulthood including mental health disorders, criminal behaviors, economic hardship, occupational instability, and substance abuse (Fergusson & Woodward, 2002; Nock, Holmberg, Photos, & Michel, 2007; Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2011; Vaughn,

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Salas-Wright, & Maynard, 2014). Given these long-term negative life outcomes, the need for students to receive supports designed to promote optimal learning and behavior within academic settings is critical.

A number of different professionals in addition to the child's teachers may play a role in helping to improve academic outcomes for students with disabilities, disorders, and/or behavioral problems by providing consultation within an academic setting. These professionals include but are not limited to psychologists, school psychologists, therapists, counselors, and clinical social workers (referred to as clinicians hereafter).

The following sections will provide an overview of disabilities and psychopathologies that may impact a student's academic performance, the consultation process within an academic setting, an overview of federal regulations related to education, and examples of school-based interventions, accommodations, and modifications designed to promote academic success.

Definitions of Disorders

Externalizing Behavior Disorders

Externalizing behavior disorders [e.g., attention-deficit/hyperactivity disorder (ADHD), conduct disorder (CD), oppositional defiant disorder (ODD)] and academic difficulties have been cited as the most common problems in childhood (Metcalfe, Harvey, & Laws, 2013), and there is high comorbidity between academic difficulties and behavior problems in the classroom (King, Lembke, & Reinke, 2016). Disruptive behaviors such as noncompliance, inattention, aggression, impulsivity, and hyperactivity interrupt the classroom process and make it difficult for teachers to carry out academic instruction (Owens, Holdaway et al., 2012), negatively impacting academic performance (Liu, 2004; Scope, Empson, McHale, & Nabuzoka, 2007). In fact, children who have a diagnosis of ADHD are more likely to repeat a grade, exhibit noncompliance in the classroom, receive special education services, and/or be expelled or suspended from school (Hinshaw, 1992; Loe & Feldman, 2007; Owens, Holdaway et al., 2012). Students who exhibit oppositional and conduct problems such as school refusal, bullying, difficulty complying with requests, and aggressive behavior are more likely than their peers to experience school expulsion, persistent academic difficulties, and academic failure despite adequate cognitive functioning (Campbell, Spieker, Burchinal, & Poe, 2006; Robins, 1991). However, a comprehensive evaluation is needed to discern the origins and interactions between externalizing behavior problems and academic functioning (King et al., 2015).

Noncompliance is defined as verbally refusing to comply with teacher requests, ignoring instructions, or becoming physically aggressive. Noncompliant behavior negatively impacts academic functioning, interferes with student learning, prevents teachers from carrying out instructional tasks, and very often precedes and/or maintains disruptive classroom behavior (Cipani, 1992, 1993; Ford, Olmi, Edwards, & Tingstrom 2001). Compliance in a classroom setting allows for maximum educational opportunities and benefits a student academically, behaviorally, socially, and emotionally (Ritz, Noltemeyer, Davis, & Green, 2014).

Internalizing Disorders

Internalizing disorders such as anxiety and depression are common, with prevalence rates of up to 20% in children prior to age 18 (e.g., Chavira, Stein, Bailey, & Stein, 2004; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Lewinsohn, Rohde, & Seeley, 1998; Merry et al., 2012; Price et al., 2013; Werner-Seidler, Perry, Calear, Newby, & Christensen, 2017). Children with internalizing disorders are at increased risk for poorer social functioning and academic outcomes (Owens, Stevenson, Hadwin, & Norgate, 2012). However, due to the subtler classroom presentation of internalizing disorders as compared to disruptive behavior disorders, internalizing symptoms often go unrecognized and unaddressed despite their detrimental impact.

In the classroom setting, anxiety can lead to inattention, reduced participation in discussions and/or activities, hesitation or avoidance of asking for clarification or other assistance when needed, missed assignments, social difficulties, and academic underperformance (Coplan, Girardi, Findlay, & Frohlick, 2007; Gimpel Peacock & Collett, 2010; Nelson, Rubin, & Fox, 2005). Anxious distraction impairs memory skills, making more effort necessary for school tasks (Owens, Stevenson, Norgate & Hadwin, 2008). Annually, approximately 2–5% of students exhibit avoidance of school entirely, known as school refusal (Wimmer, 2003). Therefore, clinicians and families working with children affected by anxiety should provide school staff with psychoeducation regarding anxiety and optimal school supports within a classroom setting.

Rates of depressive symptoms in preschool children have been estimated to be about 5–6%, while rates of depressive symptoms in school-aged children have been estimated to be 7–10% (Andreas et al., 2017). In an academic setting, students with depression may demonstrate higher levels of inattention, irritability, school absences, tardiness, social conflict, and risk for substance abuse problems (Crundwell & Killu, 2007). Further, children with depression are more likely to experience academic failure due to difficulties completing assignments, persisting on tasks, excessive focus on depressive cognitions, and feeling academically incompetent and unmotivated to perform (American Psychiatric Association [APA], 2013; Hartlage, Alloy, Vázquez, & Dykman, 1993; Huberty, 2010).

Developmental Disabilities

Developmental disabilities are lifelong conditions that negatively impact development, manifest early in life, and can cause impairments in academic, social, occupational, physical, and/or intellectual functioning (Baker, Blachner, Crinic, & Edelbrock, 2002). Examples of common developmental disabilities include autism spectrum disorder (ASD) and intellectual disabilities (ID; APA, 2013). Children as young as three with developmental disabilities have increased behavior problems relative to their same-aged peers (Baker et al., 2002), and behavior problems in children with developmental disabilities are predictive of academic failure (Baker et al., 2002; Eisenhower, Baker, & Blacher, 2005).

ASD is a developmental disability estimated to affect 1 in 68 children in the United States (Christensen, Baio, & Braun, 2016). ASD is characterized by persistent deficits in social communication and the presence of restricted and repetitive patterns of interests, behaviors, or activities that can affect academic functioning in many ways (APA, 2013). The presentation of ASD is heterogeneous, ranging from nonverbal students with severe impairments in intellectual, social, and adaptive functioning to high-functioning students in gifted programs who have milder impairments in social communication. Students with ASD with average or above intelligence have been found to have difficulties with listening comprehension, written or oral language, reading comprehension, sensory functioning, attention, problem-solving, and graphomotor and organizational skills (Barnhill, Hagiwara, Smith Myles, & Simpson, 2000; Dickerson Mayes & Calhoun, 2003a, 2003b, 2008; Goldstein, Minshew, & Siegal, 1994; Griswold, Barnhill, Smith Myles, Hagiwara, & Simpson, 2002; Minshew, Goldstein, Taylor, & Siegel, 1994; Whitby & Mancil, 2009). Students with ASD may require more support to succeed in group activities in school. Some students with ASD may also have an ID that affects learning (APA, 2013).

ID is a type of developmental disability characterized by deficits in cognitive functions such as reasoning, academic learning, problem solving, abstract thinking, and adaptive functioning that begin during childhood (American Association on Intellectual and Developmental Disabilities, 2017). ID results in failure to meet developmental and sociocultural standards for independence and limited functioning in activities of daily living (APA, 2013). As a result of cognitive impairments and deficits in adaptive functioning, children with ID are at an increased risk for academic failure, social-emotional concerns, and behavior problems (McIntyre, Blacher, & Baker, 2006).

Specific Learning Disorders

A specific learning disorder is characterized by difficulties learning and using academic skills, despite intervention (APA, 2013). Difficulties in learning include slow or inaccurate and effortful word reading, difficulties with reading comprehension, poor written expression, spelling concerns, poor understanding of numbers, and difficulties with mathematical reasoning. In order to qualify as a learning disorder, academic skills must be substantially and quantifiably below what is expected for a child's age and interfere with academic performance. Children with learning disorders may experience learning difficulties early in their schooling including understanding new material, completing assignments, and staying focused on tasks (Hinshaw, 1992). However these difficulties may not become problematic until academic demands exceed a child's capacity to understand new concepts and complete assignments (APA, 2013). In addition to academic difficulties, children with learning disorders are at increased risk for low self-esteem, isolation, language deficits, and interpersonal difficulties (Hinshaw, 1992).

Collaborative Consultation Within Academic Setting

Due to potential negative outcomes for students with defined disorders, it is imperative for clinicians to understand how to engage in collaborative consultation relationships with the student's school and family. In this way, collaborators can determine the most appropriate evidence-based intervention and/or accommodation to meet the student's needs. Generally, consultation refers to a process in which a professional assists a consultee (e.g., parent, teacher, speech therapist) with a problem (e.g., student performance or behavior) within a system (e.g., school), with the goal of helping the consultee and system in a specific manner (Natale, Ulhorn, & Malik, 2012; Rosenfield, 2008). Consultation relationships are typically defined as professional peer relationships where parties have equal authority, but the consultee is in need of specific assistance.

Before initiating a consulting relationship, the clinician must identify and define the consultee(s) and members of the consultation team charged with determining, implementing, and monitoring the needs and supports of the student. In addition to identifying members of the consultation team, the clinician should define their specific role in the consultation process. Clinicians may be utilized to help with:

- Facilitation of parent-teacher conferences
- Development and implementation of school-based interventions to manage child behavior
- Advocating for student accommodations or modifications
- Modification of teacher response to child behavior
- Restructuring of classroom environment to optimize child learning and behavior
- Tailoring or adapting instructional methodologies
- Improving skills and knowledge of parents and professionals who work with the child within the educational setting

Ethically, the clinician must assess their level of competence to provide school-based consultation for the child's specific needs. Clinicians may conduct a self-assessment of their competence to provide consultation by answering the following questions:

1. Have I worked with the presenting concern in the past?
2. Am I up to date on the existing literature in this area?
3. Am I familiar with this school setting/educational model/discipline model?
4. Do I have the resources and knowledge needed to provide consultation?

If the clinician does not work within the school setting, they should consider parents' willingness for the clinician to act on their behalf with school personnel and what content will be shared before proceeding with school consultation. The clinician should also consider the following before engaging in the consultation:

1. What is the existing relationship between parents and school teachers/personnel?
2. To what degree do parents feel comfortable sharing that their child is receiving services (e.g., therapy, medication management) outside of the school setting?
3. What will be the parents' role in establishing and/or maintaining the collaboration with the school?
4. How can the parent be empowered to maintain strategies and/or accommodations that are implemented at school after the consultation relationship with the school is terminated?
5. To what degree are school administrators open to external consultants?
6. What resources already exist within the school that may be important to any recommended intervention, accommodation, and/or modification plans?

Teacher resistance should be taken into consideration prior to initiating a consultation relationship. Teachers may question the validity of external experts with no direct classroom experience providing consultation (Spratt, Shucksmith, Philip, & Watson, 2006), and it is imperative for the clinician to view the teacher as the expert in providing instruction to children. However, when teachers understand students' cognitive and behavioral deficits based on testing (Hart et al., 2016), and/or when teachers provide high levels of emotional support for students (Cappella et al., 2012), they are more likely to be receptive to consultations. High levels of student poverty are related to limited receptiveness to school consultation, likely due to the many other competing demands and needs of these student populations (Reinke, Stormont, Herman, Puri, & Goel, 2011). Other factors that may possibly contribute to teachers' willingness to engage in the consultation process include culturally sensitive communications among the consultation team, perceptions of the student's locus of control, and teacher belief in the efficacy of psychotropic medication versus behavioral interventions to manage behaviors.

Example Models of Consultation

Conjoint behavioral consultation (CBC; Sheridan & Kratochwill, 2008) is a collaborative consultation model in which parents, teachers, school personnel, and a behavioral consultant (e.g., psychologist, school psychologist, therapist) partner to promote positive outcomes related to a student's academic, behavioral, and socioemotional functioning. The CBC model focuses on having all parties partner to enhance student outcomes through collaborative problem solving, mutually developed intervention plans, operational definitions of responsibilities for implementation of plan at school and home, and goal progress monitoring (Sheridan, Ryoo, Garbacz, Kunz, & Chumney, 2013). The CBC model differs from traditional school consultation models in that parents are taught and encouraged to implement strategies used at school in order to promote generalization of improvements across settings. The CBC model has been shown to be effective in improving student academic performance, behavior, and socioemotional functioning at home and school (Colton & Sheridan, 1998; Mautone et al., 2012; Murray, Rabiner, Schulte, & Newitt, 2008; Power et al., 2012; Sheridan et al., 2012, 2013; Wilkinson, 2005).

Instructional consultation is a consultee-centered consultation approach that simultaneously focuses on "content (i.e., instructional assessment, evidence-based academic and behavioral interventions) and process (i.e., problem-solving steps, which include data collection, and the collaborative working relationship with the classroom teacher; Rosenfield, Gravios, & Silva, 2014; pp. 249)." Instructional consultation focuses on addressing an instructional triangle that evaluates the match between student knowledge, instruction approach, and assigned task expectations (Newman, Salmon, Cavanaugh, & Schneider, 2014; Rosenfield, 2008). A data-driven approach is taken to examine any potential mismatches or gaps between the student's current and expected performance, which may require intervention. Through collaboration between the teacher and clinician, evidence-based strategies that allow for progress monitoring are implemented if mismatches exist in the instructional triangle (Rosenfield, 2008). Monitoring of implementation of evidence-based strategies is conducted to determine if there are increases in student performance following intervention or if troubleshooting is required.

The test drive model of consultation (Dart, Cook, Collins, Gresham, & Chenier, 2012) was developed and evaluated due to concern about teacher integrity and perceived acceptability of interventions. Evaluation of this model indicated that when teachers are able to try out or test drive different evidence-based interventions and then select the intervention they view as the most acceptable, the intervention is implemented with increased integrity (Dart et al., 2012).

Consultation Process

Generally, consultation is utilized as a collaborative process between the clinician, teachers, and family to help teachers modify instructional behavior to promote optimal student outcomes (Rosenfield, 2008; Sheridan et al., 2013). The consultation process generally includes identifying the problem, selecting an intervention, planning the intervention, implementing and monitoring the plan, and terminating the consultation relationship (Rosenfield et al., 2014).

Identifying the Problem Behavior

In order to implement optimal interventions and supports, the behavioral function of the individual student's problematic or interfering behavior in the classroom must be understood (Hanley, Iwata, & McCord, 2003). Within school settings, functional behavior assessments (FBA) are often utilized to operationally define the antecedents, functions, and maintaining consequences of defined problem behaviors (Iwata et al., 2000). An FBA is also utilized to develop a behavior intervention plan (BIP) that modifies variables related to the problem behavior and teaches or allows opportunities for students to learn replacement behaviors designed to improve the problem behavior (Iwata et al., 2000). Within a school-based FBA, the consultation team is first charged with operationally defining the problem behavior(s) to be addressed in specific, measurable, and observable terms. The examination of antecedents or the events (e.g., interactions, setting, environmental change, external factors) that immediately precede the problem behavior help the consultation team determine when the problem behavior is most likely to occur. Further, examination of the student's positive and/or negative consequences following the problem behavior will help the team understand how the student receives reinforcement. The FBA should also provide a better understanding of the desired behaviors the student is not yet exhibiting.

The collection of direct and indirect multi-method and multi-reporter baseline data is imperative to understand the function of the problem behavior and develop and implement intervention plans. Student performance can be evaluated via universal screening or standardized testing, academic work samples, behavioral observations, clinical interviews, psychoeducational evaluations, objective and subjective parent and teacher rating of student performance and emotional and behavioral functioning, student self-report, and psychosocial history of family. Teacher-level data can be evaluated via self-report of classroom instructional and behavioral management practices (including strategies already used with the identified student) and observation of teacher instruction. When conducting behavioral observations, the problem behavior should be monitored until it has been observed multiple times in each setting and situation it occurs. Classroom environment data can be collected by examining the structure of the classroom environment, including seat assignments, how desks are organized, and visual and audio supports used during instruction. Through this process, the consultation team should begin to identify targeted positive behaviors that the child is not yet exhibiting but that would be a desired outcome of any implemented intervention. While the baseline data available will vary for each consultation, it is imperative for the clinician to feel confident that the data collected is representative of the student's typical functioning. Once appropriate levels of data are collected, the team should utilize data-informed decision-making to select evidence-based interventions and/or accommodations to meet the individualized needs of the student.

Intervention Planning

Once enough data is collected about the identified behavior, a meeting should be arranged between all personnel involved in the student's care in order to discuss the findings of the FBA and to develop a BIP. A BIP is a formal document created by utilizing information and data obtained through the FBA to guide in the design, implementation, and evaluation of behavioral intervention strategies for a student. Students can have a BIP in the general education setting, or the BIP can be part of an IEP for students in a special education program. The content includes target behavior goals, intervention strategies to be implemented, people responsible for implementing interventions, measures used to monitor progress, and a timeline for progress monitoring (Rosenfield, 2008). The BIP includes consideration of proactive interventions designed to reduce the likelihood of the problem behavior occurring, instructional interventions to replace the problem behavior, and a reinforcement plan for when the student exhibits the adaptive replacement behavior.

Intervention Implementation

Upon intervention implementation, it is important for the consultant to be available for initial technical assistance or coaching to ensure that the intervention is implemented with fidelity. However, the consultant needs to maintain an approach of building the teacher's capacity to successfully implement an intervention that promotes the teacher's self-efficacy versus dependency on the consultant (Natale et al., 2012). The use of coaching and problem-solving with the teacher related to implemented strategies may increase the success of the intervention while simultaneously building the capacity of the teacher. As a part of implementation, the teacher, consultant, and parents need to collectively decide when the desired outcome of improved student academic performance has been met. This allows the consultation team to consider other interventions or accommodations if limited progress is observed or to determine when the consultant's services are no longer needed because defined outcomes for the student have been met.

Intervention Monitoring

Intervention monitoring and subsequent adjustments are typically conducted within the context of the response to intervention (RtI) system. RtI is the systematic practice of an academic institution providing high quality instruction and intervention consistent with student needs (Batsche et al., 2005). Within RtI, students' learning rate and performance are measured over time at specified time points in order to ensure that instruction and interventions support students in achieving optimal academic outcomes. As data is collected over time, problem-solving is utilized to make data-informed decisions about how to adjust or tailor instruction/intervention when students are not making adequate gains in performance (Tilly, 2008).

Monitoring requires consideration of several factors when making collaborative decisions regarding whether a student is making adequate gains in performance. Factors include baseline data, selection of data progress monitoring system, selection of time points for evaluating progress, evaluation of school and teacher intervention and accommodation integrity, and determination of maintenance procedures once child demonstrates adequate progress. If implementation fidelity is intact and the student is not making progress, the team can elect to make modifications to interventions and/or accommodations to meet the needs of the student. The progress monitoring process is then repeated until the student demonstrates short-term and long-term achievement. Once goals are achieved, a plan for maintenance of improvements should be completed.

Termination of the Consultation Process

Following successful goal completion and implementation of maintenance strategies, the consultant should formally notify the consultation team when the consultation relationship is being terminated (Rosenfield, 2008). When disengaging from a consulting role, clinicians should ensure that the other parties involved (e.g., parents, teachers, other school personnel) have demonstrated the independent ability to implement and track interventions with fidelity for the student.

While the consultation process can be voluntary, there are circumstances in which federal regulations are in place to legally protect children's right to an optimal academic environment. Consultants need to be aware of these regulations to educate families when indicated regarding their child's full range of options for interventions and accommodations.

Review of Federal Education Regulations

There are several federal regulations related to providing optimal academic learning environments for school-aged children with disabilities. Specifically, the laws and regulations discussed herein are intended to provide children, who otherwise might encounter varying challenges within the public school environment, access to an appropriate education. As practitioners, it is important to possess a general understanding of these federal regulations to help guide families in collaborating with schools, which can help to ensure that children are set up within an optimal learning environment for achieving academic success.

Section 504

Under Section 504 of the Student Rehabilitation Act of 1973 (hereafter Section 504), students with a disability may be eligible to receive accommodations within the public educational setting (including charter schools and virtual school). In fact, any student that has or is perceived to have an impairment resulting from a "physical or mental" disability may be eligible to receive "reasonable accommodation" under Section 504. Students would be eligible for accommodations under a Section 504 plan if it is determined that a disability impairs their functioning in any major life activities such as walking, speaking, or learning.

Because a 504 plan is simply intended to provide students with necessary accommodations so that they can adequately participate and benefit from their educational environment, disabilities are more broadly defined under Section 504. As such, students with temporary impairments, such a broken leg, can qualify for reasonable accommodations under a 504 plan. However, students experiencing longer-lasting behavioral and/or learning difficulties can also qualify for accommodations under Section 504. Examples of accommodations afforded to students under Section 504 can range from extended time during tests, shortened assignments, enlarged print, adapted classroom equipment, preferential seating, etc.

Determination for 504 plan eligibility is usually made by a multidisciplinary team of professionals including teachers, parents, and the child when appropriate. The multidisciplinary team must review evaluative data and information from multiple sources in order to determine if a student meets eligibility for a 504 plan. Sources of information considered for 504 plan eligibility may include standardized testing data, psychological or psychiatric reports, treatment summaries, physician's statements, etc. Specific processes for eligibility determination, however, can vary between school districts.

Individuals with Disabilities Education Act

Under the Individuals with Disabilities Education Act (IDEA, 2004), children with a disability can gain access to an individualized educational program (IEP) in order to meet their unique educational needs within the public school setting. Eligibility for special education services under IDEA (2004) generally entails a more involved identification process, including an initial evaluation following parental consent. Students with varying developmental disabilities and/or psychopathology often qualify for an IEP and receive services under a particular special education program. Each special education program has a unique set of eligibility of criteria that generally requires evaluation data to support that a student is unable to demonstrate adequate performance in the school environment as a result of a disability. Examples of special education programs include intellectual disability (InD), specific learning disability (SLD), gifted, autism spectrum disorder (ASD), emotional behavioral disability (EBD, which commonly includes children with diagnoses of anxiety disorders, depressive disorders, and disruptive behavior disorders), and other health impaired (OHI, which commonly includes children with ADHD and those with chronic medical issues). Although many special education programs are closely related to diagnoses, the intent is not to diagnose. Instead, eligibility determination for a special education program only implies that a student requires provision of federally mandated respective services and accommodations to obtain an appropriate education.

Unlike a 504 plan, an IEP contains specific academic and/or behavioral goals for an individual based on a given student's current functioning and further indicates how progress toward those goals will be measured. Apart from accommodations and modifications within the educational setting, the IEP may also outline other supports and services required to meet the needs of a given student (e.g., counseling, speech therapy, occupational therapy, etc.). An IEP must also note that impact of a child's disability on their functioning within the general education setting as well as note the setting in which the child will be served (related to how much time the student will participate with nondisabled peers throughout the school day).

If a student requires additional support outside of the general education setting, he/she can qualify for pull-out services which are often provided by a special education teacher. Students with significant disabilities that cannot function successfully within the general education setting may require a special class setting often consisting only of disabled peers and specially trained teachers, with a smaller student-to-teacher ratio. Generally, however, educators try to place a student in the least restrictive environment (LRE) in which they can be successful (i.e., general education classes) per IDEA (2004) regulations.

Navigating the Process of Obtaining an IEP or 504 Plan for Students

The first step in initiating the process of receiving necessary supports within the public school system involves the parent requesting a meeting with school personnel in order to discuss concerns as well as develop a plan to address identified areas of concerns. Federal regulations under IDEA (2004) outline the need for schools to provide students demonstrating behavioral and/or academic concerns with evidenced-based interventions prior to considering eligibility for special education services. If a student fails to demonstrate sufficient progress despite intervention (RtI process) or requires ongoing intensive intervention supports to maintain gains, the school may proceed with a psychoeducational evaluation for consideration for special education (IDEA, 2004). Students evincing significant disabilities such as ID or ASD generally do not go through a process of intervention; they can often immediately receive an evaluation in order to determine eligibility for special education services (IDEA, 2004). Once the evaluation is complete, the school team, including the parents of the student, must reconvene to discuss the results of the evaluation and consider eligibility for special education (Klose, 2010). Should the school team determine that the child does meet eligibility for special education services, an IEP is then developed (IDEA, 2004).

Positive Behavior Interventions and Supports at School

IDEA (2004) suggests that schools "consider the use of Positive Behavioral Interventions and Supports for any student whose behavior impedes his or her learning or the learning of others" (20 U.S.C. §1414(d)(3)(B)(i)). The following section provides examples of evidence-based interventions that are designed to increase academic performance and/or behavioral functioning within classroom settings. Brief overviews of the interventions will be provided, including their applicability to various presenting concerns. In addition, brief overviews will be provided regarding how to implement these strategies within the classroom setting.

Specific or Labeled Praise

The use of consistent teacher labeled praise or specific positive verbal reinforcement following a desired appropriate behavior is an effective and empirically supported behavior management strategy (Lewis, Hudson, Richter, & Johnson, 2004). Praise can be used to address a wide variety of externalizing and internalizing behaviors in an academic setting (Lewis et al., 2004). Children who exhibit externalizing behavioral difficulties in a classroom frequently experience negative interactions with their teachers and peers (Partin, Robertson, Maggin, Oliver, & Wehby, 2009). Due to frequent noncompliant and off-task behavior, these students frequently receive more attention or reinforcement for their inappropriate behavior than their prosocial behavior (Partin et al., 2009). Therefore, it is critical to consider the use of praise as a strategy for increasing prosocial behavior in an academic setting.

For children with developmental disabilities and/or ID, it is especially important to consider developmentally appropriate target behaviors and labeled praises to reinforce successive approximations toward goals. For example, a teacher might say "good sharing" rather than "excellent job approaching your classmate and offering her a turn on the larger red slide" to a child with lower receptive language abilities. Labeled praises should be accompanied by visual cues or gestures to increase the likelihood that child comprehends the positive reinforcement.

There are several key considerations that should be taken into account when using specific or labeled praise as a behavior management tool in the classroom. First, the clinician needs to consider the extent to which teachers view student extrinsic motivation for learning as potentially harmful to students developing intrinsic motivation for academic skills (e.g., student will only perform when external reinforcement is provided). This may impact the teacher's willingness to strategically utilize praise within the classroom as a targeted intervention (Bear, 2013). Therefore, the teacher's perceptions of the utility of praise need to be understood before employing this intervention. Next, the consultation team should create labeled praises for the positive opposite of operationally defined target problem behaviors. Strategies for praising approximations of desired behaviors the student is not yet exhibiting in the classroom setting should be discussed in order to promote positive behavioral change. Clinicians should help teachers identify a continuum of praises that can reinforce behaviors that the student is already exhibiting which are approximations of the targeted goal behavior (see Table 1 below).

Planned Ignoring

Planned ignoring involves a teacher systematically withholding attention for a student's identified negative attention-seeking behavior. When used consistently, ignoring can result in the extinction of disruptive and inappropriate attention-seeking behavior (e.g., making inappropriate noises or gestures, blurting out remarks; Simonsen, Fairbanks, Briesh, Myers, & Sugai, 2008). Planned ignoring can be paired with the use of labeled praise. For example, while ignoring a student's blurting out of an answer, the teacher could ignore the student's verbalization while simultaneously praising the student for

Table 1 Praising a continuum of positive opposite behaviors

Example behavior issues	Positive opposite behavior	Continuum of appropriate, specific, or labeled teacher/caregiver praise
Inattention		
Failing to pay close attention to details/making careless mistakes on school work	Paying close attention to tasks and completing assignments correctly	Thank you for sitting in your seat
		You did a really great job taking out the correct workbook
		Good job turning to page five
		I like how you are reading each item carefully
		Very nice job answering number one correctly
		You are doing an excellent job staying focused on completing your assignment
Avoiding tasks that are disliked, difficult, or require sustained attention	Engaging in tasks that are difficult, disliked, or require sustained attention	I like how you got your pencil out for your assignment
		Great job starting your worksheet
		Very nice job of staying focused on your assignment even though you think it is difficult
		You showed amazing effort working on that really difficult question
		Good job of asking me a question about how to complete that difficult question on the assignment
		You are doing a nice job of completing your assignment
		Thanks for finishing up your assignment
Losing materials necessary to complete tasks or activities	Keeping track of all items needed to complete tasks or activity	Good job putting all your papers in your binder
		You should be proud of yourself for keeping track of your supplies
		Excellent job checking to see if you have everything you need to get your homework done tonight
		You are working really hard to keep your belongings organized
Not listening when spoken to	Listening when being spoken to	I really like it when you look at me when I am speaking to you
		Good job stopping your work when you heard me speaking to the class
		Great job focusing on what I am telling you
		Thanks for explaining to me what I just told you
Hyperactivity/impulsivity		
Frequently getting out of seat	Remaining seated	Nice job of walking toward your chair
		You are doing a great job sitting in your chair
		Good job keeping your feet on the floor
		I like it when you sit with your bottom on the chair
		Thank you for remaining seated during reading
Blurting out answers to questions	Waiting to be called on before answering a questions	Thank you for raising your hand
		You did a great job waiting until I called on you
		Thank you for sharing your answer when I asked
		It's nice that you are letting your classmates share their answers

(continued)

Table 1 (continued)

Example behavior issues	Positive opposite behavior	Continuum of appropriate, specific, or labeled teacher/caregiver praise
Noncompliance		
Refusing to follow teacher verbal instructions	Complying with teacher request	Good job staying calm after I told you to complete that task
		Thank you for listening
		I love it when you follow directions
		I like it when you listen and follow directions right way
		You have been doing a great job following instructions today
Often loses temper	Remaining calm when not getting own way	I can tell this is difficult. Good job taking a deep breath to stay calm
		Thank you for using your words to tell me what was bothering you
		I know this can be a really difficult situation; thank you for walking away when you were upset
		Great job calming down so quickly
		Thank you for staying calm
Anxiety		
Leaving the classroom without permission due to a panic attack	Remaining in the classroom despite having a panic attack	It's awesome that you sat through the entire class today
		Great job staying in the classroom even though you felt uncomfortable
Repeatedly asking to call parents due to separation anxiety	Waiting to speak to parents until after school	Great job staying focused on your assignment
		I am really proud of you for calming yourself down even though you were upset that you missed your dad
		I like how you bossed back your anxiety and waited to talk to your Mom until after class
		You were impressively brave today by staying in school all day without asking to call your parents
Refusal to transition from one activity to another	Transitioning smoothly and quickly between activities	Good job staying calm when getting in line for art class
		You are an expert at getting from lunch to class calmly
		I really like that you were such a good helper by going to that unexpected assembly
Depression		
Minimal social interaction	Engaging with peers	It is great to see you playing with your classmates
		I like how you shared the materials with the other students
		Thank you for helping your friend with the math problem
Physical look of sadness	Expressions of pleasure or happiness	It's nice to see you enjoying this activity
		It is so awesome to see you smiling and laughing
		It makes me glad to see you so happy about going to recess today

(continued)

Table 1 (continued)

Example behavior issues	Positive opposite behavior	Continuum of appropriate, specific, or labeled teacher/caregiver praise
Social interactions		
Poor eye contact	Making eye contact	Thank you for picking up your head up when I asked you a question
		I love it when you look in my direction
		Thanks for looking at my eyes when you talk to me
Being bossy toward others	Taking turns with others	I like it that you are allowing your friends to use the colored pencils at the same time as you
		You are doing a great job taking turns in the group activity
		It was nice of you to give John a chance to pick what he wanted to do on the project
		I like how you asked your friends what they wanted to do during free time
Bullying, threating, or intimidating peers	Engaging peers appropriately	Good job keeping your hands to yourself
		Thank you for talking/playing with to your classmates nicely
		You have been doing an excellent job interacting with your friends

sitting nicely. This often immediately reduces the negative attention-seeking behavior because the child received attention for a positive behavior. Planned ignoring is not appropriate for externalizing behaviors that are destructive, aggressive, or dangerous. It is important for the clinician to explain to the consultee that the problematic behavior it is likely to experience an extinction burst in which the behavior temporarily increases in magnitude, duration, and frequency because the student is used to receiving a response for the behavior at least some of the time (Lerman, Iwata, & Wallace, 1999). Otherwise, consultees might quickly abandon implementation of this intervention (Quinn et al., 2000).

Clinicians should help address concerns teachers may have about classroom management when ignoring and problem solve around managing how other students respond to disruptive behavior. Planned ignoring can also be used to diminish attention-seeking behaviors associated with internalizing problems, such as crying related to exposure to irrational fears or repeated reassurance-seeking statements. Planned ignoring can be used with children with developmental disabilities, including ID. For children with self-injurious behavior such as headbanging or biting that has an attention-seeking function (as determined by an FBA), the teacher can withdraw attention to some extent (e.g., not talking to the child in the moment or providing reassurance), while also monitoring and ensuring the child's safety (Minshawi et al., 2013). Planned ignoring may also be used for children with ASD who exhibit inappropriate or repetitive behaviors (Bearss, Johnson, Handen, Smith, & Scahill, 2013). For example, the teacher might respond the first time a student makes a statement or question and then implement active ignoring thereafter within the situation if the student perseverates on the topic. In these cases, differential reinforcement for alternative, appropriate behaviors is critical for optimizing behavior change.

Token Economies/Response Cost Interventions

Token economies and response cost interventions are effective and empirically supported behavior interventions (Filcheck, McNeil, Greco, & Bernard, 2004; McGoey & DuPual, 2000). Token economies are contingency management systems in which students earn reinforcers (e.g., tokens, points, stickers) for exhibiting targeted behaviors (e.g., sitting quietly, compliance) that are then exchanged at a later time for desired objects and/or activities (e.g., extra screen time, movie night, desired activity; Kazdin & Geesey, 1977; McGoey & DuPaul, 2000; Quinn et al., 2000; Zlomke & Zlomke, 2003). A response cost intervention is a punishment procedure during which reinforcers (e.g., tokens) are taken away for an undesirable behavior. The removal of the reinforcer decreases the likelihood that the targeted behavior will occur (e.g., spitting, hitting; Kazdin, 1972). These strategies lead to rapid behavior changes to address externalizing behavioral concerns such as noncompliance, hyperactivity, inattention, and disruptive behavior in children ages 4 and older (Barkley, 1997; McGoey & DuPaul 2000).

When creating a daily token economy or response cost intervention, there are several key steps that are essential to the success of the intervention. The FBA will guide this process. The first step is to select the target behaviors to be addressed. The student's behavior should then be assessed to estimate the frequency and/or duration the student is already engaging in targeted behaviors. This must be done at several points during a baseline data collection period to obtain an accurate estimate of the prevalence of the target behaviors. This allows for the frequency of a goal behavior to be identified that is neither so difficult that the student can never reach it or so easy that it does not result in behavior change. Once completed, a reasonable criterion for the number of times a student must exhibit the targeted behavior within a defined period of time to receive a positive reward should be set. For the student to be motivated to work toward the defined goals, the student should be given the opportunity to create a menu of rewards from which to choose (e.g., daily rewards, weekly rewards; see Table 2 below).

Table 2 Example token economy rewards

	Appropriate school rewards	Appropriate home rewards
Kindergarten to 4th grade	Class helper	Favorite snack
	Eat with a friend	Extra play time
	Sticker	Screen time
	Line leader	Choosing a special breakfast
	Lunch with the teacher	Eating out
	Draw a prize from the class “prize box”	Going to the park
	Positive note sent home	Extra play time with parent
5th–8th grade	Run classroom errands	Screen time
	Help classmate with an academic activity	Listen to music
	Help teacher present a lesson	Chore pass
	Praised on school-wide announcement	Eating out
	Allow student to sit anywhere in the classroom	Special hang out activity with parent
	Draw a prize from the class “prize box”	Staying up late for an extra hour
		Having friends over
		Going to a friend's house

Token economies are used for a broad range of problem behaviors. For externalizing behavior, students may earn rewards for appropriate behavior such as following class rules, keeping hands to themselves, raising their hand, or staying focused on a task. When response cost interventions are used to address externalizing behavior, students may lose reinforcers for inappropriate behavior such as breaking classroom rules, hitting, blurting out responses before being called on by their teacher, or getting out of their seat frequently (McGoey & DuPaul, 2000). Token economies can also be implemented to help anxious or depressed students to engage in more behavioral activation, peer interactions, group projects, or completion of classroom-based exposure activities (Kendall & Hedtke, 2006). Token economies have been supported for use with students with mild ID and/or ASD (see

Matson & Boisjoli, 2009, for review). However, they are less appropriate for students with more severe cognitive deficits (Matson & Boisjoli, 2009). For students with ID, token economies often focus on target behaviors related to conduct (e.g., staying seated) and academic task (e.g., finishing portions of assignments on time; Matson & Boisjoli, 2009). For students with ASD, token economies have been effectively used for social behaviors (e.g., initiating social conversation or play; Kahng, Boscoe, & Byrne, 2003; Matson & Boisjoli, 2009). Finally, token economies can also be used for adaptive behaviors related to activities of daily living (e.g., toilet training) for very young students and those with ID and/or ASD (Matson & Boisjoli, 2009).

Once the token economy is created, it is important to monitor the student's progress and modify as needed. However, token economies often require some trial and error; therefore, it is important to give the system time (enough data points related to implementation integrity and student performance) to reliably determine if the intervention is working before making modifications. The system should be put into place until the student is able to consistently meet criterion targeted behaviors. If the student fails to consistently meet their goal, the criterion should be adjusted to an easier goal for the student, or the implementation of the system should be addressed if integrity issues are identified. Once a student is consistently meeting the goals for the targeted behavior, the reinforcement for that behavior should be removed gradually and another behavior should be added and targeted if needed. The daily token economy or response cost intervention can be faded gradually when the student consistently exhibits all target goal behaviors.

Daily Report Card

Daily report cards are a type of token economy that are an empirically supported behavior modification tool for children who exhibit disruptive behavior and/or attentional difficulties in the classroom (Fabiano et al., 2010; Owens, Holdaway et al., 2012). Daily report cards are appropriate for students with academic difficulties, behavior concerns (e.g., noncompliance, attentional difficulties, or aggression), or social difficulties in a classroom setting. Students are provided immediate feedback about targeted behaviors and receive praise from their teacher for working toward and/or meeting behavioral goals directly to their daily report card (Owens, Holdaway et al., 2012). The daily report card is sent home daily, at which time caregivers review the daily report card with the student and provide rewards based on the student's performance (Fabiano et al., 2010; Owens, Holdaway et al., 2012). Therefore, the daily report card can be a powerful tool to help teachers and caregivers maintain daily communication.

Emotion Regulation Strategies

Emotion regulation (ER) is comprised of the processes that monitor, evaluate, and modify emotional reactions, including intensity and temporal features (Thompson, 1994). ER includes a constellation of skills that allow an individual to control their response to environmental stressors and manage and/or recover from this response (Keenan & Shaw, 2003). ER difficulties are common across a broad range of psychopathology including developmental disorders, bipolar disorders, depressive disorders, anxiety disorders, and disruptive behavior disorders (Buckholtz & Meyer Lindenberg, 2012; Nolen-Hoeksema & Watkins, 2011; Gross and Munoz, 1995; Keenan & Shaw, 2003). Within school settings, children can demonstrate ER difficulties in response to a variety of settings related to academic instruction, peer interactions, teacher-student interactions, and performance-based tasks. Generally, children are taught and practice effective ER strategies within outpatient evidence-based treatments (e.g., cognitive behavior therapy for anxiety and/or depression) or group school-based programs (e.g., coping power, social problem-solving skills training, social skills training). Clinicians can advise teachers on how to support the student's use of effective ER within the context of skills the child is learning from other treatment modalities.

Affective Education to Promote Emotion Regulation

Affective education teaches students how to more effectively engage in adaptive emotion regulation (Schutz & Pekrun, 2007). Affective education is particularly relevant for students with anxiety disorders, disruptive behavior disorders, depressive disorders, impulse-control disorders, and ASD, many of whom exhibit emotion dysregulation (APA, 2013; Hofman, Sawyer, Fang, & Asnaani, 2012; Keenan, 2000; Mazefsky et al., 2013; Shaw, Stringaris, Nigg, & Leibenluft, 2015). Affective education first teaches students to better identify their own emotions, as well as the emotions of others. An example of an affective education curriculum with tools for use in the classroom by teachers is the Zones of Regulation, which uses colors to represent various emotional experiences (Kuypers, 2011). Affective education next teaches students the cognitive-behavioral triad of how their thoughts, feelings, and behaviors are interrelated (Stark, Herren, & Fisher, 2009; Stark et al., 2005). Students learn how interpretations and responses to situations can vary and can affect thoughts, feelings, and behaviors. Finally, students learn that specific strategies (e.g., cognitive restructuring, coping skills) can be used to modify interpretations and responses to elicit more positive thoughts, feelings, and behaviors.

Teachers and other school personnel can promote affect education in schools by modeling the labeling of emotions. For example, the teacher can demonstrate labeling his or her own emotions in various situations and labeling students' emotions. Teachers can prompt students to label their own emotions or use fun games such as emotion charades to promote affective education. Teachers can provide positive reinforcement for students' appropriate labeling of emotions (e.g., labeled praise, stickers) in themselves and others.

Somatic Relaxation

Somatic relaxation interventions are utilized to increase adaptive emotion regulation and reduce stress through relaxing the body and have proven to reduce psychological distress and increase individuals' positive state of mind (Jain et al., 2007). Examples of somatic relaxation techniques include progressive muscle relaxation, diaphragmatic breathing, and guided imagery techniques.

Within progressive muscle relaxation (PMR), students are taught to tense a relax muscle groups throughout the body. PMR helps students become more aware of how their body feels when they are tense or stressed versus when they feel relaxed. Diaphragmatic breathing includes breathing in slowly through the nose until the belly protrudes out, briefly holding the breath, and then slowly exhaling by mouth. This breathing process is repeated approximately five to ten times or until the student feels relaxed. Within guided imagery, students are taught to imagine they are in a relaxing place and to imagine feeling calm. Once relaxed, students can return to the activity they were engaged in preceding the imagery. Guided imagery is often accompanied by the use of diaphragmatic breathing and/or progressive muscle relaxation.

For children with emotion dysregulation, somatic relaxation techniques provide the opportunity for students to produce a relaxed state while staying in the environment that is triggering the dysregulation. From a consultation perspective, the consultation team should evaluate specific antecedents for when the student would benefit from utilizing somatic relaxation and develop a plan for cueing the student to use the technique prior to significant dysregulation. If feasible, the student should be provided the opportunity to receive positive reinforcement for daily practice or antecedent-specific use of somatic relaxation. Reinforcement will increase the student's positive association with somatic relaxation and increase the probability that the student utilizes the technique when indicated.

Social Problem-Solving

Although various models of social problem-solving for children have been described, conceptually, most of these models outline similar processes. Components of social problem-solving utilized by a wide variety of social competence treatments including identifying the problem, regulating affect, perspective taking, generating alternative solutions, evaluating possible consequences for solutions, implementing solutions, evaluating specific solutions, and troubleshooting (D'Zurilla & Goldfried, 1971; Lochman & Wells, 2002; Lochman & Dodge, 1994; Spivack & Shure, 1989). The underlying approach of social problem-solving training is not to teach children what to think, but rather to teach children a problem-solving thinking style that allows them to address common interpersonal problems (Shure, 2001).

Problem-solving deficits have been observed at each stage of social-cognitive processing. At the identification stage, aggressive and depressed children have been found to recall fewer relevant cues about events, base interpretations of events on fewer cues, selectively attend to hostile rather than neutral cues, and attribute hostile bias to peers (Akhtar & Bradley, 1991; Lochman & Dodge, 1994; Lochman & Wells, 2002; Quiggle, Garber, Panak, & Dodge, 1992; Webster-Stratton & Lindsay, 1999). At the solution generation stage, children with aggression or impulsivity offer fewer competent verbal solutions, offer more aggressive solutions, and generate fewer and less effective solutions (Akhtar & Bradley, 1991; Lochman & Wells, 2002; Shure, 2001; Webster-Stratton & Lindsay, 1999). Children with aggression produce more aggressive solutions in part because they believe that aggressive behavior will result in desired outcomes (Akhtar & Bradley, 1991; Lochman & Wells, 2002; Webster-Stratton & Lindsay, 1999). Children with depression are less likely to generate assertive responses or to believe that assertive responses lead to positive outcomes (Quiggle et al., 1992).

The adaptive use of social problem-solving skills has been shown to be positively related to better adjustment, the use of more effective coping strategies, improvements in anger problems, depressive symptoms, and general well-being (D'Zurilla, 1990; McGuire, 2001; Spivack & Shure, 1989; Stark, Reynolds, & Kaslow, 1987; Sukhodolsky, Kassinove, & Gorman, 2004; Vostanis, Feehan, Grattan, & Bickerton, 1996).

For children receiving social problem-solving skills training in other treatment modalities, clinicians can reinforce and support implementation of this coping strategy within the child's classroom by collaborating with the family and teacher regarding building social problem-solving sequences for each identified antecedent. Once sequences are developed, the clinician can collaborate with the teacher to provide student with visual cues or reminders before a typical antecedent is presented to utilize social problem-solving skills. Because most social problem-solving steps are internal, it may be difficult for the teacher to identify when the student has successfully engaged in the social problem-solving process. Therefore, the clinician and teacher should develop plans for reinforcement whenever the students engage in the positive opposite following presentation of a typical triggering antecedent.

Mindfulness-Based Meditation

A more recent model that has been introduced to the school setting is mindfulness-based meditation or mindfulness-based stress reduction (MBSR; Sibinga, Webb, Ghazarian, & Ellen, 2016). Mindfulness-based interventions are built into multiple types of treatment programs or classroom setting (Beauchemin, Hutchins, & Patterson, 2008; Schonert-Reichl et al., 2015). Mindfulness meditation programs implemented within school settings encompass the student bringing his or her attention to the present in a moment-by-moment basis (e.g., selecting an attention anchor to focus on; Britton et al., 2014; Marlatt & Kristeller, 1999). The student is then instructed to bring about emotional calmness by focusing attention on specific sensations (e.g., sounds within the body) experienced in a moment. This process helps to bring about clarity and acceptance of the moment being experienced in a nonjudgmental manner. Classroom-based mindfulness programs also practice the techniques during class and discuss how to apply the techniques within typical daily situations.

Mindfulness-based interventions have been shown to have a positive impact on children's emotional and behavioral functioning with a particular effectiveness for children with existing psychopathology (Zoogman, Goldberg, Hoyt, & Miller, 2015). When considering mindfulness to improve the behavioral and emotional functioning of a student, the clinician should collaborate with the teacher to determine potentially stressful events for the student which would allow the student the opportunity to practice mindfulness.

Graduated Exposures

Some students present with clinically significant levels of anxiety that warrant more targeted intervention through school-based or outpatient therapy settings. Graduated exposures are a critical component of most anxiety interventions, as they are highly effective in targeting avoidant coping (e.g., avoiding public speaking) and escape behaviors (e.g., school refusal) over a relatively brief period of time (Kendall et al., 2006). The clinician collaborates with the student's teacher in supporting exposure activities once a fear hierarchy (also known as a "ladder") of exposure exercises according to the students' expected fear/distress/anxiety ratings is created. With support from the teacher, the student approaches the least anxiety-provoking situation and repeats the exercise until habituation occurs (i.e., a significant reduction in anxiety) before moving on to the next exercise on the hierarchy.

Collaborative consultation is especially relevant when the teacher or school administration is needed to support the implementation of the exposure activity. During graduated exposures, the teacher will have the student self-report level of anxiety and provide encouragement without reassurance when the student is engaged in the exposure activity (Gillihan, Williams, Malcoun, Yadin, & Foa, 2012; Kuypers, 2011). For example, a student with separation anxiety might frequently ask to call their parents. The teacher should let the child know that in order to get control over the anxiety, he/she is going to practice waiting to talk to their parent and that the teacher will not respond to requests to call parents frequently.

Graduated exposure to school attendance has been recommended for older students and students with higher levels of anxiety related to the school environment (Kearney, 2008; Wimmer, 2003; 2010). For example, graduated exposure to school could start with defining a child's hierarchy of fears and levels of discomfort and then approaching feared behaviors such as getting ready for school, arriving at school, and attendance in a preferred class, coupled with receiving rewards (e.g., tangible or social) for approaching and/or completing those behaviors. Rewards could then be faded out for successful behaviors as more difficult exposures are added and rewarded with tokens.

Antecedent Strategies for Test Anxiety

While intervention strategies listed for anxiety are also recommended for reducing test anxiety, there are specific antecedent strategies for test anxiety. Teachers working with students with test anxiety should inform them of the format of test in advance and provide practice tests when feasible (Goonan, 2003). Simulation of testing conditions with a practice test serves as a form of exposure to promote habituation of anxiety, as well as practice to increase familiarity with test format. Beyond interventions, there are several recommended accommodations for test anxiety, including alternate presentation, alternate responses, extended time, preferential seating, and breaks (Hurren, Rutledge, & Garvin, 2006), which are detailed below.

Peer-Mediated Instruction and Intervention

It may be helpful to pair some students with a supportive and encouraging peer role model or mentor, either in dyads or groups. This technique is formally known as peer-mediated instruction and intervention (PMII) but often referred to as the "buddy system" (Hall & Stegila, 2003). PMII should be used when both parties agree to this arrangement, rather than forcing students to pair who express opposition to the idea (Thelen & Klifman, 2011). Specifically, the person selected to serve as a "buddy" should be a peer or older student volunteer who exhibits positive behavior and academic functioning and is eager to help others (Huberty, 2010). Students can be paired briefly during specific situations (class outings), in rotations (e.g., monthly), or more long term (e.g., the school year).

Peer-mediated approaches have been found to be effective for children with ADHD and disruptive behavior because they increase opportunities for engagement and active learning (Piffner, 2011). For example, students with attentional difficulties who have trouble organizing tasks and preparing for activities may benefit from being paired with a classmate who can provide support in the areas of organization and preparation (e.g., helping student pack homework at the end of the day). It may also be beneficial to pair students with attentional difficulties or reading disorders with peers to give students the opportunity to take turns reading passages or taking the lead on problem-solving activities. Given that some children with disruptive behaviors have difficulties transitioning between classroom activities, it may be beneficial to pair students with difficulty transitioning with peers who can assist in helping transitions (e.g., helping student find correct workbook for upcoming lesson; Piffner, 2011).

There is support for pairing students to improve social skills in young students with ASD (Chan et al., 2009; Laushey & Heflin, 2000). Pairing students can also help to reduce anxiety and reduce disruptive behavior (e.g., specifically during transitions) in both regular and special education classrooms (Jackson & Campbell, 2009). To reduce the fear of rejection by peers for students with anxiety and/or depression, teachers should select small groups in classrooms versus having students choose their own groupings.

Preparing for Transitions

For some students, transitions between activities and changes in classroom routines can elicit anxious, disruptive, and/or noncompliant behavior. Therefore, for students with transition difficulties it may be beneficial to create routines or provide countdowns (e.g., 20 min, 10 min, and 5 min warnings before the end of an activity). Additionally, students with difficulties transitioning may benefit from the use of rewards (e.g., tokens) and praise (e.g., thank you for getting in line) for successful transitions from activity to activity (Piffner, 2011).

For students with anxiety, notify and prepare students in advance for significant changes in the classroom routine (e.g., substitute teachers, assemblies), in order to allow the student to plan and proactively engage in adaptive coping strategies. This is particularly important if there are identifiable antecedents or triggers for anxiety that may occur (e.g., fire drills, active shooter training drill, field trips, oral presentations).

A highly structured classroom routine with transition supports can assist all students to know what to expect (Thelen & Klifman, 2011) but is particularly beneficial for those with ASD. Visual schedules are recommended for students with ASD (e.g., Dettmer, Simpson, Myles, & Ganz, 2000) but may also be helpful to other students such as those with anxiety. Pairing visuals (e.g., picture schedule, visual timer) with an auditory cue (e.g., ringing bell, rainshaker) for transitions is also recommended, particularly for students with developmental or language delays who might have more difficulty comprehending complex instructions or information regarding the planned sequence of events (Thelen & Klifman, 2011).

Student Accommodations

The following section details accommodations that are typically included within 504 plan or IEP but can be voluntarily implemented. An accommodation is a support documented on a student's 504 plan or IEP that is intended to allow a student with a disability access to *the same curriculum* as peers without disabilities (IDEA, 2004). Although variability exists regarding the provision of accommodations between states, all states are required to provide eligible students with fair accommodations that minimize the impact of a student's disability in their accessibility to the general education curriculum (Hatcher & Waguespack, 2004). Most states provide accommodations related to the following areas: setting, time, presentation, and response (Hatcher & Waguespack, 2004). Clinicians are charged with understanding and advocating for accommodations that will assist students in achieving optimal outcomes. Below are examples of these types of accommodations.

Preferential Seating/Limited Distraction Setting

When a student receives preferential seating or limited distraction seating, they are placed in a location within the classroom that best suits their learning style and/or behavioral difficulties (Hatcher & Waguespack, 2004). For example, the student is able to work in a place that is free from distractions (e.g., peers, windows, busy areas of the classroom), seated closer to the teacher during instructional time, or allowed to leave the classroom to complete assignments. Preferential seating may be beneficial for students with attentional difficulties who would benefit from frequent teacher cues to stay on task. Additionally, students with frequent noncompliant or disruptive behavior may be placed near the teacher to allow for the teacher to provide immediate reinforcement for appropriate behavior. For children with anxiety, preferential seating may be given to place children near the teacher or supportive peer, closer to the bathroom (e.g., somatic complaints), and/or away from more boisterous children. Children may also be given the option to select a comfortable seat in an auditorium, such as in the back, if they are anxious in crowds, or if they have incompatible sensory issues.

Extended Time on Tasks and Tests

Testing accommodations for students with behavioral difficulties or disabilities are common, and extended time is the most common accommodation (Lovett, 2010). With extended time, students with a disability are allotted additional time to complete test and/or classroom assignments or given alternate due dates (Hatcher & Waguespack, 2004; Lovett, 2010). The amount of extended time allotted to students is dependent on their learning and/or behavioral difficulties. Extended time may be recommended particularly for students with attention difficulties that may interfere with their test-taking, such as students with ADHD and/or test anxiety. It is the most frequently used accommodation for students with LD but should be considered on an individual basis rather than assigned based on LD diagnosis alone due to the heterogeneity of this population (Fuchs & Fuchs, 2001). In addition, students with internalizing symptoms such as test anxiety (Hurren et al., 2006) or depression (e.g., psychomotor slowing) may also benefit from extended time.

Alternate Presentation

As some students with disabilities may be permitted to complete tasks via alternate methods, presentation of information can also vary for students with disabilities. For instance, children with reading difficulties may benefit from having academic material presented in a variety of ways, for example, having test items and assignments read aloud clearly and presented in writing (Hatcher & Waguespack, 2004). Another accommodation related to presentation can include repetition or various presentations of educational material or multimodal provision of course content including oral, visual, and hands-on opportunities for learning content (Hatcher & Waguespack, 2004).

Alternate Responses

Alternate forms of responding to tasks may also be permitted. For instance, some students with disabilities (e.g., dysgraphia, learning disorder in written expression) may be allowed to respond orally to test questions rather than via writing (Hatcher & Waguespack, 2004) or complete an oral presentation rather than a written report. Students with hearing loss, vision loss, and language or speech sound disorders might also benefit from being permitted to respond via alternate forms of communication, such as sign language, Picture Exchange Communication System, or with other digital devices and communication applications (assistive technology).

Chunking and Scheduled Breaks

Students with disabilities may also benefit from chunking, which is when assignments are broken into brief time periods or time or smaller portions (Hatcher & Waguespack, 2004). The consultation team through a FBA identifies how long a student can optimally work on an assignment before becoming fatigued, frustrated, and/or distracted. For students with ADHD, ID, and/or LD, chunking can help them complete tasks that are difficult, help them feel less overwhelmed, allow for more opportunities for positive reinforcement from teachers/caregivers, and reduce the argumentativeness that is often accompanied with the completion of long/difficult assignments (Bulgren & Lenz, 1996; Gargiulo & Bouck, 2017; Mautone, Lefler, & Power, 2011).

Scheduled breaks can also be beneficial for students with attentional or behavioral difficulties, anxiety, and depression. Scheduled breaks are when students are allowed breaks when needed and appropriate. A plan with clear expectations for breaks should be formed between the teacher and student. This can include breaks within the classroom (e.g., allowing the student to engage in a brief break activity or put their head down briefly when feeling faint). Breaks should be used with caution to prevent inadvertently reinforcing safety behaviors or maladaptive coping (e.g., anxious avoidance, such as escape during panic; Williams, Boyle, White, & Sinko, 2010).

Modifications

Unlike accommodations, modifications are *changes to the curriculum content* that students are expected to learn (Lee, Wehmeyer, Soukup, & Palmer, 2010; Nolet & McLaughlin, 2005). Modifications are usually implemented after attempts to use accommodations alone to allow the student to successfully access the standard curriculum content have been deemed unsuccessful. Modifications are sometimes used in combination with accommodations (e.g., a student with alternate assessments who is also given extended time).

Adapted Workload

Depending on student functioning, modifications to decrease or increase the student's workload may be implemented. Students who have academic and/or behavioral difficulties that make it difficult for them to complete the required coursework may receive a modified or reduced course load to accommodate their learning needs. For example, students with given disabilities may receive shortened assignments or the ability to receive partial credit for work completed (Hatcher & Waguespack, 2004). Teachers may also consider modifying the amount of items students must complete (e.g., by having them complete every other problem; Hatcher & Waguespack, 2004).

Alternate Grading

When appropriate accommodations and modifications are implemented and a student continues to exhibit a pattern of failing grades, it may be appropriate to use an individualized alternate grading system to optimize the student's performance and maintain the student's motivation to work toward developmentally appropriate academic goals (Guskey & Bailey, 2001; Polloway et al., 1994). This generally applies to students with more severe disabilities that require an individualized curriculum. Options for grading modifications include pass-fail systems, weighted grading systems, and separate grades for effort and achievement (Guskey & Bailey, 2001; Munk & Bursuck, 2004).

Alternate Assessments

It is often deemed inappropriate for students with curriculum modifications to be assessed using standard tests or standardized state exams. If this is the case, the IEP will state that the student is not required to complete standardized exams, and in some cases, may participate in an alternate assessment. It is important to note that in some states, there are certain grade levels at which passing standardized testing is required, and therefore, decisions regarding alternate assessment may need to be made early in elementary school. While it is possible to change testing designations (e.g., from standard to alternate) in later school years, it may be difficult to meet requirements for a standard diploma once a student is opted out of standardized state testing (Thurlow & Johnson, 2000).

The requirements for each diploma type vary by state. It is common for commencement ceremonies to be standardized to celebrate students' achievements regardless of the type of diploma awarded. However, the consideration of a nontraditional diploma must be made carefully, as there is some evidence to suggest that these may limit future employment opportunities to some extent (Gaumer Erickson, Kleinhammer-Tramill, & Thurlow, 2007).

Summary

It is imperative for clinicians working with students with developmental, intellectual, or psychological challenges to have a strong understanding of how to engage in collaborative consultation with the student's family and school personnel to determine the most appropriate evidence-based intervention and/or accommodation to meet the student's needs. IDEA (2004) suggests that schools utilize evidence-based interventions and supports to improve students' academic skills and emotional and behavioral functioning within the classroom. Interventions can be implemented voluntarily by the school or within the context of a 504 or IEP plan. An accommodation is a support typically documented on a student's 504 plan or IEP that is intended to allow a student with a disability access to the same curriculum as peers without disabilities (IDEA, 2004). Modifications are changes to the curriculum content that students are expected to learn.

Inter-professional collaboration and consultation for improving academic skills and outcomes for students with different needs have been shown to have positive outcomes overall (Hurwitz, Kratochwill, & Serlin, 2015). However, research in school consultation has been described as underdeveloped and dated, with significant gaps between research and practice (Erchul & Sheridan, 2008). For example, there is limited research support for successful evidence-based interventions, accommodations, and modifications for particular student populations (e.g., students who are retained and socially promoted, children with depression) that warrant additional research investigation (Rones & Hoagwood, 2000). Additionally, because the success of consultation has been shown to be dependent upon the individual collaborators, future research is needed to understand individual clinician consultation training models, characteristics, and/or interaction styles that optimize collaborative consultation effectiveness (Hurwitz et al., 2015; Sheridan, Welch, & Orme, 1996). Videoconferencing is increasingly utilized within behavioral health interventions, and the acceptability and the utility of videoconferencing for consultation and/or observation need to be further explored (Fischer et al. 2016). Cultural issues are important to consider when studying differences in individual success with collaborative consultation. However, there is a dearth of literature exploring the implementation of collaborative, culturally competent school consultation (Ingraham, 2000; Newell et al., 2010). A particular struggle for clinicians is the engagement of low income, low resource schools where meeting students' basic needs are the highest priority (Atkins, Frazier, Birman, Adil, Jackson, Graczyk, & McKay, 2006). Effective yet sensitive strategies for engaging these school systems are needed.

Finally, academic success for all students is a tremendous health protective factor. That is, academic success and risky health behaviors are strongly interrelated, and the implementation of effective interventions to support academic achievement is key to improving the well-being of not only youth but also adults (Bradley & Greene, 2013).

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ADHD

Johnny L. Matson and Jasper A. Estabillo

Contents

Introduction

One of the most common and frequently researched topics in the child mental health field is attention-deficit/hyperactivity disorder (ADHD). Rates of the disorder in children have been rising rapidly, and in recent years, large numbers of adults have also been diagnosed with the disorder. These trends have led some researchers to refer to these developments as an epidemic (Nielsen, 2017). In most cases, the person diagnosed with ADHD is prescribed a stimulant medication. Often a second class of add-on medications is prescribed as well. Generally, these add-on drugs are atypical antipsychotic medications. Psychological treatments are also sometimes used, often in combination with medication. A review of common treatment protocols for children and adolescents will be the primary focus of this chapter. First, however, a brief overview of symptoms of ADHD will be discussed.

Symptoms

The core symptoms of ADHD are well-established and include inattention, off-task behaviors, excessive fidgeting, restlessness, and excessive motor behaviors such as being out of seat, impulsivity, and excessive talking, as well as frequently interrupting others. Categories of ADHD include primarily inattentive, primarily hyperactive/impulsive, or a combination of the two, with the latter condition being the most serious and difficult to treat.

It is also recognized that ADHD is a heterogeneous disorder that frequently overlaps with other childhood mental health and/or neurodevelopmental conditions. This fact is obviously important for diagnosis, but it also has important implications for the development and implementation of treatment plans. Thus, investigators have paid a great deal of attention to this topic.

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For example, Newcorn et al. (2001) note the potential effect of comorbid conditions on the core symptoms of ADHD. They evaluated 498 children with ADHD. The participants were divided into groups based on comorbidities. All the children displayed high levels of inattention, impulsivity, and disruptive errors. The ADHD plus oppositional defiant or conduct disorder group had especially high levels of impulsivity, while the ADHD plus anxiety disorder group had particular difficulties with inattentiveness. These authors also found that boys had more severe ADHD symptoms than girls.

Comorbid depression has also been studied with children diagnosed with ADHD. Daviss (2008) noted that when this comorbidity is present, depression tends to emerge several years after ADHD symptoms emerge. Thus, the authors also posit that chronic ADHD symptoms may be a primary cause of depression and the person's inability to cope with the ADHD symptoms when they emerge. With respect to treatment, Daviss recommends a biopsychosocial approach to intervention. He also recommends an individualized approach that considers targeting specific symptoms as well as environmental factors that may contribute to the child's mental health status. Where the symptom presentation is potentially complex, Daviss recommends a broader array of interventions which include medication along with environmentally based treatments. This latter group includes manualized therapies which have been developed for childhood depression. He also stressed the value of including school personnel and parents in treatment planning and implementation.

Other problems that commonly co-occur with ADHD are oppositional defiant disorder and conduct disorders. Husby and Wichstrom (2017) suggest that oppositional defiant disorder symptoms may predict conduct disorders, which have a later onset. They also note a strong relationship between oppositional defiant disorder and ADHD.

Hogue, Evans, and Levin (2017) looked at the relationship between ADHD and adolescents who have developed adolescent substance abuse. As an intervention strategy, they suggest using a family ADHD psychoeducation and embedding medication management within this treatment. They also recommended a clinic-based treatment which involves the family. A focus on implementing treatment strategies in the home environment is also emphasized. These example studies point to the need to identify and treat comorbid problems along with core ADHD symptoms. A more detailed review of a range of treatment options follows next.

Treatment

Wolraich et al. (2011) present a series of treatment guidelines for the treatment of ADHD. They make the point that school applications may be more difficult for adolescents since multiple teachers are involved, which of course differs from primary school classes. These factors are also associated with cost. Medication alone is a common choice of clinicians for the potential coordination problems noted above. Casadei and colleagues (2017) note this treatment option (i.e., medication) is cheaper than psychological interventions or multimethod approaches to intervention. Friedman, Banaschewski, Sikiricia, and Chen (2017) further underscore the issue of scarce resources. They surveyed over 3600 caregivers regarding services for ADHD. Common themes reported to the researchers included underfunding and gaps in service provision.

The use of medication long term can become more expensive due to the laboratory tests and addressing side effects. This point is underscored by the fact that more and more children are being treated with medication. Additionally, children are being treated with these drugs for longer periods of time and with higher doses (Goldman et al., 1988). Because the most problematic aspects of medication occur months or years after the treatment begins, these aspects of medications are often underemphasized. The majority of children diagnosed with ADHD are prescribed stimulant and/or non-stimulant drugs (Hauck, Lau, & Wing, 2017). Antidepressant medication was prescribed for roughly 20% of children with ADHD and almost 5% of children without ADHD.

Chen et al. (2017) have addressed a particularly interesting positive effect of methylphenidate. They looked at injuries, specifically bone fractures, and found that they occurred at greater rates among individuals with ADHD. When the drug was administered for over 180 days, the drug group suffered from fewer injuries than the ADHD group who did not receive the treatment.

Jahangard et al. (2017) have also looked at the effect of medication on noncore symptoms of ADHD. Over an 8-week period, methylphenidate plus risperidone was administered for symptoms of oppositional defiant disorder. They found that the combination of both drugs decreased both ADHD and oppositional defiant disorder symptoms more than methylphenidate alone.

Michaelson et al. (2001) treated 297 children between 8 and 18 years of age who were diagnosed with ADHD. Children and adolescents received 1.2 mg/kg/day and 1.8 mg/kg/day or placebo. Medication was superior to placebo for improving ADHD core symptoms as well as social and family functioning.

Multimodal Treatments

A number of studies have employed combined treatments. Pelham et al. (2005) described a study with 27 children diagnosed with ADHD who were 6–12 years of age. They used transdermal methylphenidate in combination with behavior modification. The psychological intervention consisted of a token economy with reinforcers plus response cost. Additionally, the children were provided social skills training plus problem-solving. The kids also received noncontingent reinforcement. Individualized behavioral treatment plans were used for children engaging in disruptive behavior. Reinforcement of positive behaviors and the use of time-out were included in these plans. The combination of behavior modification and medication proved to be more effective than either medication or psychological treatment used alone.

Abikoff et al. (2004) describe the treatment of 103 children diagnosed with ADHD who were 7–9 years of age. They drew many different conclusions from Pelham et al. (2005). Methylphenidate was used alone and paired with broad psychosocial treatment of parent training, counseling, social skills training, psychotherapy, and academic training. These authors concluded that adding these psychological treatments did not improve ADHD oppositional defiant disorder symptoms over a 2-year period. There are at least two possible explanations for these divergent results. Firstly is that the specificity and consistency of treatment implementation may vary across studies. Secondly, psychological approaches may be more behavior specific. Thus, if the psychological treatment focused more on social and academic skills, it would follow that these skills would be impacted more than core symptoms of ADHD and oppositional defiant behavior. If the former group of symptoms were not measured, misjudgments of treatment efficacy would follow. Another of these multimethod studies is described by Reed, Jakubovski, Johnson, and Bloch (2017). They looked at school-based interventions on truancy and school fights. These authors stress that the failure to garner strong parental involvement was a major predictor of psychological treatment failure. Effective treatment did curb these problem behaviors.

Enns, Randall, and Smith (2017) also describe a multimodal method to treat ADHD. They evaluated 485 children and adolescents who had received services for ADHD in Canada. They reported positive effects associated with multimodal therapy. Positive effects included higher medication adherence and improved academic performance. Also, when a multimodal strategy was employed, disparities based on family income and ADHD-related problems were minimal.

Miranda, Presentacion, and Soriano (2002) describe a multicomponent school-based treatment for ADHD symptoms of children. Fifty-two children were assigned to either a treatment or a control group. A preplanned intervention strategy consisted of covering general information on ADHD in session one. Topics covered were the nature, incidence, and effects of ADHD on learning and behavior. The next two sessions focused on teaching general principles and procedures of behavior modification. Session four covered instructions such as rearranging space, how to use instructions, directions, and feedback with respect to appropriate classroom performance. Also, there was a focus on the management of educational materials. Sessions five and six employed cognitive behavioral methods such as how to manage their child's inappropriate behaviors, the use of self-instructions, using reinforcement during self-evaluation, and contingency plans for the entire class. The "Think Aloud" program was also used. Self-instructions included: (1) What is my problem? (2) What is my plan? (3) Am I following my plan? (4) How did I do it? Considerable teacher support, reinforcement, encouragement, and feedback were used. As the child became more self-sufficient, prompts by the teacher were faded. Specific behaviors that were targets included the following: (1) avoid aggression toward others, (2) respect teachers and classmates, (3) stay seated, (4) remain quiet while seated, (5) attend to tasks, and (6) follow teacher directions. A point system was used to reward meeting appropriate behavior targets. These rules were taught by the teachers in a group context, and the points were applied individually. The treatment group did significantly better on academic performance and classroom conduct and improved teacher knowledge of the educational needs of their children.

Richter and colleagues (1995) describe a multimodal treatment program goal. They note that important questions regarding the treatment of ADHD in children remain. For example, what combination of treatment components best addresses differences in age, severity of core ADHD symptoms, and comorbid disorders such as conduct disorder, autism, intellectual disabilities, or anxiety? These authors also note that early studies focused almost exclusively on the use of stimulant medications on core inattention and impulsivity symptoms. This approach has given way largely to psychosocial programs such as the one by Miranda et al. (2002). The combination of medication with these psychological treatments has also been discussed. These authors' overall conclusion is that combined treatments may produce better results than treatment models using a singular intervention.

Jensen et al. (2001) describe a large-scale treatment study looking at singular and combined interventions. Five hundred seventy-nine children 7–10 years of age were assigned to one of four conditions of 14 months' duration. Children were not excluded if comorbid conditions such as conduct disorder, internalizing disorders, and specific learning disabilities were diagnosed. Treatment one was methylphenidate while treatment two was behavior management. This latter intervention consisted of 35 sessions to teacher/parent behavior management and coordinating with school services. Children in this condition also received summer school consistent of day-long sessions for 8 weeks. The focus was on sports, social, and academic skills. The same therapist provided parent training and supervised their child's counselor during the summer program. The therapist also consulted with the child's teacher during the regular school year. They also supervised a teacher's aide who worked with the child for 12 weeks in the fall. Treatment three combined the first two treatments. The final intervention group was called the community comparison group. Families in this group were provided a list of referrals. Another option was to refer the family back to the original provider. Treatment in this condition was heterogeneous and varied from family to family dependent on whatever was available and what parents agreed to use. About 43 of the group received stimulant drugs. Drug and psychological interventions were described as much less intensive than in groups one to four.

The first three treatment groups described had superior effects to the community comparison group. These data underscore the value of interventions that are intensive and which are provided by specialists in ADHD with backgrounds in psychiatry and psychology. This is in contrast to the less effective method of general practitioners and generalists in the mental health field. The combined treatment was superior to medication or intensive specialized psychological intervention. Having said that, both of the singular treatments provided in groups one and two also result in benefits.

Duric, Gundersen, Golos, and Elgen (2017) describe a treatment for ADHD that had a 6-month follow-up. They studied 285 children and adolescents diagnosed with ADHD in Norway with a mean age of 11–6 years. One treatment was described as non-pharmacological (NF). The NF group employed scalp sensors to measure brain waves. In an effort to shape brain wave activity, kids played video games. Treatment was conducted three times a week for a total of 30 sessions. A second condition consisted of methylphenidate, while a third condition combined the first two treatments. Parents reported change at a 6-month follow-up, but teachers did not. The NF group showed little change, but relatively equal change was seen for the medication group and the medication plus NF group. It should be noted, however, that the psychological intervention was nonconventional and may plain the results in this paper.

Swanson et al. (2008) took a more conventional approach. They compared stimulant medication to behavior therapy in a review of papers on the topic. These authors draw a number of conclusions. (1) Intensive drug management using a stimulant medication algorithm should be a first-line treatment. This approach is recommended with or without behavior therapy. (2) Growth suppression of 20% accumulates due to stimulant medication over a 2-year period with height reductions of up to 2 cm. Rebound is possible once medication is discontinued. (3) Long-term treatment effects defined as 2 years were evident with the stimulant medication algorithm. (4) Relative superiority of stimulant medication may be temporary for 2/3 of children, and these effects will be evident by 3 years of drug use. (5) More needs to be learned about these children who receive medications and why some children stop medication use for ADHD.

Pelham et al. (2000) have also addressed the issue of combined treatments for ADHD symptoms of children. They treated 117 children who range in age from 7 to 9 years. Children were assigned to a behavior therapy summer camp. Children at the camp were diagnosed with ADHD and were divided into placebo or medication groups. This latter group was described as the combined treatment or multimodal group. The camp involved 3 h of manualized treatment each day of camp. A focus of this treatment was on teaching children how to function as a group on establishing friendships. The remainder of the day, children participated in recreational activities in groups. Psychologists and special educational teachers provided the care. Children participated in a response cost system where points could be won or lost throughout the day. They found that the addition of medication added only marginal improvements over the behavioral-based school program on a range of measures. These measured included aggression and/or defiant behavior, interacting with peers, recreational activities, and home settings. Other categories included academic skills and general all-around normal behaviors. They describe the 14-week program as producing very large gains.

Bikic, Reichow, McCauley, Ibrahim, and Sukhodolsky (2017) provide a review of organizational skills training for children with ADHD. Skill building methods have been used to teach organization of materials. In some of the therapy models, time management and goals for treatment were broken down into steps and combined with prompts, instructions, and reinforcement. Another program these authors review includes the Homework, Organization, and Planning Skills (HOPS). As with the program components reviewed alone, this is a skills-based treatment that was provided after school for 8 weeks. Organizational checklists and methods to track homework were used. The Child Life and Attention Skills (CLAS) program is another of these organization treatments for children with ADHD. Major aspects of this program include teacher report cards on the child, guidance in task completion, improving executive functioning, and dealing more effectively with problems. The Family School Success (FSS) is yet another of these programs. The primary goal of this approach to the treatment of ADHD is to enhance positive parental involvement with the school process. One of the primary targets includes inattention on the parent of the child. All of these organizational programs proved to be useful in enhancing attention and academic skills. Many of these programs also involve a parental component. Frequently used strategies involve providing structure to the child's routine to enhance organizational skills. This structure, which is planned and supported by parents and teachers, is further aided by the instructional methods such as performance feedback and reinforcement systems. These approaches tend to be independent of medication-based treatments for ADHD.

Tamm et al. (2017) target a different set of behaviors for children with ADHD. Their focus was specific to word reading difficulties of 216 children in grades 2–5. Groups consisted of medication and parent training focused on ADHD treatment, a treatment condition consisting of reading instruction, and a third condition which combined treatments in group 1 and group 2. Treatment outcome measures consisted of ratings on ADHD scales by parents and teacher and on assessment of word reading and/or decoding. As would be expected, inattention and hyperactivity/impulsivity symptoms responded best to the medication plus parent training condition and the combined condition. The two groups with greatest improvements on ADHD symptoms did not differ markedly. Word reading and decoding improvements were greatest for the reading instruction and combined conditions. These data suggest that interventions need to be symptoms specific. This finding is in tune with our earlier remarks that some interventions may appear less effective because the behavior being affected by the intervention may not be addressed in some studies. Measurement issues of this sort may lead investigators to make incorrect assumptions regarding the effectiveness of various treatments.

Shuai et al. (2017) describe a Chinese sample of 44 children with ADHD and 88 children with typical development. Five of the children in the ADHD groups were on medication for their symptoms. The authors provided a skills-based intervention focused on executive function. Specific skills that were targeted included planning and organizing, theory of mind, time management, and emotion regulation. These skills were taught to the children. The learning environment was structured so that ample opportunities to produce these skills were presented. A parent component was also employed. Parents were provided education about ADHD and applied behavior analysis. Among the techniques used were behavioral contracts, token systems, and differential reinforcement of other behavior. Compliance and eye contact were among the behaviors that were trained. Significant improvements in all measured of executive function were noted.

Sibley, Comer, and Gonzalez (2017) address the problem of poor treatment utilization among adolescents with ADHD. These authors used parent-teen video conferencing for ADHD. The focus was on motivating the adolescents to meet goals as well as a focus on how parents could implement strategies to support their children. The authors note that this learning format results in very good adherence to treatment and satisfaction with the program.

Parent Training

Chronis, Chacko, Fabiano, Wymbs, and Pelham, Jr. (2004) review a number of studies that focus on behavioral parent training (BPT). These authors present an excellent review. One of the most significant points they cover are common components of parent training. The typical sequence involves (1) an overview of behavior management principles and ADHD symptoms; (2) establishing home-school notes, home behavior checklists, and various reward systems; (3) attending to (reinforcing) appropriate behavior while ignoring minor transgressions; (4) giving appropriate commands and reprimands; (5) defining and reinforcing contingencies; (6) employing time-out; (7) establishing home token systems; (8) enforcing contingencies outside the living environment; (9) problem-solving methods; and (10) maintenance after active treatment has been terminated.

The authors point out that over the last two decades, a major move in parent treatment has been from the clinic to group school-based programs. Many of these programs are manualized. One of the best known of these is parent-child interaction therapy. The focus of this intervention is a series of conventional behavior therapy strategies such as in vivo practice, modeling, and performance feedback. Initially, this therapeutic model was implemented on a family-by-family basis. More recently group strategies have been employed to decrease costs and enhance efficiency of the training. Videotaped modeling of skills has also been introduced as a means of enhancing treatment efficiency.

Other manualized programs have also been devised as a means of enhancing childhood coping skills. These treatment models also use videotaped modeling, group discussion, role-playing, and performance feedback. One of these programs is the Incredible Years (Webster-Stratton, 1996). Chronis et al. (2004) state that this training model is promising for families of children with ADHD. We underscore that originally this treatment was designed for oppositional defiant disorder and conduct disorder. It should also be underscored that these two latter disorders are also comorbid with ADHD at high levels.

Another of these well-established training models is the Community Parent Education Program (COPE; Cunningham, Brenner, & Secord, 1998). Similar behavior therapy strategies to the Incredible Years program are used. There is also a focus on parent-led small groups with a particular emphasis on problem-solving. Chronis-Tuscano, Wang, Woods, Strickland, and Stein (2017) underscore the importance of parent involvement in ADHD interventions for their children. They also make the point that ¼ to ½ of these parents have also experienced ADHD. It seems logical to conclude, therefore, that these interventions may benefit the parents as well.

Haack, Villodas, McBurnett, Hinshaw, and Pfiffner (2017) have also looked at the benefits of parent treatment in children with ADHD, predominately inattentive type. They employed the multifaceted psychosocial skills program CLAS. They treated 7- to 11-year-old children with the latter intervention or a more parent-focused treatment. Both treatments resulted in improvements in negative parenting, while the CLAS group also improved positive parenting.

Treatment Issues

Sikirica, Gustafsson, and Makim (2017) conducted a retrospective study of 1794 children and adolescents 6–17 years of age in Sweden. They looked at treatment patterns for these clients, defined as the first administration of stimulant medication. For those with comorbidities, more medications were used. Also, there were, as would be expected, greater overall resource use and higher cost.

Colaneri, Klein, and Adesman (2017) have also addressed the issue of medication utilization for persons diagnosed with ADHD. They addressed the issue of physician practices aimed at presenting the misuse of stimulant mediations. The most common practice was to use long-acting medications versus immediate-release drugs. Another strategy has been to prescribe non-stimulant drugs for ADHD since other psychotropic drug classes are less likely to be used recreationally. Medical contracts with clients seemed to be moderately effective and were used but less frequently than the other two methods mentioned. Print materials on the potential misuse of medication were also mentioned but rarely used. Another method that has been suggested but which also has gained little traction was to prescribe smaller numbers of pills. The authors point out that physicians must take greater responsibility for drug misuse by employing the strategies noted above more frequently and systematically.

Sleath et al. (2017) have also addressed the issue of drug adherence. They studied children and adolescents between 7 and 17 years of age. Also, parents completed questionnaires. Seventy families participated in the project. One-third of the children and adolescents desired more information on ADHD from mental health professionals. The average number of questions was 8. With respect to nonadherence, being nonwhite and being older were the greatest risk factors.

Compliance to psychosocial treatment is also a major issue of concern. Schultz, Evans, Langberg, and Schoemann (2017) addressed this issue in a large multisite study called the Challenging Horizons Program. This program covered one school year and focused on academic and social skills of adolescents diagnosed with ADHD. Those who complied with the treatment showed improvements in challenging behaviors, being organized, and completing homework. Little impact on social skills was observed, however. An interesting finding was that participants most in need of ADHD social services were most likely to comply.

Conclusion

A marked evaluation in treatment and service provision has occurred in those with ADHD. While not specifically addressed here, due to the scope of the book's topics, adults are being diagnosed with ADHD at much higher rates in recent years. Other trends have been ever-increasing numbers of children being diagnosed with ADHD. Comorbid disorders are being diagnosed at much higher rates and being treated much more frequently as well. Also, behavioral interventions are recommended for treating hyperactivity/impulsive behavior even when criteria for ADHD are not met (Wolraich et al., 2011).

Abuse of stimulant drugs is a major topic as well. Better drug adherence and proactive efforts for mental health professionals are urgently needed. More and better implementations of psychosocial treatments are also needed. There is sufficient evidence to conclude that behaviorally based methods implemented at school and with parents paired with stimulant drugs produce the best results. More emphasis on how to expand this approach in the broadest real-world context is needed.

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Treatments for Autism Spectrum Disorders

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Contents

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that presents with restricted and repetitive behaviors and interests as well as deficits in social communication abilities and sensory abnormalities. When discussing treatments available for individuals with ASD, there are many considerations that need to be taken into account before selecting an appropriate intervention. No single intervention will be maximally effective for all clients and intervention planning that is individualized to the client based on specific factors will help to improve treatment outcomes. Some of these factors include the intellectual functioning of the individual, the severity of autistic symptoms, as well as any comorbid disorders (both medical and psychological) that may affect treatment.

When discussing level of functioning for individuals with ASD, many often confuse this with the severity of autism symptoms; rather, these are two distinct characteristics. While it is true that a majority on the autism spectrum also have an intellectual disability, this is not necessarily tied to severity of autism symptoms, and, in fact, many individuals with ASD are considered "high functioning" (i.e., no intellectual disability diagnosis), and some exhibit intellectual functioning well above the average range. Because of this wide range of intellectual functioning across the

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autism spectrum, differing treatments should be considered. For example, cognitive-behavior therapy (CBT) may be a useful tool in treating an individual with ASD with average or above average intellectual functioning but may not be as useful for an individual with an intellectual disability; for these individuals a more behavioral approach may be more effective. Clinicians and families need to be aware of these issues and make appropriate decisions that will be most impactful for their specific client.

In this chapter, we will briefly discuss the history of ASD including classification changes as this is important to understand when working with and treating this population. We will then discuss the importance of early intervention in working with children with ASD as well as what makes an intervention "evidence-based." The focal point of this chapter will present many of the prominent interventions that are available to individuals with ASD with respect to their level of empirical support (or lack thereof) and in some cases the potential for harm. This is not meant to be an exhaustive review of all available interventions/treatments available for ASD (as there are many) but rather a review of some of the most popular and well research (which are not always one and the same) treatments for ASD.

History

ASD is a relatively new diagnosis compared to others in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5). While ASD remains somewhat new and understudied, it is now becoming a more prominent neurodevelopmental disorder, receiving a large amount of attention from clinicians and families alike. Although parents and physicians are now more aware of signs and symptoms to be looking for, the history and development of the disorder remain predominantly unknown by most.

First Use

The term "autism" first came into use in 1911 by Eugen Bleuler, a Swiss psychiatrist. His use of the word "autism" was intended to represent one's self-absorbed retreat into an idiosyncratic mental state of fantasy, which he thought to be tied to symptoms of a schizophrenic trait (Goldstein & Ozonoff, 2009). He reported that those with schizophrenia oftentimes display behaviors such as daydreaming and imaginative play but that as long as the "autistic thinking" of the schizophrenic individual remains intact, so does their ability to think reasonably and rationally. However, if the thinking is challenged, then the individual displays illogical and irrational thinking patterns (Bleuler, 1913). Bleuler's focus on the sensory abnormalities in terms of autism led many children from the 1930s to 1960s with schizophrenia to be thought to actually have autism. Leo Kanner made the distinction between autism and schizophrenia in children, reporting that autism was due to a deviation from typical neurodevelopment (Goldstein & Ozonoff, 2009). However, this led to some confusion among professionals, and the distinction between disorders has continually been debated, although there is significant evidence and criteria supporting a clear distinction (Cohen, Paul, & Volkmar, 1986; de Bruin, de Nijs, Verheij, Hartman, & Ferdinand, 2006; Towbin, Dykens, Pearson, & Coehn, 1993).

The features of autism were initially outlined by Kanner (1944, 1954), describing a series of "core symptoms." These symptoms included an inability to form appropriate social relationships with those around them, an odd use of language or general speech/language deficits, and an excessive desire for a "preservation of sameness" that were present from birth onward, although they became more noticeable during childhood (Kanner, 1943, 1944). Additionally, he noted that autism was present more often in boys than girls, these children more often have enlarged heads, and their parents tended to be more intelligent with stronger interests in science and arts than in other people (Kanner, 1943, 1954; Kanner & Eisenberg, 1957). Interestingly, Hans Asperger, a German researcher, was also investigating these behaviors around the same time as Kanner. In fact, the ideas and observations are so similar and so close in temporal proximity that some researchers argue that Kanner knew about Asperger's work but chose to ignore it. It is also possible that the two researchers truly were not aware of each other's studies due to WWII preventing any exchange of information (Deisinger, 2011). However, his work went mostly unnoticed until it was translated to English in 1991. The work of Asperger led to a wider array of disordered symptoms to be classified within the spectrum of autism, thus allowing individuals with less severe impairments to receive psychological and other therapeutic interventions.

Classification/Diagnosis

In 1972, Michael Rutter reported that childhood schizophrenia, the disorder label used to describe autistic symptoms that lumped children with schizophrenia and autism together, was no longer helpful. He believed that "childhood schizophrenia" was being used as a catchall for the above-described symptoms and it no longer held the same level of clinical utility (Rutter, 1972). He based this decision off a previous publication from himself and colleagues that described a triaxial classification system that separated intellectual disabilities and clinical problems (Rutter et al., 1969). This model began to gain more support from clinicians as time went on, and eventually included psychiatric and intellectual axes, but split the etiological factors into biological factors and psychosocial factors. His work propelled autism into the next phase for diagnosis and treatment, the DSM.

DSM-III, DSM-III-R, DSM-IV, and DSM-IV-TR

A description of the diagnosis for autism first appeared in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) as infantile autism and was listed in a new category: pervasive developmental disorders (American Psychiatric Association 1980). The criteria included a pervasive lack of response to others, deficits in language development, odd use of language or pronoun reversals if speech is present, insistence on sameness, odd interests or attachments to objects, onset prior to 30 months of age, and the absence of schizophrenic features such as hallucinations and delusions. Then, in the DSM-III-R (American Psychiatric Association. Work Group to Revise DSM-III, American Psychiatric Association 1987), the disorder was renamed to "Autistic Disorder" with some changes in the criteria including the removal of age of onset and a requirement of 8 out of 16 items with at least 2 impairments in reciprocal interaction, 1 communication impairment, and 1 restricted interest or activity. The diagnostic criteria changed very little between DSM-III-R, DSM-IV, and DSM-IV-TR, with the exception of the inclusion of Asperger's disorder, which required six criteria instead of the eight required for autism. However, it was not until DSM-5 that the disorder of autism saw a significant change.

DSM-5

The DSM-5 (American Psychiatric Association. DSM-5 Task Force, & American Psychiatric Association, 2013) shifted the diagnostic criteria so that it emphasized deficits in two core areas associated with autism: social communication and restricted/repetitive behaviors/interests. Within the social communication domain, individuals must exhibit impairments in a total of three areas, including social and emotional reciprocity (e.g., struggling with social communication, impairment in showing and sharing of interests or emotions, or failure to engage in other social interactions), nonverbal social communication (e.g., poor eye contact, impaired use and understanding of gestures, and impaired use of facial expressions), and deficits in developing and maintaining social relationships. They must also exhibit impairments in at least two of the following restricted/repetitive behaviors or interests including stereotyped/repetitive motor movements, use of objects, or speech and insistence on sameness or over-adherence to rituals or routines, restricted interest in objects or subject matter, or exhibit sensory abnormalities such as over- or under-reactivity to different sensory input. Additionally, the individuals must experience significant impairments in areas of adaptive functioning.

One of the major changes from prior DSM editions to the DSM-5 is the elimination of Asperger's disorder and the change of "Autistic Disorder" to "Autism Spectrum Disorder" with the implementation of severity levels. This allows clinicians to provide a severity rating on a three-point scale that describes the level of support needed. Additionally, the DSM-5 provided a series of specifiers to describe impairments that commonly co-occur in individuals with autism including intellectual disability, language impairments, or other neurodevelopmental, mental, or behavioral disorders or catatonia. Furthermore, the DSM-5 eliminated the age limitation which allows for additional inclusion of individuals. However, due to the elimination of Asperger's disorder, those who display autistic traits that are higher functioning are more likely to not receive a diagnosis.

Early Treatment Requires Early Diagnosis

The ability for a mental health professional or physician to diagnose a child with ASD is tied to the age of the child as well as the severity of symptoms. Children can be diagnosed as early as 12 months of age, but these infants typically have more severe and noticeable differences such as language regression, unusual mannerisms, severe developmental delays, or having relatives with ASD (Valicenti-McDermott, Hottinger, Seijo, & Shulman, 2012). Typically, ages 4–5 are when the majority of children are diagnosed with ASD, as it coincides with the commencement of preschool or kindergarten when these children are expected to socialize with their peers but rather begin displaying certain behavioral differences.

One of the main issues with the process of diagnosis and treatment for children with ASD is the latency periods. There is a range in time between when a parent notices potential symptoms and when they receive a formal diagnosis, often lasting 6 months or more. Additionally, many parents will intentionally avoid seeking out a diagnosis or treatment for fear of stigmatizing their child. The other issue here is that many underserved or lower socioeconomic families are undereducated on potential symptoms to be looking for and therefore do not realize that their child may be on the spectrum. Additionally, once a diagnosis is obtained, there is generally an additional latency period in finding and setting up intervention services. Depending on the city in which the family is living, there could be as little as one or no professionals who specialize in providing treatment to children with autism. Then, even if there are specialists in the area, parents often struggle with lengthy wait lists.

Multiple studies have implicated the importance of early diagnosis and early treatment in the positive outcome of children with ASD (McNamara, 2003). For example, in a study investigating the outcome of 4-year-olds diagnosed at age 2, they found that treatment improved symptoms to the point that many of the children included in the study with a diagnosis of ASD at age 2 were functioning at the level of a typically developing child at age 4 (Sutera et al., 2007). In contrast, children diagnosed and provided treatment later in life displayed higher rates of "emotional difficulty," and an overall "poor" or "fair" overall outcomes (Eaves & Ho, 2008). It's obvious that the earlier a child is diagnosed, the better the outcome, but there are other factors, such as lower symptom severity, parent participation, and higher maternal education that are associated with better outcomes as well (Mhatre, Bapat, & Udami, 2016). These critical periods of diagnosis and treatment aid in providing the child with a better grasp of verbal and social skills to improve their overall quality of life as they mature and adjust developmental trajectories.

Measuring Empirical Support

The empirical basis concerning ASD treatment is both diverse and extensive. Interventions that are considered "evidence based" in the treatment of ASD symptoms have been shown to improve deficits in adaptive, cognitive, and social functioning. There is a growing body of evidence to support the efficacy of intensive behavioral interventions, which are typically one-on-one with the client and therapist and are carried out over 25–40 h per week. The interventions are structured and designed with lessons broken down into simple repeated tasks or trials. In each trial, the client is presented with a stimulus and encouraged through the use of positive reinforcement (Lovaas, 1987). Clients receiving intensive behavioral interventions have shown improvements in their performance on measures of intellectual abilities, language skills, and adaptive functioning (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005). The following will discuss seminal studies that have influenced empirically based interventions used today.

Empirically supported treatments are theory-driven and testable treatments intended for a specific population or disorder. This led to some issues in the early to mid-1900s as there were still few clinicians that agreed on the diagnosis of autism, which made identifying a theoretical platform for treatment implementation difficult. However, one of the first studies implementing a theory-driven empirically-based treatment was conducted by Lovaas and colleagues. His study, termed the UCLA Young Autism Project, provided empirical support of interventions for individuals with ASD (Lovaas, 1987). In this study, they incorporated behavioral analysis to evaluate the educational effects of a behaviorally based intervention for young children diagnosed with ASD. The children received 10–40 h of intervention per week at varying degrees of intensity. The outcome of the study showed that children receiving more frequent and intense interventions displayed significantly greater gains in terms of intellectual ability.

Additional studies have replicated these findings (e.g., Sheinkopf & Siegel, 1998), and a meta-analysis of 34 behavioral intervention studies conducted by Eldevik et al. (2009) and later 16 group design treatment studies (Eldevik et al., 2010) supported the use of intensive behavioral intervention as the treatment of choice based on the superior outcomes found reliably across studies and substantial increases in IQ for participants receiving more intensive intervention.

Based on many of the same principles, the Early Start Denver Model (ESDM) is another intervention program geared specifically for young toddlers. The ESDM model has exhibited significant improvements in autistic-related symptomology (Dawson et al., 2012; Estes et al., 2015), and the practice seeks to promote the development of neural systems for social interaction and consequently elevate the child's social motivation. The practice also tries to facilitate active attention to faces by increasing a child's exposure to interpersonal exchanges. In addition to significant gains in socio-communicative function, long-term participation in ESDM has seemed to normalize electrophysiological brain responses to facial stimuli in young children with autism (Dawson et al., 2012).

Once behavioral interventions were identified as empirically supported treatments, researchers began investigating new methods of treatment that were more generalizable to natural environments. For example, Koegel, O'Dell, and Koegel (1987) developed a treatment intended to improve verbal abilities in nonverbal children with autism. His study showed such improved gains that other researcher began using the same "naturalistic" approach with observed gains in areas such as symbolic play, joint attention, disruptive behavior, and social behavior to name a few (Koegel, Koegel, & Camarata, 2010). These studies brought about a new form of treatment modality, referred to as Pivotal Response Treatment (discussed in further detail below), which is a scientifically-based approach to treatment that allows for scientific review.

In summary, the research literature shows strong support for intensive behavioral intervention in the treatment of children with ASD. A number of research studies strongly favor the use of intensive behavioral interventions with evidence that is compelling in both its consistency and scope. However, research varies in efficacy and the level of potential harm within different forms of treatment ranging from non-efficacious to efficacious and empirically validated. While this chapter does not seek to review all evidence-based interventions (see Wong et al., 2015 for a more extensive review of evidence based practices) or unsubstantiated and potentially harmful treatments (see Foxx & Mulick, 2016 for an extensive resource on controversial therapies), many of the common treatments will be discussed.

Non-efficacious but Generally Benign Treatments

Many therapies and interventions that are available to families and individuals with ASD lack research support for their effectiveness in the actual treatment of ASD symptoms. Some of these are due to a lack of research in the area; however, many of these have been found to be ineffective through rigorous studies. Many of the treatments/interventions included in this section are generally benign meaning they cause no significant harm to the individual or family but at the same time offer little to no benefit in regard to improving ASD symptoms or outcomes. Regardless, many of these interventions are widely used and supported by family members, clinicians, and caregivers in spite of its unproven efficacy.

Vitamin Supplements

Linus Pauling introduced orthomolecular psychiatry in the late 1960s, which argues for treating mental illness using vitamins and minerals. Pauling believed that inadequate levels of vitamins and minerals could produce a number of mental defects. Pauling's theory has been used to support vitamin treatment for autism spectrum disorder. However, the use of vitamins in psychological and developmental disorders is not supported in a number of well-designed studies (Kozlowski, 1992).

Over the past 20 years, B6 and magnesium have been a popular choice for ASD. However, there is still not enough evidence to support the use of supplements for treatment of ASD. Rimland, Findling, Maxwell, and Witnitzer (1998) studied participants using a randomized, double-blind trial and found the use of vitamins and other supplements displayed no significant difference from controls. More recently, vitamin supplements have been in use as a complimentary or alternative medical treatment for ASD.

Vitamin C is not commonly used as an isolated treatment for ASD, but it is frequently combined with other vitamins and given to children with ASD. Researchers studied the efficacy of vitamin C and reported a decrease in stereotyped behavior in a double-blind trial of children with ASD (Dolske, Spollen, McKay, Lancashire, & Tolbert, 1993); however, the results of this study have not been replicated.

Although vitamins and minerals are a recommended part of a healthy diet, suggesting that vitamins or minerals should be used as the primary treatment for ASD is unfounded and has little support. Vitamins and minerals do not have an effect on the impairment in verbal or nonverbal communication, imagination, reciprocal social interaction, or developmental delays in ASD. Therefore, vitamins and minerals should not be viewed as an alternative medical treatment; instead vitamins and minerals should be viewed as complimentary dietary supplements.

Camels' Milk

Along the same vein of vitamins and minerals, milk is typically thought of as containing important nutrients for human nourishment. Camels' milk is believed to have some potential therapeutic effects in diseases such as diabetes and hepatitis B (Shabo, Barzel, Margoulis, & Yagil, 2005). Recently, some parents have used camels' milk as an alternative treatment for children with ASD because of the perceived therapeutic capabilities.

Initially, experimentation using animals has shown that a powerful opioid, casomorphin, causes autistic-like symptoms in animals (Shabo & Yagil, 2005). This opioid is believed to initially cause cognitive and behavioral symptoms, eventually leading to brain damage in animals. Consequently, Shabo and Yagil suggest that we restrict cows' milk products because it can lead to the formation of casomorphin. Instead, Shabo and Yagil recommend camels' milk as it does not contain beta-lactoglobulin or beta-casein like cow's milk. They also believed that there is additional benefit to camels' milk in the form of immunoglobulins, which are necessary for maintaining the immune system and for healthy brain development.

While it is true that camels' milk lacks beta-lactoglobulin and beta-casein, which are two powerful allergens in cow's milk, this only makes camels' milk more appealing to children suffering from allergies related to cow's milk. However, this would not necessarily mean a reduction in ASD symptomology such as impairment in verbal or nonverbal communication, reciprocal social interaction, and developmental delays (Bashir & Al-Ayadhi, 2013). Children with severe food allergies may benefit from the unique properties of camels' milk, but it should be viewed as a complementary dietary supplement for the general population and not as a primary treatment option for individuals with ASD (Bashir & Al-Ayadhi).

Special Diets

Some pediatricians and general physicians will inform parents or patients that special diets can aid in autistic symptoms. More specifically, a casein- and gluten-free diet has had an increase in popularity in recent years, boasting the curative effects of a clean and healthy diet on pain tolerance, self-injurious behaviors, delayed or lost language, and attention. Other diets promoted include the "Whole Food Diet" that claims to help with picky eating and hyperactivity, the "Specific Carbohydrate Diet," which is suggested to help with distension, sleep, and attention, and the "Body Ecology Diet," that is gluten free, casein free, and sugar free, with improvements in digestion, distension, and sleep (Ackerman, 2015).

In children with ASD and gastrointestinal (GI) abnormalities, a gluten- and casein-free diet can be beneficial compared to similar children without GI abnormalities, but this is strongly tied to parent's perception of improvement (Pennesi & Klein, 2012). Conversely, other research indicates that a gluten- and casein-free diet is not scientifically supported and that these restrictive diets can cause stigmatization and reduced cortical bone thickness (Mulloy et al., 2010). Limiting a child's diet is not only suggested to be ineffective but can also become problematic as children with ASD already tend to have a limited food preference; so by reducing that even more, major health concerns may arise.

Overall, the results of special diets are problematic because most of the studies rely on parent report of the outcome variables. This method of treatment is often seen as a simple solution for parents that is more cost-effective than the majority of the other treatments, as well as less harmful. Therefore, parents become hopeful and biased in their assessment of the effectiveness of special diets when, in fact, there is little evidential support for the mechanism of change with this treatment.

Equine-Assisted Activities and Therapies

Animal-assisted therapies have been used to influence physiological factors including lowering blood pressure, regulating heart rate, and decreasing anxiety levels (Morrison, 2007). Equine-assisted activities and therapies (EAAT) are a subtype of animal-assisted therapy, which some have tried as an alternative treatment for individuals with ASD. The purpose of EAAT is to use horseback riding activities to improve balance, posture, and mobility of the client (Parish-Plass, 2013). Another important goal of EAAT is to develop a therapeutic relationship or bond between the client, therapist, and horse (All et al., 1999). Proponents of EAAT claim that it stimulates multiple domains of functioning for children with ASD. This therapy targets children with neurological disorders who generally present with a combination of motor, cognitive, and social disabilities (Fine, 2006).

In EAAT therapy, the horse represents a multisensory organism, which can assist children with ASD to better utilize their own senses (McDaniel, Osmann, & Wood, 2015). EAAT is believed to help each child understand how their bodies relate to external stimuli (Parish-Plass, 2013). Another potential benefit is that a child with ASD may feel compelled to communicate with the horse or the instructor during the therapy session because of the excitement they feel from the experience (All et al., 1999). However, caution should be used with regard to the claims EAAT and other animal-assisted therapies make. Replication and further research are needed to assess the claims and therapeutic effects of EAAT with better controls (McDaniel et al., 2015).

To date, there is not sufficient evidence to show that EAAT benefits the cognitive, psychological, or social domains of individuals with ASD (McDaniel et al., 2015). The only existing meta-analysis of EAAT was presented to the Society for the Study of Occupation. The paper reviewed existing studies and noted that research is still inconclusive in regard to the effects of EAAT. Therefore, EAAT should not be considered a best practice or primary treatment option for individuals with ASD.

Dolphin-Assisted Therapy

Dolphin-assisted therapy (DAT) refers to the implementation of therapy while swimming with dolphins. DAT involves a child receiving the reward of swimming with a dolphin after successfully completing a therapy session (Nathanson, 1998). The child's success in the therapy session is usually attributed to the motivating effects of swimming with a dolphin. Proponents of DAT claim extraordinary results and breakthroughs for their clients (Marino & Lilienfeld, 2007). The objective of DAT is to help individuals with ASD by aiding in motor function, attention span, and language development (Humphries, 2003).

David Nathanson, a clinical psychologist, studied DAT, and he is responsible for much of the existing research on DAT. Nathanson hypothesized that children with ASD would better focus their attention to the stimuli in their environment, if a dolphin was present. That is because the dolphin would give the child an incentive, which Nathanson thought would motivate the child to complete each task and to give the appropriate response in the therapy session (Nathanson, 1998).

There are no set criteria for what constitutes DAT, and there are no regulations (Marino & Lilienfeld, 2007). Some proponents of DAT have suggested that the technique works through sonophoresis, in which the dolphins' ultrasonic echolocation influence is thought to cause positive chemical and electrical changes in the individuals in close proximity (Brensing & Linke, 2003). However, the claim that echolocation serves as the therapeutic instrument in DAT has no scientific merit (Humphries, 2003).

Psychologists have cautioned that DAT is not effective for any known condition. While we included DAT in the benign category, DAT presents considerable potential risks to the humans and the captive dolphins involved in the therapy (Marino & Lilienfeld, 2007). DAT has been strongly criticized as having no long-term benefit and being based on flawed observations (Humphries, 2003). For these reasons, the purportedly therapeutic procedure of DAT should not be considered a primary treatment option for individuals with ASD.

Hyperbaric Oxygen Therapy (HBOT)

Hyperbaric oxygen therapy (HBOT) is considered an alternative medicine treatment in which patients breathe pure oxygen in a pressurized chamber. While this treatment is considered a well-established treatment for medical conditions such as decompression sickness, arterial gas embolisms, and carbon monoxide poisoning and to aid in the healing of wounds, it has also been used in treating individuals with ASD.

Some researchers have reported potential improvements in behavioral functioning in children with ASD. For example, one study reported improvement on both clinician and parent reports of behavior (Bent, Bertoglio, Ashwood, Nemeth, & Hendren, 2012); however, this study lacked any type of control group or objective measures of behavior. Few rigorous studies have been conducted utilizing HBOT, and of those that have employed more rigorous methods, results suggest no improvements in any ASD symptoms, cognitive functioning, or common comorbid symptoms (Xiong, Chen, Luo, & Mu, 2016). In fact, in a study of 16 children utilizing multiple baseline methods (and 5 replications of those multiple baselines), researchers reported no significant or consistent findings which demonstrated the ineffectiveness of HBOT in treating ASD (Jepson et al., 2011). While no studies have found HBOT to be particularly harmful when used correctly (although some studies have reported mild ear barotrauma), the cost of HBOT can be exorbitant and takes resources away from more evidence-based practices.

Craniosacral Therapy

The theory behind craniosacral therapy was developed by John Upledger based on his research at Michigan State University from 1975 to 1983 (Upledger, 2017). He believed that the reason children were experiencing autistic symptoms was due to a buildup of cerebrospinal fluid in the brain, causing increases in pressure (Offit, 2010). Craniosacral therapy is a form of massage that claims to use manipulation of the cranial bones and sutures to redirect the flow of cerebrospinal fluid (Vanes, 2013). Although this form of therapy has been used for roughly three decades, clinical trials have been limited. Research against craniosacral therapy purports that there is no evidence to suggest that these children have any spinal fluid buildup. However, a recent study consisting of 124 patients found that craniosacral therapy shows improvement in cognitive function, communication, and social skills (Kratz, Kerr, & Porter, 2016); however, these results have not been replicated. More research is needed to further support the use of this therapy though the recent study is suggestive of positive outcomes with fewer harmful side effects when compared to other treatments discussed within this chapter.

Non-efficacious and Potentially Harmful Treatments

While there are many therapies that have been proven ineffective or lack evidence supporting their efficacy, there are also therapies within this distinction that are not only ineffective but are potentially dangerous and harmful. These are therapies which parents, caregivers, individuals, clinicians, and others should avoid. In these cases, the risks greatly outweigh any potential benefits, and empirical studies have shown these therapies/interventions to be ineffective.

Miracle Mineral Solution (MMS)

Miracle Mineral Solution (MMS) was developed by Jim Humble and is sold as a “miracle” cure for almost any medical issue. Jim Humble does not possess any credentials relating to ASD, medical biology, or chemistry, and furthermore, the ingredients associated with MMS are not medicinal in nature, but rather the ingredients included in MMS are toxic to the human system.

One of the known components of MMS is industrial bleach, which makes up 28% of the mixture and causes nauseas, severe vomiting, lowered blood pressure, and fever (Williams, Dawling, & Seger, 2009). Proponents of MMS assure potential clients that the side effects are part of a detox process that is both natural and healthy to undergo. These claims are false and dangerous. People experiencing negative symptomology from the use of MMS should instead seek immediate medical attention (Williams et al., 2009).

Proponents of MMS have claimed that MMS is effective in treating ASD, HIV, colon problems, brain cancer, heart disease, and skin diseases and in regenerating the liver. Some people have even advocated for the use of MMS to treat malaria, a claim that has been refuted by the International Federation of Red Cross and Red

Crescent Societies (IFRC). MMS is not approved by the FDA or regulated in any way by the government. Unfortunately, MMS is still somewhat of an attractive option to parents seeking potential solutions and alternative treatments for ASD (Brown, 2011). MMS is administered using several different methods; parents are told to mix bleach in their child's juices, baby bottles, and even administer via enemas. To date, there are no empirical journal articles that legitimize the claims of MMS proponents or support the use of MMS as an effective treatment for ASD or any other condition.

Chemical Castration

One of the more harmful and less efficacious forms of treatment for individuals with ASD is chemical castration, or the administration of medications that reduces the amount of testosterone and estrogen in the body. The most frequently used medication is Lupron, which is designed for the treatment of prostate cancer, to suppress production of testosterone. The theory behind administration of the drug in treating ASD is that it helps to remove mercury from the body, as high mercury levels are thought by some parents to cause autistic symptoms, while simultaneously decreasing the child's aggressive and sexual behaviors. However, many medical experts argue against the claims that the medication, or mercury in general, has anything to do with ASD (Heasley, 2010). In fact, chemical castration made the Forbes list of "5 Scariest Autism Treatments,'" right after Miracle Mineral Solution, (Willingham, 2013).

Chemical castration, developed by Mark and David Geier, was believed to decrease testosterone that was tied to mercury making it more difficult to chelate. However, little research was found in support of this treatment, and in fact, more research states that it has potentially harmful side effects. Unfortunately, the treatment had so much advertisement from the Geiers that many unsuspecting parents are still using chemical castration as a means to treat their children.

Chelation Therapy

Chelation therapy follows a similar hypothesis with chemical castration such that there is too much mercury in the blood of children with autism, and therefore it needs to be removed. The process of this therapy involves injecting a synthetic solution (ethylenediaminetetraacetic acid, EDTA) into the bloodstream to remove heavy metals or minerals. Although the Geiers (see "Chemical Castration" section) were the first to hypothesize chelation therapy could be an effective treatment for autism, it was J. B. Handley who received credit for this treatment. He founded Generation Rescue, an organization intended to provide parents of children with autism the truth about their disorder and heal their children from mercury poisoning (Offit, 2010). However, results from randomized control studies are mixed at best, with most studies expressing concern for the safety of the children (Sinha, Silove, & Williams, 2006). Then, in 2008, the *Journal of the American Medical Association* published an article stating that the federal government has halted any trials testing chelation therapy, stating that the "studies had little scientific merit and exposed participants to unacceptable safety risks" (Mitka, 2008). Much like many other harmful treatments for autism, chelation therapy has been deemed harmful and non-efficacious.

Medicinal Marijuana

Some in the medical field argue that use of medicinal marijuana is a potentially useful alternative treatment option for individuals with ASD (Lucido, 2004). These advocates suggest that medicinal marijuana has the ability to control epileptic seizures, relieve nausea, stimulate appetite, help metabolism, decrease anxiety, ease pain, combat muscle spasms, and improve certain autoimmune disorders (Cohen, 2009; Gilman, 2005; Levisohn, 2007; Martín-Sánchez, Furukawa, Taylor, & Martin, 2009). However, the degree to which medicinal marijuana helps with each of the aforementioned problems is still highly debatable (Anderson, Hansen, & Rees, 2015).

There are also a number of negative side effects associated with the use of medicinal marijuana that persons administering the drug must take into consideration before prescribing the drug. For instance, the human brain is not fully developed in adolescence, and the brain does not fully develop until a person has reached their mid to late 20s (Anderson et al., 2015). The habitual use of marijuana is also associated with negative residual neuropsychological effects (Anderson et al., 2015). Medicinal marijuana is believed to cause cognitive dysfunction and significant pathology and may cause structural changes in the brain (Brooks, 2012). Therefore, adolescents and children are especially vulnerable to the negative effects of medicinal marijuana (Brooks, 2012).

The consequences of prolonged use of marijuana are disconcerting, and each prescriber must cautiously weigh the costs and benefits of its use. For these reasons, medical marijuana will likely remain a questionable alternative treatment option until further research is compiled to better assess its efficacy. Additionally, medicinal marijuana should not be prescribed as the primary treatment for ASD because medicinal marijuana does little to nothing to combat impairment in verbal or nonverbal communication, reciprocal social interaction, and developmental delays in ASD (Hadland, Knight, & Harris, 2015).

Chiropractic Manipulation

A relatively new and increasingly popular alternative treatment for ASD is chiropractic manipulation. An estimated 10% of parents of children with ASD have used chiropractic care for their children in the hopes of alleviating ASD-related symptoms (Hanson et al., 2007; Wong & Smith, 2006).

Chiropractic manipulation of the spine is used by chiropractors to treat a variety of medical conditions including ASD. The exact rationale for its use in the treatment of core symptoms of ASD is unknown and not supported (Akins, Angkustsiri, & Hansen, 2010). Increasingly, adverse events have been associated with spinal manipulation, including subarachnoid hemorrhage, vertebral dislocation, and quadriplegia (Vohra, Johnston, Cramer, & Humphreys, 2007). Furthermore, the cervical spine in children is fragile and particularly vulnerable to injury from the use of chiropractic manipulation (Akins et al., 2010).

Proponents of chiropractic care suggest that cranial misalignments contribute to ASD symptoms (Khorshid, Sweat, Zemba, & Zemba, 2006). According to these proponents, when the skull is misaligned, the part of the brain adjacent to the misalignment will suffer a greater pressure and a decreased blood and nerve supply, which results in hypoxia to that part of the brain (Wong & Smith, 2006). This is believed to adversely affect how that part of the brain functions (Khorshid et al., 2006).

The health claims made by chiropractors regarding the application of manipulation as a health care intervention for individuals with ASD continues to lack scientific support and credibility (Akins et al., 2010). To date, there are no published randomized studies comparing the effects of chiropractic manipulation in children with ASD (Gotlib & Rupert, 2008). Methodological weaknesses including lack of a control group, unclear criteria for ASD diagnosis, and use of invalidated tools for measurement of ASD improvement are present in a number of misleading findings that support the use of chiropractic manipulation (Akins, et al., 2010). Therefore, the chiropractic manipulation remains an unsafe and non-efficacious treatment option for individuals with ASD.

Facilitated Communication (FC)

Many individuals with ASD are also nonverbal or non-communicative. In fact, it is estimated that approximately one-quarter of individuals living with ASD are nonverbal with even higher rates of those that have significant communication deficits. Many therapies have been developed to help augment or assist individuals in their ability to communicate their wants and needs with others.

Facilitated communication (FC) is a technique which utilizes a trained facilitator to physically aid the nonverbal individual in typing out their thoughts. This was brought to the United States by Douglas Biklen from Syracuse University in the early 1990s but was quickly debunked in the mid-1990s by several researchers (Jacobson, Mulick, & Schwartz, 1995; Shane & Kearns, 1994). Although the technique was thought to have been disproven, the prevalence of FC continues to this day and the School of Education at Syracuse University and others continue to provide trainings for FC.

FC is also used in many clinical applications throughout the United States and internationally despite well-structured experiments that have invalidated the use of this method. FC can become dangerous in such instances of abuse allegations or any situation in which the authorship of the communication comes into question (Todd, 2012). FC has resulted in situations where families have been falsely accused of sexual or physical abuse as well as family-trusted clinicians betraying that trust and gaining false consent for sexual relationships with a non-communicative client (as is the case of Anna Stubblefield of Rutgers-Newark). Due to the lack of evidence supporting FC in actual communication authored by the individual, but rather authored by the facilitator, and the potential for serious harm, FC is considered an ineffective and potentially dangerous treatment method.

Potentially Efficacious Treatments

The research base of effective autism treatments is continually growing and maturing. That being said, there are several treatments and interventions that show promise in improving ASD symptoms or improving comorbid impairments but lack evidence to be included in our last category of empirically validated treatments. These include under-researched interventions relying solely on small-case designs or lack controls to prove the efficacy of these treatments but show significant potential based on the research that is currently available.

Floortime (DIR)

The developmental individual difference relationship-based model (DIR) is described as a functional developmental approach, which examines how children integrate their motor, cognitive, language, spatial, and sensory abilities to carry out emotionally meaningful goals (Greenspan & Wieder, 1999). DIR is used to treat children with a variety of developmental problems, including children with ASD (Prelock & McCauley, 2012). This approach, which is often referred to as “floortime,” remains popular with families of children with ASD through the distribution of publications, seminars, and websites (Prelock & McCauley).

The model is based on Greenspan and Wieder’s (1999) affect diathesis hypothesis, which suggests that children with symptoms of ASD may have a biologically based processing deficit involving the connection of affect, symbol formation, motor planning, and sequencing capacities (Wieder, 2013). According to the authors, the ability to connect affect to motor function and symbolic representation is a critical skill that develops in the second year of life (Greenspan & Wieder, 1999).

The DIR approach appears attractive to parents because of its unique aspects of emotional reciprocity, which is not typically associated with ASD. With its focus on emotional development, the model gives hope to parents that normal social interactions can be achieved through the use of DIR (Stephenson, Carter, & Kemp, 2012). Additionally, proponents of DIR have accused behavioral interventions of not focusing on the emotional development of their client base (Kalyva, 2011). These advocates then misrepresent the DIR approach as unique in its ability to provide parents with a warm relationship with their child with ASD (Carr & LeBlanc, 2007). Despite emotional appeal and popularity of DIR, no well-controlled studies have been published to document the effects of DIR (Carr & LeBlanc). Overall, DIR lacks the necessary empirical support to be considered a validated treatment for ASD (Carr & LeBlanc; Stephenson et al., 2012).

Pivotal Response Training (PRT)

Pivotal response training (PRT) is a behavioral treatment method based loosely on the method of applied behavior analysis (ABA) with a more naturalistic teaching perspective and focus on increasing motivation of the individual and implementation by parents/caregivers. These “pivotal responses” are behaviors that are considered essential to stimulating learning and motivating responses in nontarget behavioral areas such as language, social interaction, play skills, and other areas. It was created and validated for use with children between 2 and 16 years of age and has a relatively strong research base supporting its use and effectiveness.

As with other ABA-based behavioral interventions, earlier intervention has been strongly tied to better outcomes, especially when implemented before 5 years of age. In addition to improvements in the target behaviors, one study observed increased verbal utterances from baseline measurements of 10–30% prior to PRT to 70–80% posttreatment (Bryson et al., 2007). Likewise, another study observed significant increases in all measured areas of adaptive and independent behavior as a result of a community-based PRT intervention across all age groups (Baker-Ericzén, Stahmer, & Burns, 2007). While the evidence base for PRT relies primarily on small case designs, a recent meta-analysis suggests outcome effectiveness in PRT models that focused on at least two of the three core features of ASD (Bozkus-Genc & Yucesoy-Ozkan, 2016). Although current evidence suggests general efficacy of PRT, further research (and more systematic and rigorous methods) is needed to compare PRT against other well-validated ABA-based interventions (Cadogan & McCrimmon, 2015).

Empirically Validated Treatments

Our final category includes treatments and interventions for ASD that have been shown through rigorous and well-constructed studies and meta-analyses to be well-validated and effective treatments. While we hope that this area continues to grow, there are several useful tools that have been proven to be effective in improving outcomes for individuals with ASD and should be considered the first choice treatments of clinicians and family members. Early intensive behavioral interventions that are based on applied behavior analysis (ABA) are currently viewed as the most efficacious treatments and will not be discussed in elsewhere. However, there are several treatments that incorporate some ABA methods that will be discussed here.

Behavior Therapy

Mixed results exist in the effectiveness of behavioral treatments for the socially significant behaviors of those with autism. One of the most well-known treatments for ASD is applied behavior analysis (ABA), which is discussed further in another chapter. ABA is an applied science devoted to understanding the ways in which the environment affects one’s behavior to better understand behaviors and ways to improve socially relevant difficulties (Vismara & Rogers, 2010). Other forms of efficacious behavioral treatments for ASD fall under the realm of discrete trial training (DTT), which breaks down complex skills to teach behaviors in a sequential building-block process (Lovaas, 1981). Each step consists of a specific set of instructions and goals, oftentimes with the therapist modeling the appropriate action or response. This form of behavioral treatment has been found to increase IQ by an average of 20 points, and when an intensive form of DTT is applied to children under the age of 7, their scores on standardized tests significantly increase (Cohen, Amerine-Dickens, & Smith, 2006; Howard et al., 2005; Sallows & Graupner, 2005). However, DTT has been criticized for being too restrictive in its presentation and use of stimuli, making it less generalizable to the individual’s natural environment (Koegel et al., 1987; Schreibman, 1997).

In response to the negative aspects of DTT, new behavioral therapies came to light including incidental teaching and milieu teaching (Kaiser & Hester, 1996; McGee, Feldman, & Chernin, 1991). These new behavioral therapies are intended to create teaching opportunities within the individual's naturally occurring events with explicit prompting, reinforcing attempts, and natural reinforcement. These forms of therapy increase applicability in natural settings, are reported to be less aversive to individuals with autism, and are more easily taught to caregivers, thus reducing the frequent need of therapists. A third form of behavioral treatment is the Early Start Denver Model.

Early Start Denver Model (ESDM)

Early treatment has been shown to be crucial to more positive outcomes for individuals with ASD. One treatment model that has focused on the early intervention of children between 12 and 48 months of age is the Early Start Denver Model (ESDM). This treatment focuses on improving developmental trajectories by focusing on skills during sensitive periods of development (Rogers & Dawson, 2010). While ESDM was originally developed to be conducted in a 1:1 setting, researchers have found that a group-based delivery of ESDM has also been effective over other group-based interventions (Vivanti et al., 2014). The intervention is based on practices of ABA but incorporates a relationship-focused developmental model to provide a more naturalistic learning approach. This intervention helps to address some of the criticisms of ABA methods such as discrete trial training which have been denigrated based on a lack of naturalistic learning.

While this method has not been shown to significantly reduce those symptoms specific to ASD (Rogers & Dawson, 2010; Vivanti & Dissanayake, 2016), it has been shown to be effective in increasing cognitive, adaptive, and language abilities in young children with long-term gains maintained (Estes et al., 2015). The ESDM model has been demonstrated to be beneficial to children over 48 months of age; however, superior gains have been found in children receiving this intervention before 48 months of age, especially with respect to language and overall verbal development (Vivanti & Dissanayake, 2016). This supports the view that these skills develop in a very sensitive and critical period of development that is specifically targeted by this intervention. Given this, meta-analyses support the effectiveness of ESDM in treating young children with ASD (Canoy & Boholano, 2015), but the effectiveness of this intervention is highly dependent on the age of the child (earlier intervention generally gives way to better outcomes) and the intensity of the intervention (increased hours generally correlated with better outcomes).

Social Skills Interventions

Social skills interventions are treatments that focus primarily on facets of one's social behavior. Individuals with autism frequently struggle with socially related behaviors, and therefore social skills interventions are applied to focus on eye contact, appropriate content of speech (e.g., saying please and thank you), appropriate speech intonation, number of words spoken, appropriate facial affect, appropriate motor movements, verbal disruptions, and actions such as leaving a group or participating in conversational speech to name a few. The primary focus of these interventions is most often initiating conversation and making eye contact. These social skills are most often taught in school settings, which allows for increases in applicability and generalizability to the individual's natural environment (Matson, Matson, & Rivet, 2007). Techniques implemented in social skills training include peer-mediated approaches, peer tutoring, social games, self-management, video modeling, direct instruction, visual cuing, circle of friends, and social-skills groups.

Modeling and reinforcement are the most applied form of social skills training and typically include an individual and confederate in which a social situation aimed at eliciting a response from the target individual is presented. The response is rated, and feedback is provided on successes and ways in which they can still improve. Social and edible rewards are also provided as reinforcement for appropriate responding. However, this method of social skills training is more effective for higher functioning individuals. In peer-mediated interventions, the peers (most often children) are trained in how to model and prompt appropriate social behaviors (Matson et al., 2007). Unfortunately, this becomes very limited in younger children because teaching them how to model appropriate behaviors and prompt is not easily done. There are additional ways of doing social skills training, including at home with parents and with a psychologist, speech therapist, or occupational therapist, all of which have been proven to be effective (Matson, et al., 2007). Although this intervention is included in the "Empirically Validated Treatments" section, it should be noted that not all social skills interventions have been proven to be efficacious.

Experimental Treatments

With the development of new information in ASD, treatments continue to form based on these findings. Treatments that are still undergoing research but have not had significant support for or against their efficacy or harm will be discussed below.

Stem Cells

Mesenchymal stem cells and cord blood cells have been suggested as a method to treat ASD, but this proposal has not been fully tested (Ichim et al., 2007). Some researchers believe that mesenchymal stem cells may represent a significant future treatment option for individuals with ASD (Hu et al., 2011). Since immune system deregulation has been associated with ASD, mesenchymal stem cells show reasonable potential as a treatment for the disorder. That is because individuals with ASD tend to have an imbalance in T lymphocytes cells and natural killer (NK) cells (Siniscalco et al., 2012). In addition, peripheral blood mononuclear cells (PBMCs) overproduce leukocytic pyrogen (Ichim et al., 2007). Researchers believe that by mediating the suppressive immune activity, mesenchymal stem cells could be able to restore balance in the immune system (Hu et al., 2011).

Although mesenchymal stem cells or other medical research options may 1 day be viable treatment options for individuals with ASD, there is not currently enough medical research to support the use of mesenchymal stem cells in ASD populations (Siniscalco et al., 2012).

Oxytocin Inhalation

Oxytocin, a neuropeptide believed to be responsible for increased social interactions, has received growing interest in autism research. It is theorized that this naturally occurring hormone, which is now in synthetic form, can be administered through the nasal cavity of children and adolescents with ASD to increase their social interactions. However, in a randomized control trial testing the effects of oxytocin on emotion regulation, social interaction, and general behavioral adjustment in children diagnosed with ASD, results did not indicate any significant improvements in the oxytocin group (Lin et al., 2014). Additionally, oxytocin did not improve emotion recognition or repetitive behaviors in this sample. Conversely, other results suggest that oxytocin can increase visual scanning of faces, including the eye area, increased social playing and interaction, and improved ability to process socially relevant cues and acquire their meaning in an interacting context (Andari et al., 2010).

From a neurological level, the administration of oxytocin into patients with ASD increases the blood-oxygen-level-dependent (BOLD) activation in visual areas of the brain selectively for faces. Oxytocin also activated the anterior orbital frontal cortex, a region of the brain known for its role in reward value representation, during a social reciprocity task (Andari, Richard, Leboyer, & Sirigu, 2016). Although this displays the effect of oxytocin at a neurological level, research is still inconclusive for the effectiveness at the behavioral level.

Treatment of Comorbid Psychopathology

Patients with ASD will oftentimes display comorbid psychological disorders such as intellectual disabilities, ADHD, depression, anxiety, and other psychological disorders tied to behavior such as obsessive-compulsive disorder or conduct disorder. Because of that, treatments have been created with the primary aim of treating these comorbid disorders.

Medication

Pharmacotherapy for the treatment of ASD would appear to be a simple solution for a lifetime disorder. However, as of yet, there exists no medication to effectively treat the disorder itself. Much like the use of antipsychotic medications to treat disorders such as schizophrenia, medication used in patients with autism is only effective for certain "problem behaviors" and varies on an individual basis. A series of medications including fluvoxamine, sertraline (a selective serotonin reuptake inhibitor), clomipramine (a tricyclic antidepressant), and risperidone and ziprasidone (atypical antipsychotics) have been applied to patients with an ASD diagnosis for the treatment of symptoms including aggressive behavior, repetitive behavior, and self-injurious behaviors (Sawyer, Lake, Lunsky, Liu, & Desarkar, 2014). In a review of medication efficacy, Sawyer et al. (2014) found that fluvoxamine and risperidone were the most effective in treating repetitive behavior, and risperidone and ziprasidone were the most effective in treating self-injurious behavior. Additionally, the summation of research indicates that certain Federal Drug Administration (FDA)-approved medications such as risperidone, fluvoxamine, and ziprasidone are effective in treating aggressive behaviors, whereas sertraline was noted to cause increases in aggression. Research therefore indicates that certain forms of medication can be effective in treating some of the challenging behaviors associated with ASD, but no such medication currently exists to treat the core symptoms of the disorder.

Cognitive Behavior Therapy

Individuals diagnosed with autism oftentimes will have a series of comorbid disorders including mood disorders, anxiety, and obsessive-compulsive disorder (OCD). One way in which these disorders are treated is through the use of cognitive behavior therapy (CBT). Although CBT is used in this population, the treatment is focused more on the comorbid disorders instead of the symptoms of ASD itself. Treatments have been modified for those with autism to focus on the thoughts and behaviors associated with OCD, mood disorders, and anxiety and have shown to be highly effective in higher functioning individuals (Krebs, Murray, & Jassi, 2016; Lang, Regester, Lauderdale, Ashbaugh, & Haring, 2010; Scattone & Mong, 2013). However, many of the studies investigating CBT with autism spectrum disorders focused on those with Asperger's and/or generally lower severity of symptoms. More research is therefore required for the application of CBT more broadly.

Future Research Directions

With the shift in psychological research toward a more genetic or biological model, more studies are focusing on neurological and biological components of autism (Muotri, 2016). By investigating the molecular compounds and development of the disorder, researchers will be able to increase knowledge regarding effective medication for treatment of the disorder. That being said, obtaining an adequate sample size is important to assess for generalizability. One of the limitations within current treatments today is that much of the literature is based on DSM-IV diagnoses which separate Asperger's from autism. With the implementation of a spectrum for diagnosis based on severity of symptoms and functioning, future research and treatment should be looking at differences in treatment within this spectrum.

In terms of research-specific directions, animal models continue to be perfected in mimicking the symptoms of autism, while psychotropic medications continue to be developed to target changes in brain functioning (Damiano, Mazefsky, White, & Dichter, 2014). However, due to the fact that approximately 50% of individuals with a diagnosis of ASD display positive improvements as a result of receiving an evidence-based treatment, we see an increased need for improving our understanding of the disorder and its functioning. As the rates of ASD increase, identifying effective and efficacious treatments becomes more imperative.

As discussed earlier within this chapter, early identification of symptoms or early diagnosis is directly related to improved outcomes later in life. However, many children are not diagnosed until they begin school, if not later. This issue could be mended by improving screenings for ASD in pediatric settings and a better way to categorize children who do not yet meet criteria for a diagnosis but still exhibit symptoms (Goin-Kochel, Mackintosh, & Myers, 2006). Similarly, studies should look at risk factors related to the development of ASD as a means of identifying children that may potentially develop the disorder later on.

Lastly, much of the research on treatments for individuals with ASD is targeted primarily on infants and children. This leads to issues with adolescents and adults because it is difficult to transform the evidence-based treatments so that they apply to an older demographic. In fact, a review of literature conducted in 2013 discovered that there were only 13 randomized controlled trials of interventions for adults with ASD (Bishop-Fitzpatrick, Minshew, & Eack, 2013). By conducting more studies with an adolescent and adult population, mental health professionals will be better able to implement effective treatments depending on the severity of symptoms.

Conclusion

The treatment of ASD is a complicated and often slowly progressing task. However, with careful treatment planning and reliance on those interventions that are empirically validated, the task of improving the lives of individuals with ASD (and their families) can be a highly rewarding endeavor. While future research is needed in the treatment of ASD, especially for adolescent and adults, there are several resources at the hands of well-trained clinicians to improve social functioning, adaptive living skills, communication, and the myriad of comorbid issues that often accompany an ASD diagnosis. As researchers and clinicians who work with individuals with ASD, we need to place greater focus and value in empirically validated and evidence-based treatments and better inform clients and families regarding the vast array of unsubstantiated and potentially harmful treatments that continue to persist among the options for treatment.

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Treatment Strategies for Depression in Youth

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Contents

There is a well-developed literature on depression in adults, including treatment, risk factors, phenomenology, course, and biological substrates (Kessler et al., 2003; Saleh et al., 2017). Examination of both psychopharmacologic and psychosocial treatments is extensive (Cuijpers, van Straten, van Oppen, & Andersson, 2008), and treatment guidelines have been developed to direct clinicians' interventions (American Psychiatric Association, 2006). However, examination of depression in youth has commenced much more recently, and the research literature to guide treatment is less well-developed. The last three and a half decades have seen a surge in our understanding of the phenomenology, course, correlates, and etiology of youth depression. Despite the many questions that remain, the field has moved forward in the development of efficacious treatment strategies. In the treatment of adolescent depression, selective serotonin reuptake inhibitors (SSRIs) have demonstrated limited efficacy, but tricyclic antidepressants have not (Bridge et al., 2007; Cipriani et al., 2016). Given the rates of adverse events in clinical trials with youth, their limited efficacy (Cipriani et al., 2016), and concerns about the potential for increased risk of self-harm associated with SSRIs in youth (US Food and Drug Administration, 2004), there is a strong need to continue to develop and test effective psychosocial treatments as alternatives and supplements to medication in the comprehensive treatment of depressed youth.

Although depression appears to be relatively rare prior to adolescence, representing only 3% of school-aged youth (Costello et al., 1996), the prevalence increases significantly postpuberty (Costello et al., 1996; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Avenevoli, Knight, Kessler, & Merikangas, 2008) to 4.6% among adolescent boys and 5.9% among adolescent girls (Costello, Erkanli, & Angold, 2006). The limited literature to date suggests potentially important differences in adolescent-onset and preadolescent-onset depression. First, earlier onset depression may be associated with a more pernicious course than later onset depression (Kovacs et al., 1984).

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Second, early-onset depression frequently disrupts the negotiation of important developmental tasks with deleterious impact on psychosocial competence (Puig-Antich et al., 1985a, 1985b; Puig-Antich et al., 1993). Thus, compared to nondepressed school-aged youth, depressed school-aged youth are more likely to enter adolescence with fewer skills to cope with an increasingly demanding environment. Third, while research generally supports the role of negative attributional processes in adolescent depression (Garber & Flynn, 2001), the data on the role of cognitions in preadolescent depression is less clear (Lakdawalla, Hankin, & Mermelstein, 2007). Fourth, while the data suggest strong continuity between adolescent and adult depression (Bardone, Moffitt, Caspi, & Dickson, 1996; Fleming, Boyle, & Offord, 1993; Lewinsohn, Rohde, Klein, & Seeley, 1999; Melvin et al., 2013; Pine, Cohen, Gurley, Brook, & Ma, 1998; Weissman et al., 1999), studies of preadolescent-onset depression suggest high rates of ongoing maladjustment and psychiatric disorders, but less specificity for later depression. In sum, there is evidence that adolescent-onset and preadolescent-onset depression differ in important ways. For these reasons, we have chosen to examine treatments for adolescents and preadolescent depression separately.

In this chapter, we describe the primary psychosocial treatment approaches that have been investigated for depression in youth. First, we outline some of the critical issues to consider in treatment for youth depression. Second, we review the literature on treatment efficacy. Third, we suggest directions for future research.

Critical Issues in Treatment of Depressed Youth

It is important to identify the factors that contribute to and impact youth depression to clarify potential etiological processes, which can inform treatment research and prevention efforts. In this section, we will briefly discuss the relation between developmental context, comorbidity, familial processes, stress, cultural background, and neurobiological factors on childhood depression.

Developmental Context

It has been well established that rates of depression rise significantly as children reach adolescence (Hankin et al., 2015), with the greatest spikes occurring in girls (Hankin et al., 2015; Hankin, Mermelstein, & Roesch, 2007). This demonstrates a clear need to understand the impact of developmental processes on depression. Risk factors that seem related to depression symptoms across development include greater impact of cognitive vulnerabilities, increased exposure to stressful life events (particularly interpersonal stress), and the intersection with ongoing developmental processes (Abela & Hankin, 2008).

Cognitive vulnerability theories of depression posit that an individual may be predisposed to perceiving, judging, and processing information in a way that is negatively biased and overly self-referential (Abela & Hankin, 2008). This negative pattern can trigger a cascade of depressogenic thinking, which can lead to a depressive state. For example, cognitive vulnerability theories emphasizing the role of hopelessness focus on the idea that the individual sees negative events as having global and stable causes that lead to catastrophic outcomes and trigger negative self-views (Abela & Hankin, 2008). Since children have an underdeveloped concept of the future and a lower capacity to generalize concepts across various situations, this type of negatively biased information processing is likely to require a more advanced stage of cognitive development. There is some support for the idea that children display less hopelessness than adolescents (Stark, Sander, & Hauser, 2006; Weiss & Garber, 2003), and there is a weaker relationship between cognitive vulnerabilities and depression in the face of stressors for children (Lakdawalla et al., 2007). As youth reach later developmental stages, they are able to make extrapolations across time and circumstances. As a result, the cognitive vulnerability may then be applied more broadly, in accord with these advances in development (Abela & Hankin, 2008; Kaslow, Adamson, & Collins, 2000).

In addition to the more globally applied cognitive vulnerability, youth face more stressful life events as they advance in age, particularly in the realm of interpersonal stress (Shih, Eberhart, Hammen, & Brennan, 2006). As youth enter adolescence, the peer context becomes increasingly salient, and youth experience more peer-related stress as they transition from being family oriented to peer oriented (Tompson, Boger, & Asarnow, 2012). For girls, this rise in interpersonal stress may be steeper than for boys, and girls may experience a stronger reactivity to this type of stress (Hankin et al., 2007), placing them at greater risk for depression. These risk processes may in part account for the particularly steep increases in rates of depression in postpubertal females.

The more stabilized and entrenched cognitive vulnerabilities, along with the increases in peer-related stress, all occur within the context of other developmental factors, such as the greater egocentricity of adolescence (Elkind, 1978). This heightened self-referential focus may serve as the platform for the assumption and expectation that one's negative self-views are also endorsed and actively held by others within the social setting (Lakdawalla et al., 2007). The expectation of a persistently negative imagined audience may further exacerbate the vulnerability toward a depressive episode.

The rise in rates of depression with age has prompted a significant focus on understanding adolescent depression. While this emphasis is understandable, it is important not to neglect childhood depression, which has received less attention. The gap between research on adolescent depression and childhood depression is particularly stark in relation to treatment studies. There have been few randomized control trials (RCTs) that exclusively targeted preadolescents with diagnosed depression (Dietz, Weinberg, Brent, & Mufson, 2015; Luby, Lenze, & Tillman, 2012; Tompson, Sugar, Langer, & Asarnow, 2017b). In addition, most treatment trials focused on children with elevated depressive symptoms as opposed to meeting criteria for a clinical diagnosis of a depressive disorder. More research is needed to understand the role of age and development on treatment outcomes, as the data on potential age effects appears to be mixed with Weisz and colleagues (Weisz, Thurber, Sweeney, Proffitt, & LeGagnoux, 1997) finding that therapy was more effective for children (ages 4–12) than for adolescents (ages 13–18). However, a review of 150 different studies of the effects of psychotherapy with children and adolescents found that treatment outcomes were superior for adolescents (mean effect size of 0.65) compared to children (mean effect size of 0.48) (Weisz, Weiss, Han, Granger, & Morton, 1995). Another meta-analysis found that the effect size for studies of youth under age 13 was not significantly different from the effect size for treatment of adolescents (0.41 versus 0.33) when trials with mixed child and adolescent samples were excluded (Weisz, McCarty, & Valeri, 2006). However, the effect size for the younger children (vs. adolescents) was based on a very small number of trials ($n = 7$) all of which were selected based on depressive symptoms vs. diagnoses, which likely led to less severe depression in the child samples.

Altogether, this research highlights a clear need for a better understanding of the relationship between age and treatment outcomes in youth depression. The extant literature points to distinct differences in the impact of risk factors that vary across development (Harter, 2012). Effective treatment strategies should therefore be tailored to the specific socialization needs and cognitive capacities of youth at different developmental stages. More research is needed on youth depression generally and childhood depression particularly. Such research should be informed by the developmental changes associated with preadolescence and adolescence and the ways in which they interact with various treatment approaches. Additionally, while developmental considerations are typically examined according to age, there is a strong need to investigate the ways in which these risk factors impact individuals with developmental delays who are experiencing, or at risk for developing, depressive symptomology (D'Angelo & Augenstein, 2012).

Comorbidity

Youth depression is most commonly accompanied by anxiety and behavior disorders (Kovacs, Obrosky, & George, 2016). Research has estimated that more than half of the youth with diagnosable depression almost meet criteria for another Axis I disorder (Lewinsohn, Rohde, & Seely, 1998). The odds ratios between depression and ADHD, conduct disorder, and anxiety are 5.5, 6.6, and 8.2, respectively (Angold, Costello, & Erkanli, 1999). Additionally, youth with developmental disabilities may be at enhanced risk for the development of depression. The limited research suggests that youth with an intellectual disability have greater odds of having depression (*OR* = 1.7; Emerson, 2003), and students with learning disabilities score somewhat higher on measures of depressive symptoms (Maag & Reid, 2006). Children with autism spectrum disorders also have an increased risk for depression symptoms (Ghaziuddin, Ghaziuddin, & Greden, 2002; Matson & Nebel-Schwalm, 2007; Saulnier & Volkmar, 2007; Strang et al., 2012). Thus, depression is not only difficult for children and adolescents because of its symptoms in isolation, but also because of the vast risk it poses to the child with its high comorbidity (Archie, Kazemi, & Akhtar-Danesh, 2010).

The greatest risk and most dangerous associated behavior that depression presents to children and adolescents is suicide. In the USA, suicide is the third leading cause of death among youths ages 10–14 and second among those ages 15–24 (CDC, 2015). Furthermore, in 80–90% of cases of adolescent suicide, a psychiatric disorder was present (Bridge, Goldstein, & Brent, 2006), with mood disorders being primarily present, especially in girls (Shaffer et al., 1996).

Familial Processes

Familial processes are also key factors associated with youths' risk for and vulnerability to depression. Parental psychopathology has often been associated with youth depression (Beardslee, Gladstone, & O'Connor, 2011; Tompson, Asarnow, Mintz, & Cantwell, 2015). Findings from multiple studies show that offspring of depressed parents have higher rates of depression diagnosis, recurrence, and chronicity than those of nondepressed parents (Goodman et al., 2011; Murray et al., 2011; Weissman et al., 2016). In addition to the genetic and biological risk factors (Hankin et al., 2015) that may account for these associations, psychosocial factors in families may also contribute (Goodman & Gotlib, 2002). Two areas of familial processes that have received attention in the literature include parenting behaviors and family conflict.

Harsh, or aversive, parenting practices include behaviors such as overly negative criticism, lack of warmth, and parent-child conflict. There is consistent evidence that suggests that parental depression interrupts a caregiver's ability to care successfully for the child. Parents who are depressed exhibit overly harsh parenting behaviors (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Wilson & Durbin, 2010) and display greater disengagement and negativity than nondepressed mothers (Lovejoy et al., 2000). Apter-Levi et al. (2016) found that depressed mothers displayed more negative parenting and that maternal depression was associated with reduced cortisol variability in their children, which predicted higher child psychopathology and social withdrawal. This study provides support for a pathway of vulnerability in which maternal depression may negatively impact children's HPA system functioning and thus, their social-emotional adjustment (Apter-Levi et al., 2016). In addition, offspring are at increased risk for developing an insecure attachment (Milan, Snow, & Belay, 2009). All of these factors are associated with increased risk for depression in offspring (Yap & Jorm, 2015).

In addition to parenting factors, the overall family environment may confer additional risk for youth depression. Families of children with depression have higher levels of conflict, including marital discord, both of which are linked to increases in depressive symptoms (Kane & Garber, 2004; Mark Cummings, Keller, & Davies, 2005; Rabinowitz, Drabick, & Reynolds, 2016; Rice, Harold, Shelton, & Thapar, 2006; Sheeber, Hops, & Davis, 2001). Not only does family conflict impact the depressed child, but there is a bidirectional effect, with the depressed child displaying more negative affect that impacts family conflict (Kelly et al., 2016).

This research underscores the need to understand the complex role of the family in the etiology and maintenance of youth depression. Such understanding should inform treatment planning in terms of determining the target of treatment (child, parents, parents and children, or families) and the most appropriate treatment strategies (medication, family-focused treatment, or individual treatment).

Stress

Research has indicated that stress is one of the predominant pathways to the development and manifestation of youth depression (Stark et al., 2005; Stark et al., 2006; Young & Dietrich, 2015). Knowledge of the role of stress is therefore crucial in designing and implementing effective treatments. Stressful life events may play a role both in the etiology and maintenance of youth depression. In terms of etiology, the diathesis-stress model posits that there are underlying vulnerabilities (the diathesis) predisposing the individual to depression such as genetic factors (Hankin et al., 2015) and cognitive vulnerabilities (Abela & Hankin, 2008). According to this model, these predispositions, when coupled with stressors, increase the likelihood of symptom onset (Lakdawalla et al., 2007). There is evidence to suggest that youth at risk for depression may experience more stressful life events (Hammen, Hazel, Brennan, & Najman, 2012) and may be more sensitive to the effects of this stress (Hammen, 2002).

In terms of maintenance of depression, stress generation models of depression speak to the bidirectional relationship between depressive symptoms and life stress. In these models, symptoms of depression increase interpersonal stress, which in turn contributes to ongoing depression symptoms. For example, a depressed youth expecting rejection may withdraw from social interactions, increasing the chances that social isolation will result and contributing to greater depressive symptoms over time. Indeed, when the nature of a particular life stressor has been evaluated, there are mixed findings that *independent life stressors* (e.g., those over which the individual has little to no influence) are correlated with depression, with some evidence supporting a link (Aber, Brown, & Jones, 2003; Hammen et al., 2012), and other researchers finding no significantly predictive association between these types of events and depression (Rudolph et al., 2000). More consistent research has pointed to a link between youth depression and *dependent life stress* (events that a youth with depressive symptoms may influence) (Hankin et al., 2007) as well as interpersonal stress. Compared to nondepressed youth, those with depressive symptoms experience more peer-related stress and family conflict, which predict heightened depressive symptoms, particularly when cognitive or genetic vulnerabilities are present (Hamilton, Stange, Abramson, & Alloy, 2015; Hammen, 2006; Liu & Alloy, 2010; Rice et al., 2006; Rose, Glick, Smith, Schwartz-Mette, & Borowski, 2016; Sheeber, Davis, Leve, Hops, & Tildesley, 2007). In addition to experiencing heightened stress, depressed children and adolescents are also more likely to use avoidant coping strategies to manage stress (Rodríguez-Naranjo & Caño, 2016). Conversely, children's use of more adaptive coping strategies for managing stressors is associated with fewer depressive symptoms (Burwell & Shirk, 2007; Rodríguez-Naranjo & Caño, 2016).

Although there is more research needed, stressors that are interpersonal and dependent seem to play a definitive, but complex, role in the onset and course of youth depression, and independent stressful life events may also have an impact. Treatment planning and research should involve considerations of these contextual factors and the ways in which the attitudes, cognitive style, and actions of depressed youth in stressful situations may influence symptomatology.

Cultural Considerations

Cultural background is another key factor that relates to the manifestation of youth depression and its treatment. Existing research on ethnicity and depression indicates that various racial groups experience differing levels of depression severity, varied symptom expression, and different likelihoods of receiving treatment (Stark et al., 2006).

In terms of depressive symptoms' rates, research has demonstrated that Chinese American, Filipino American, Japanese American, and Native Hawaiian youth experience higher rates of depressive symptoms than white youth (Okamura et al., 2016). However, the highest rates of depressive symptoms, when compared to other racial/ethnic groups, occur among Hispanic youth (Céspedes & Huey, 2008) and particularly Hispanic girls (McLaughlin, Hilt, & Nolen-Hoeksema, 2007). There is some evidence to suggest that cultural clashes between the high emphasis on individuation in western cultures and the emphasis on family ("familismo") predominant in Hispanic/Latino cultures may partially account for the higher depressive symptom rates (McLaughlin et al., 2007).

Not only do rates of symptoms vary for different ethnic minority groups, but research suggests variation in the nature of symptoms endorsed as well. For example, Iwata, Turner, and Lloyd (2002) found that African American, US-born Hispanic, non-US-born Hispanic, and non-Hispanic white adolescents and young adults provided different responses to symptoms as reflected on the Center for Epidemiologic Studies Depression Scale (CES-D). More specifically, they found that the African American respondents scored low on depressed affect symptoms and high on somatic symptoms, while the US-born Hispanic respondents scored low on the interpersonal symptoms, but lower positive affect.

In addition to recognizing differences in symptom expression, it is also important to pay attention to the intersection between culture and help-seeking behaviors. Researchers have found variations in the level of mental health service utilization across racial groups. For instance, Cuffe and colleagues (Cuffe, Waller, Cuccaro, Pumariega, & Garrison, 1995) found that while African American adolescents had higher scores on a measure of depression, they were less likely than European American adolescents to receive outpatient treatment for any disorder and were more likely to drop out of treatment early. Researchers have found a similar trend for depression treatment seeking behavior more specifically (Lindsey, Chambers, Pohle, Beall, & Lucksted, 2013). Some have suggested that higher rates of perceived mental health stigma may account for this discrepancy. In a study of stigma among African American youth and depression severity, researchers found that greater depression symptom severity was associated with elevated perceptions of stigma (Rose, Joe, & Lindsey, 2011). An additional noteworthy finding in this study was that youth with higher rates of depression accurately identified their need for treatment (Rose et al., 2011). This suggests that efforts to increase treatment seeking for depressed adolescents may not require more psychoeducation on the need for treatment, but a greater emphasis on decreasing stigma associated with treatment seeking.

Taken together, these findings indicate that response to treatment might differ according to the client's ethnic background. Current clinical trials may not generalize to underrepresented minorities (Huey & Polo, 2008; Kataoka, Zhang, & Wells, 2002; Miranda et al., 2005). Additionally concerning is the paucity of data to draw definitive conclusions on the cross-cultural generalizability of treatments (Kataoka, Novins, & DeCarlo Santiago, 2010). Clearly, depressed youths (and likely their treatment providers) hold beliefs and values about psychopathology and treatment that are influenced by their various cultural backgrounds (Weisz, Jensen Doss, & Hawley, 2005). Therefore, a sensitive understanding of these differences is essential to accurate assessment and effective planning of treatment and treatment research.

Neurobiological Factors

Given that not all youth respond to current depression treatments, whether they are psychosocial or psychopharmacological, there has been a recent push to understand underlying neurobiological processes in youth depression that may lead to more targeted and effective interventions.

Processes that have received recent attention include reward processing, heart rate variability, and sleep. We will briefly discuss several of these neurobiological mechanisms as they relate to the treatment of child and adolescent depression, but will not include an exhaustive review.

Reward Processing Based on a number of recent studies in youth with depressive disorders, reward processing may be a promising endophenotype for risk for depression and could have important treatment implications. A number of depressive symptoms may be related to reward processes, resulting in the low positive affect and difficulties with emotion regulation, often seen in depression (Forbes, 2009; Forbes & Dahl, 2005; Hankin, Wetter, & Flory, 2012; Sheeber et al., 2009; Silk, Davis, McMakin, Dahl, & Forbes, 2012). When the reward system is suppressed, depression and low positive affect are thought to result (Davey, Yücel, & Allen, 2008; Hankin et al., 2012). Indeed, it has been theorized that certain depressive symptoms such as anhedonia, social withdrawal, and psychomotor retardation may in part result from reduced reward seeking behavior, decreased motivation to obtain reward, and disruption in the experience of rewarding outcomes (Forbes & Dahl, 2005; Hankin et al., 2012).

Recent research provides support for the role of reward processing and emotion regulation in depression. Specifically, interventions for depression have been linked to activity in several brain regions associated with such processes (Straub et al., 2015; Tao et al., 2012). In a study of CBT group treatment for adolescent depression, Straub et al. (2015) found that treatment response was significantly associated with changes in brain activation in areas implicated in reward processing and emotion regulation, including the left hippocampus, the left amygdala, and the bilateral subgenual anterior cingulate cortex (sgACC). Activation of these areas is frequently cited as relevant to depression processes (Arnone et al., 2012; Gotlib et al., 2005; Yang et al., 2010). These results suggest that psychotherapy may be able to affect processes involved in emotion regulation.

A number of recent efforts have attempted to identify how best to target low positive affect, reward processing, and emotion dysregulation in depression, both through intervention programs and the identification of individual differences in these systems. Hankin and colleagues (Hankin et al., 2011) found that youth carrying short alleles of 5-HTTLPR displayed lower positive emotion in the context of unsupportive parenting and higher positive emotion in the context of supportive parenting (Hankin et al., 2011). As such, future interventions could target the family environment in order to upregulate youth positive affect and enhance salience of anticipated and received rewards in the context of behavioral activation and emotion regulation processes (Hankin et al., 2012). Kovacs et al. (2006) pilot tested one such contextual emotion regulation therapy for child depression, which focused on the self-regulation of distress and dysphoria in children ages 7–12. Although a small pilot trial, at a 12-month follow-up, 92% of the children had achieved remission of dysthymia (Kovacs et al., 2006). Although promising, more research is needed in order to understand how and when in development to target low positive affect and reward processing in existing depression interventions, which could be key to both intervention and prevention efforts (Silk et al., 2012).

Heart Rate Variability Heart rate variability (HRV) is an index of parasympathetic nervous system function that is considered a psychophysiological marker of emotion regulation (Beauchaine & Thayer, 2015; Koenig, Kemp, Beauchaine, Thayer, & Kaess, 2016). Specifically, low resting high-frequency HRV (HF-HRV) has been associated with a range of psychopathology in children and adolescents (Beauchaine, Gatzke-Kopp, & Mead, 2007; Crowell et al., 2005) and has more generally been linked to emotion regulation deficits (Beauchaine & Thayer, 2015). With regard to depression, compared to healthy controls, depressed children and adolescents have lower resting state HF-HRV (Koenig et al., 2016). However, unlike in adult samples, a recent meta-analysis found no association between

HF-HRV and depression severity in depressed youth, although these associations were limited to nonclinical samples (Koenig et al., 2016). Although research on HRV in youth depression is in its infancy, current findings suggest HRV could be used as a marker of treatment response, with Koenig et al. (2016) suggesting that such biomarkers may be useful assessment tools, especially for children who have difficulty reporting symptomatic distress. Additionally, treatment options designed to increase or alter vagal activity may be particularly effective, such as physical activity, diet changes, and potentially more invasive vagus nerve stimulation (Koenig et al., 2016).

Sleep The relationship between sleep difficulties and depression in youth is a complicated one. During adolescence major changes in both sleep patterns and rates of depression occur (Costello, Copeland, & Angold, 2011; Lovato & Gradisar, 2014). Among adolescents in a clinical sample, increased depressive symptoms are associated with sleep problems, although this association has not been evident among children under age 12 (Alfano, Zakem, Costa, Taylor, & Weems, 2009). The association is further complicated by the fact that the majority of depressed adolescents report sleep complaints (Liu et al., 2007), and its role as an etiological factor or correlate of depression remains unclear. Some evidence suggests that sleep disturbance in depressed adolescents may increase the risk for a subsequent depressive episode (Roane & Taylor, 2008; Roberts & Duong, 2013), contribute to the maintenance of depression, interfere with treatment, and persist after remission of a depressive episode (Clarke & Harvey, 2012; Emslie et al., 2001). For instance, Emslie et al. (2012) found that adolescents who reported more substantial insomnia were less likely to respond to fluoxetine compared to adolescents who reported less insomnia. However, this was not the case with children, such that children who reported more substantial insomnia were more likely to respond to fluoxetine compared to those who did not report higher levels of insomnia (Emslie et al., 2012). The mechanisms by which sleep disturbance plays a role in the development and maintenance of depression are complex, but it is believed that in part it is due to the role that sleep plays in emotion regulation as well as involvement of the HPA axis (Clarke & Harvey, 2012).

There is promising evidence that sleep disturbances may be effectively treated and result in depression symptom improvement in adults (Manber et al., 2008). Unfortunately, very few studies have examined sleep interventions with depressed youth. Preliminary treatment studies for adolescents incorporate CBT techniques to improve the response rate to traditional psychotherapy for youth depression (Clarke & Harvey, 2012). Given the promising results in the adult literature and the pervasive sleep disturbances in depression and youth, particularly in adolescence, the treatment of comorbid sleep disturbance and depression may be a fruitful avenue for increasing the effectiveness of current evidence-based treatments.

Efficacy of Treatments for Youth Depression

Adolescent Depression

As reviewed briefly above, research on psychosocial correlates of depression in youth emphasizes its association with negative cognitions (review, Garber & Flynn, 2001), disturbed interpersonal relationships (review, Kaslow, Jones, Palin, Pinsof, & Lebow, 2005), and stress (Rudolph et al., 2000). Accordingly, evidence-based treatments for adolescents can be broadly delineated into either cognitive behavioral or interpersonal approaches. Studies vary in their inclusion of subjects with diagnosed depressive disorders versus subjects with high levels of depressive symptoms. It is not clear the degree to which findings from studies of youth with high depressive symptoms generalize to youth with a diagnosable depressive disorder. Table 1 includes studies conducted with youth with diagnosed depressive disorders. The 21 studies include 12 with a cognitive behavioral intervention condition, five with an interpersonal therapy condition, two with social skills conditions, and three with family therapy

Table 1 Randomized clinical interventions trials for adolescents with diagnosed depression

Reference	Subjects	Diagnostic/risk assessment	Treatment format(s)	Intervention type(s)	Posttreatment assessment	Impact of treatment
Asarnow et al. (2005)	Ages 13–21 (*n* = 418)	Either: (1) Endorsed "stem items" for MDD or DD from the CIDI-12, 1 week or more of past-month depressive symptoms, and a total CES-D score>16, or (2) CES-D score>24	Individual	(1) 6-month quality improvement intervention	Immediate	Intervention patients, compared with usual care patients, reported significantly higher mental health care utilization, fewer depressive symptoms, higher mental health-related quality of life, and greater satisfaction with mental health care
				(2) Usual care		
Brent et al. (1997)	Ages 13–18 (*n* = 107)	Diagnosis of MDD based on K-SADS interview and BDI ≥13	Family	(1) Systematic behavior family therapy	Immediate	The CBT group had faster response, fewer cases of diagnosable MDD at the end of the treatment, and a lower number of depressive symptoms and was more likely to be remitted than other groups. No difference between family and supportive therapies
			Individual	(2) CBT		
				(3) Supportive therapy		
Clarke, Rohde, Lewinsohn, Hops, and Seeley (1999)	Ages 14–18 (*n* = 123)	Diagnosis of MDD or DD based on the K-SADS interview	Group	(1) Adolescent coping with depression course (CWD-A)	Immediate; 12 months; 24 months	CBT was associated with higher depression recovery rates (66.7% vs. 48.1% in wait list condition) and greater reduction in depressive symptoms. Addition of parent group had no significant effect. Booster sessions accelerated recovery among youth still depressed at the end of acute treatment but did not reduce recurrence
				(2) CWD-A with nine-session parent group		
				(3) Wait list control		
Clarke et al. (2002)	Ages 13–18 (*n* = 88)	Diagnosis of DSM-III-R MDD and/or DD based on the K-SADS interview	Group	(1) Usual care plus group CBT program (CWD-A)	Immediate; 12 months; 24 months	No significant differences between CBT and usual care, either for depression diagnoses, continuous depression measures, nonaffective mental health measures, or functioning outcomes
				(2) Usual care		
Clarke et al. (2005)	Ages 12–18 (*n* = 152)	Diagnoses of DSM-IV MDD based on the K-SADS-PL (Present and Lifetime Version) interview	Individual	(1) Brief CBT plus treatment as usual (primarily SSRI)	Immediate; 26 weeks; 52 weeks	CBT program showed advantages on the Short-Form-12 Mental Component Scale and reductions in treatment as usual outpatient visits and days' supply of all medications. No effects were detected for MDD episodes; a nonsignificant trend favoring CBT was detected on the CES-D
				(2) Treatment as usual		

(continued)

Table 1 (continued)

Reference	Subjects	Diagnostic/risk assessment	Treatment format(s)	Intervention type(s)	Posttreatment assessment	Impact of treatment
Diamond, Reis, Diamond, Siqueland, and Isaacs (2002)	Ages 13–17 (*n* = 32)	Diagnoses of DSM-III-R MDD based on the K-SADS	Family	(1) Attachment-based family therapy (ABFT)	Immediate; 6 months	At posttreatment, 81% treated no longer met criteria for MDD vs. 47% of patients in the waitlist group. The ABFT patients showed greater reduction in depressive and anxiety symptoms and family conflict. At follow-up, 87% of the ABFT patients continued to not meet criteria for MDD
				(2) Minimal-contact, waitlist control group		
Emslie et al. (2008)	Ages 7–18 (*n* = 168)	Diagnosis of DSM-IV MDD with CDRS-R ≥40 and CGI ≥4	Individual	Acute treatment:	12 weeks (acute) 6 months (responders only)	Following acute treatment 51% adolescents and 71% of children (ages 7–11) entered continuation. In continuation treatment fluoxetine was superior to placebo in preventing relapse (42% versus 69%) and in increasing time to relapse in children and adolescents
				(1) Fluoxetine		
				(2) Placebo		
				6-month continuation:		
				(1) Fluoxetine		
				(2) Placebo		
Fine, Forth, Gilbert, and Haley (1991)	Ages 13–17 (*n* = 66) 83% female	Diagnosis of MDD or DD based on K-SADS interview	Group	(1) Therapeutic support group (TSG) vs.	Immediate; 9 months	At posttest both groups improved; TSG significantly more effective than SSG in reducing depression on K-SADS with more subjects in nonclinical range. Group differences disappeared at follow-up
				(2) Social skills group (SSG)		
Goodyer et al. (2007)	Ages 11–17 (*n* = 208)	Diagnosis of MDD on K-SADS-PL (Present and Lifetime Version) interview	Individual	(1) SSRI and routine care	Immediate; 28 weeks	There was no difference in effectiveness between groups. No evidence that CBT in addition to SSRI and routine care is more effective than SSRI and routine care alone
				(2) SSRI, routine care, and CBT		
Lewinsohn, Clarke, Hops, and Andrews (1990)	Ages 14–18 (*n* = 59)	Diagnosis of major, minor, or intermittent depression based on K-SADS interview with mother and adolescent	Group	(1) Adolescent-only CBT training group	Immediate; 1 month; 6 months; 12 months; 24 months	Significantly fewer youths in the treatment groups met criteria for depressive disorders after treatment and at follow-up. Significantly improved on self-reported depression, anxiety, number of pleasant activities, and depressogenic thoughts. Trend for adolescent-parent condition to outperform adolescent-only group
			Family	(2) Adolescent-parent CBT training groups		
				(3) Wait list control		

Melvin et al. (2006)	Ages 12–18 (*n* = 73)	Diagnosis of DSM-IV MDD, DD, or DDNOS based on the K-SADS	Individual	(1) CBT	Immediate; 6 months	All groups showed significant improvement on outcome measures and this was maintained at follow-up. Combined group was not superior to monotherapy. CBT alone was superior to medication alone
				(2) Antidepressant medication (Sertraline)		
				(3) Combined CBT and medication		
Mufson, Weissman, Moreau, and Garfinkel (1999)	Ages 12–18 (*n* = 48)	Clinician diagnosis of MDD based on the HRSD	Individual	(1) Interpersonal psychotherapy for depressed adolescents (IPT-A)	Immediate	IPT-A patients reported greater decrease in depressive symptoms, improved social functioning, and improved problem-solving skills compared to controls. In the IPT-A condition, 74% recovered compared to 46% in the control condition
				(2) Clinician monitoring		
Mufson et al. (2004)	Ages 12–18 (*n* = 63)	DSM-IV diagnosis of MDD, DD, adjustment disorder with depressed mood, or DDNOS and HRSD>10 and a C-GAS score<65	Individual	(1) IPT-A	Immediate	IPT-A associated with fewer clinician-reported depression symptoms on the HAMD, better functioning on the C-GAS, better overall social functioning on the Social Adjustment Scale-Self-Report, greater clinical improvement, and greater decreases in clinical severity on the Clinical Global Impressions scale
				(2) Treatment as usual		
O'Shea, Spence, and Donovan (2015)	Ages 13–19 (*n* = 33)	DSM-IV diagnoses of MDD based on the K-SADS-E (epidemiological version)	Individual	(1) IPT-I	Immediate; 12 months	Improved depression, anxiety, and overall functioning. No difference between IPT-I and IPT-G. Treatment gains maintained at 12-month follow-up
			Group	(2) IPT-G		
Reed (1994)	Ages 14–19 (*n* = 18)	Clinician diagnosis of MDD or DD	Group	(1) Social skills training	Immediate; 6–8 weeks	Skills group participants scored significantly higher on clinicians' rating of improvement. Male subjects improved, but female subjects deteriorated
				(2) Attention placebo control		
Rohde, Clarke, Mace, Jorgensen, and Seeley (2004)	Ages 13–17 (*n* = 91)	DSM-IV diagnoses of MDD and conduct disorder based on the K-SADS-E-5 (epidemiological version)	Group	(1) CWD-A	Immediate; 6 months; 12 months	Posttreatment MDD recovery rates better in CWD-A group (36%), compared to life skills/ tutoring (19%). CWD-A participants reported reductions in BDI-II and HDRS scores and improved social functioning posttreatment. Group differences in MDD recovery rates at follow-up were nonsignificant
				(2) Life skills tutoring/control		

(continued)

Table 1 (continued)

Reference	Subjects	Diagnostic/risk assessment	Treatment format(s)	Intervention type(s)	Posttreatment assessment	Impact of treatment
Rosselló and Bernal (1999)	Ages 13–18 (*n* = 71)	Diagnosis of MDD, DD, or both	Individual	(1) CBT (2) IPT (3) Wait list control	Immediate; 3 months	Both active treatments were associated with significant reductions in depression when compared to wait list. IPT was superior to CBT in enhancing social functioning and self-esteem
Rosselló, Bernal, and Rivera (2008)	Ages 12–18 (*n* = 112)	Diagnosis of DSM-III-R MDD using the DISC or CDI >13	Individual Group	(1) CBT-I (2) CBT-B (3) IPT-I (4) IPT-G	Immediate	Individual format and group produced similar reductions in depressive symptoms. CBT overall resulted in greater improvements in depressive symptoms and self-concept
TADS Team (2004)	Ages 12–17 (*n* = 439)	DSM-IV diagnosis of MDD based on the K-SADS-PL (Present and Lifetime Version)	Individual	Twelve weeks of: (1) Fluoxetine alone (2) CBT alone (3) CBT with fluoxetine (4) Placebo	Immediate	There were significant differences between combination treatment and placebo on the CDRS-R. Combined treatment was superior when compared with fluoxetine alone and CBT alone. Fluoxetine alone was superior to CBT alone
Vostanis, Feehan, Grattan, and Bickerton (1996)	Ages 8–17 (*n* = 56)	Diagnosis of MDD, DD, or minor depression based on K-SADS	Individual	(1) Depression treatment program (2) Attention placebo	Immediate; 9 months	No difference in remission rates; remission rates were high in both groups
Wood, Harrington, and Moore (1996)	Ages 9–17 (*n* = 48)	Diagnosis of MDD or RDC minor depression based on K-SADS interview with both parent and child	Individual	(1) CBT (2) Relaxation training	Immediate; 6 months	Posttest revealed greater reductions in depressive symptoms and an advantage in overall outcome in the CBT group. At follow-up, group differences were attenuated

MDD major depressive disorder, *DD* dysthymic disorder, *DDNOS* depressive disorder not otherwise specified, *CIDI* Composite International Diagnostic Interview, *K-SADS* Schedule for Affective Disorders and Schizophrenia for school-aged children, *BDI* Beck Depression Inventory, *CDI* Children's Depression Inventory, *CGAS* Children's Global Assessment Scale, *GAF* Global Assessment of Functioning Scale, *CES-D* Center for Epidemiologic Studies Depression Scale, *CDRS-R* Revised Children's Depression Rating Scale, *RADS* Reynolds Adolescent Depression Scale, *BID* Bellevue Index of Depression, *DISC* Diagnostic Interview Schedule for Children, *HRSD* Hamilton Rating Scale for Depression conditions. Five studies include comparison with medication conditions. Table 2 includes interventions conducted with youth experiencing high levels of depressive symptoms and reviews ten interventions, eight of which are cognitive behavioral in their approach and two of which investigate interpersonal therapy.

Cognitive Behavioral Approaches As illustrated in Tables 1 and 2, cognitive behavioral interventions have been more thoroughly investigated than any other intervention approach for adolescent depression. The specific cognitive interventions used have varied across treatment studies. These studies have compared cognitive behavioral treatment with different conditions, examined its delivery in different formats (group versus individual), looked at longer-term follow-ups, and examined the role of parallel parent groups in enhancing treatment efficacy.

Of the 16 studies of diagnosed depressed youth that included a cognitive behavioral treatment condition, 11 support the superiority of CBT in comparison to control conditions. The efficacy of cognitive behavioral interventions has been demonstrated when compared to waitlist or no intervention conditions in four studies. CBT showed superiority in four studies comparing it to waitlist control (Clarke et al., 1999; Lewinsohn et al., 1990; Rosselló & Bernal, 1999; Smith et al., 2015) and showed equal effects in one study when compared with a monitor and control condition (Poppelaars et al., 2016). Yet CBT showed superiority in only one of the four studies comparing it to usual care (Asarnow et al., 2005). In one of the studies in which CBT did not show an advantage (Clarke et al., 2005), the usual care consisted primarily of medication (SSRI) intervention. In a second study in which CBT did not show an advantage (DePrince & Shirk, 2013), CBT for adolescent depression was modified to address history of interpersonal trauma as well. The usual care (UC) therapists were predominantly client-centered, psychodynamic, and family systems oriented and employed treatment strategies common to their clinical practice. Studies with an undefined UC component (Clarke et al., 2002, 2005; Shirk, DePrince, Crisostomo, & Labus, 2014) underscore the importance of understanding what participants are receiving in "usual care" conditions. Five studies have compared CBT to other psychosocial treatments, and it has been shown to be superior to systemic family therapy, supportive therapy (Brent et al., 1997), relaxation training (Wood et al., 1996), and life skills training (Rohde et al., 2004). However, in one study comparing it to interpersonal psychotherapy (IPT), IPT had a larger effect size and greater enhancements in social functioning and self-esteem (Rosselló & Bernal, 1999). In the four studies that included medication arms, one was not designed to compare the two interventions (Asarnow et al., 2005), one found that the addition of CBT to treatment with medication had no benefit over treatment with medication alone (Goodyer et al., 2007), one found medication alone to be superior to CBT (TADS team, 2004), and one found CBT to be superior to medication intervention (Melvin et al., 2006). In the study by Asarnow et al. (2005), 418 adolescents in primary care settings (ages 13–21) were randomly assigned to a 6-month "quality improvement" intervention or usual care. Those in the quality improvement intervention had access to a care manager, who educated them about depression and treatment options, and participants could select medication or CBT treatments. Although the study was not designed to evaluate the relative efficacy of CBT and medication, the quality improvement intervention overall was associated with significantly lower depressive symptoms, and adolescents were somewhat more likely to prefer CBT. In the study by Goodyer et al. (2007), 208 adolescents (ages 11–17) with major or probable major depression were randomly assigned to one of two groups: treatment with an SSRI, CBT, and clinical care or treatment with SSRI and clinical care without CBT. The ongoing clinical care provided to both groups consisted of psychoeducation and attention to family or peer group conflicts. The authors found that receiving CBT in conjunction with an SSRI and ongoing clinical care had no benefit over treatment with an SSRI and ongoing clinical care alone. In the study conducted by Melvin et al. (2006), 73 adolescents (ages 12–18)

Table 2 Randomized clinical interventions trials for adolescents with depression symptoms or risk factors for depression

Reference	Subjects	Diagnostic/risk assessment	Treatment format(s)	Intervention type(s)	Post-intervention assessment	Impact of treatment
Ackerson, Scogin, McKendree-Smith, and Lyman (1998)	Ages 14–18 (*n* = 22)	CDI >10 and HRSD >10	Self-administered	(1) Cognitive bibliotherapy (reading "Feeling Good") and weekly monitoring phone calls	Immediate; 1 month	Treatment produced statistically and clinically significant improvements in depressive symptoms that were maintained at follow-up. And a significant decrease in dysfunctional, but not in negative automatic, thoughts
				(2) Delayed-treatment control		
Clarke et al. (1995)	9th and 10th graders (*n* = 150)	CES-D >23 but does not meet criteria for MDD or DD (K-SADS)	Group	(1) CWD-A	Immediate; 6 months; 12 months	Significantly fewer CWD-A adolescents diagnosed MDD or DD. Higher GAF and lower CES-D for CWD-A group at posttest but no differences at follow-up
				(2) No intervention		
Clarke et al. (2001)	Ages 13–19 (*n* = 94)	Symptomatic adolescent offspring (CES-D >24) of recently depressed parents, assessed using the F-SADS	Group	(1) Usual HMO care plus group cognitive therapy	Immediate; 12 months; 24 months	Group intervention decreased depression symptoms and episode rates to the community-normal range and decreases in the incidence of MDD at follow-up
				(2) Usual HMO care		
Kerfoot, Harrington, Harrington, Rogers, and Verduyn (2004)	Mean age 13.9 (1.9) (*n* = 52)	Contact with social services within the previous 2 years; mood and feelings depression questionnaire>23	Individual	(1) Brief CBT	17 weeks after initial assessment; 33 weeks after initial assessment	No significant differences between groups in depression or global adjustment. At posttreatment, 77% of the CBT group and 80% of the routine care group had residual depressive symptoms or disorder
				(2) Routine care		
Marcotte and Baron (1993)	Ages 14–17 (*n* = 25)	CDI >15 on two administrations and elevated score on semi-structured interview focusing on depressive symptoms	Group	(1) Rational emotive	Immediate; 8 weeks	No difference between the two treatments: Depressive symptoms reduced at posttreatment in both groups
				(2) No treatment		
Poppelaars et al. (2016)	Girls, mean age 13.35 (0.64) (*n* = 208)	RADS-2 >59	Computerized	(1) School-based CBT prevention program	1 week; 3 months; 6 months; 12 months	No difference between four groups; depressive symptoms decreased in all conditions
				(2) Computerized CBT		
				(3) Combination of school-based and computerized CBT		
				(4) Monitoring control condition		

Reynolds and Coats (1986)	9th–12th graders ($n = 30$)	(1) BDI score >11; (2) RADS >71; (3) BID >20; (4) No other current treatment	Group	(1) CBT (2) Relaxation training (3) Wait list control	Immediate; 5 weeks	Both active treatments showed significant decreases in depressive symptoms and improved academic self-concept compared to wait list. Relaxation associated with reductions in anxiety as well
Smith et al. (2015)	Ages 12–15 ($n = 112$)	MFQ-C >20	Computerized	(1) School-based computerized CBT (2) Waiting list	Immediate; 3 months; 6 months	Relative to being on a waiting list, C-CBT was associated with statistically significant improvements in symptoms of depression and anxiety according to adolescent self- report
Young, Mufson, and Davies (2006)	7th–10th graders ($n = 41$)	(1) CES-D scores between 16 and 39 (2) At least 2 subthreshold or threshold symptoms on the K-SADS (3) No present Major Depressive Episode (MDE)	Group	(1) IPT-AST (adolescent skills training) (2) SC (school counseling)	Immediate; 3 months; 6 months	IPT-AST group had significantly less depressive symptoms and overall improved functioning at post and follow-up periods. There were fewer depression diagnoses at any point in the study period for the IPT-AST group (3.7%) as compared to the SC group (28.6%)
Young, Mufson, and Gallop (2010)	Ages 13–17 ($n = 57$)	(1) CES-D scores between 16 and 39 (2) At least 2 subthreshold or threshold symptoms on the K-SADS (3) No present Major Depressive Episode (MDE)	Group	(1) IPT-AST (adolescent skills training) (2) SC (school counseling)	Immediate; 6 months; 12 months	Decreased depression symptoms and improved overall functioning in IPT-AST group at post and 6 months. At 12 months, no significant differences between the groups on either depression symptoms or overall functioning

MDD major depressive disorder, *DD* dysthymic disorder, *K-SADS* Schedule for Affective Disorders and Schizophrenia for school-aged children, *BDI* Beck Depression Inventory, *CBT* cognitive behavioral therapy, *CDI* Children's Depression Inventory, *GAF* Global Assessment of Functioning Scale, *CES-D* Center for Epidemiologic Studies – Depression Scale, *CDRS-R* Revised Children's Depression Rating Scale, *RADS* Reynolds Adolescent Depression Scale, *BID* Bellevue Index of Depression, *HRSD* Hamilton Rating Scale for Depression, *MFC-Q* Mood and Feelings Questionnaire-Child, *IPT-AST* Interpersonal Psychotherapy-Adolescent Skills Training, *SC* school counseling were randomly assigned to the CBT alone, medication alone (sertraline), or a combined CBT and medication intervention. CBT alone was superior to medication alone and the combined treatment was not superior to either treatment alone. The authors have noted that the poor showing for medication in this study may be a function of inadequate dosing. Finally, the Treatment of Adolescent Depression Study (2004) compared CBT alone, fluoxetine alone, CBT combined with fluoxetine, and placebo. Although the combination treatment was superior to all other conditions, fluoxetine was superior to CBT alone, and CBT alone was not significantly better than pill placebo. It has been noted that the effect size for the CBT intervention in the TADS study was significantly smaller than in other studies of CBT, and the version used may have been "low potency" (Weisz et al., 2006). In fact, other investigators have questioned the implementation of the specific CBT intervention in the TADS study, suggesting it may have been overly structured and not have allowed the flexibility necessary for maximally impactful implementation (Hollon, Garber, & Shelton, 2005). At this time, given the conflicting findings, the role of medication-psychotherapy combination treatments for adolescent depression remains unresolved.

Six studies have examined group cognitive behavioral interventions in adolescents with high levels of depressive symptoms rather than diagnosed depressive disorders. In the studies where treatments have been applied to participants who are not diagnosed, samples were frequently heterogeneous. Using cutoffs on continuous measures of depressive symptoms, some researchers may include many youth with diagnosable depression (Kerfoot et al., 2004; Marcotte & Baron, 1993; Reynolds & Coats, 1986), but for practical reasons are unable to provide specific diagnoses. Others, in an effort to focus on the secondary prevention, studies in at risk-samples have purposely excluded diagnosed youth and focused on subsyndromal depression (Clarke et al., 1995, 2001). Due to this heterogeneity, it is difficult to determine whether findings from these studies can effectively be compared to one another or generalized to youth with diagnosable depressive disorders. In four of the studies, cognitive behavioral treatment was superior to a no-treatment comparison group. Clarke et al. (1995, 2001) examined the 15-session Coping with Depression Course (CWD) in two studies. In the first study ninth and tenth graders, who had high CES-D scores, but did not meet criteria for a depressive disorder, were randomly assigned to CWD or a no intervention group and followed up at 6- and 12-month intervals after treatment completion. In the second study, youth ages 13–19, whose parents had recently been depressed and were themselves currently symptomatic (but did not meet criteria for major depressive or dysthymic disorders) were assigned to usual care or usual care plus CWD and followed at 12 and 24 months after treatment was completed. In both studies, the rates of depressive disorders at follow-up were significantly lower in the CWD-treated groups and comparable to community rates of depression. In a small study of youth with mild to moderate depressive symptoms, Ackerson and colleagues (Ackerson et al., 1998) found a significant advantage of implementing cognitive bibliotherapy over no treatment, suggesting the possible utility of brief, inexpensive, cognitively focused interventions for milder depressive symptoms. Finally, Reynolds and Coats (1986) compared cognitive behavioral therapy to relaxation training and to no intervention. Although the cognitive behavioral intervention was superior to the no-treatment condition, it showed no advantage over relaxation training. Overall, these studies of cognitive behavioral interventions in youth with elevated depressive symptoms provide support for these treatments; however, they are unable to address whether psychosocial treatments generally or cognitive behavioral treatments specifically are superior to no-treatment conditions.

Two studies found no advantage for cognitive treatments. Kerfoot et al. (2004) found no differences between brief cognitive behavioral therapy and routine care in a sample of youth seen through social service agencies. However, chronicity, comorbidity, and residential instability led to high levels of treatment non-completion in this challenging sample. Indeed, fewer than one half of participants in the study completed four sessions of cognitive behavioral therapy. Marcotte and Baron (1993) compared rational emotive therapy to no treatment in a small sample of teens with high depressive symptoms. Symptoms reduced in both groups posttreatment; however, the extremely small sample and limited statistical power make it difficult to draw meaningful conclusions.

Cognitive interventions have been implemented in different formats, including individual and group. Of those studies conducted with diagnosed depressed adolescents, nine were conducted in an individual format and four in a group format, and both approaches were associated with significant improvements in depressive symptoms. Of those studies of adolescents with high depressive symptoms, four used a group format and three found significant advantage to CBT over a no intervention control (Clarke et al., 1999; Clarke et al., 2001; Reynolds & Coats, 1986). Indeed, meta-analysis supports the observation that both formats may be useful in the treatment of adolescent depression (Weisz et al., 2006).

Computerized CBT programs for depressed adolescents have recently been developed with the aim of more broadly disseminating evidence-based treatments, especially to adolescents who would not otherwise have access to treatment. Between two studies included in the cognitive behavioral treatment condition, the results are mixed. A multisite, school-based randomized controlled trial compared computerized CBT program (C-CBT) to a waitlist condition for youth ages 12–16 with significant depressive symptoms (Smith et al., 2015). Results demonstrated that compared to waitlist control, C-CBT was associated with statistically significant improvements in depressive symptoms, maintained at 6-month follow-up, according to adolescent self-report. In a second RCT (Poppelaars et al., 2016), for 208 female adolescents with depressive symptoms, there was no difference in change in symptomatology between a CBT prevention program, a computerized CBT program, a combination of the two, and a monitoring control condition. Going forward, establishing reliability and cultural competency will be critical factors in the development of new computer delivered interventions.

While the immediate effects of cognitive behavioral interventions for youth depression have been evaluated, fewer studies have examined longer-term impact. Indeed, as revealed in Tables 1 and 2, a limited number of studies have provided follow-up evaluations. Clarke and colleagues have included the longest follow-up intervals, ranging from 12 months (Rohde et al., 2004) to 24 months (Clarke et al., 1999; Clarke et al., 2002; Clarke et al., 2005; Lewinsohn et al., 1990). Results are mixed. In two studies in which there were initial group differences, treatment effects were maintained throughout a 24-month follow-up in one (Lewinsohn et al., 1990), but attenuated by 12 months in another (Rohde et al., 2004). Two studies showed no difference between CBT and usual care conditions either immediately or at a 24-month follow-up (Clarke et al., 2002, 2005). One study examined the use of booster sessions to promote recovery in youth who remained depressed following the 8-week group CBT intervention and to prevent recurrence in recovered youth (Clarke et al., 1995). Booster sessions significantly reduced time to recovery in symptomatic youth, but failed to prevent recurrence. Alternatively, in a small pilot study, Kroll, Harrington, Jayson, Fraser, and Gowers (1996) found much lower rates of relapse among youth receiving continuation CBT compared to an historical control group. Overall, the degree to which CBT interventions are sustained over time is not clear, and future studies need to include substantial follow-up periods.

Two studies have examined the role of parent involvement in cognitive behavioral therapy. Each study compared the Adolescent Coping with Depression (CWD) course alone with CWD supplemented with cognitive behavioral training for parents and to waitlist control. In both studies, treated groups had higher rates of recovery from depression and greater reductions in depressive symptoms. However, there was not strong support for the addition of parental involvement. One of these studies found no difference between CWD alone and CWD with the supplemental parent group (Clarke et al., 1999), and the other revealed only a slight trend for the adolescent-parent condition to outperform the adolescent-only condition (Lewinsohn et al., 1990). Thus, while it is generally agreed that parent involvement in youth treatments is important, extensive parent involvement in the delivery of cognitive behavioral interventions is not supported.

Since Weisz et al. (2006) reported large effects of cognitive behavioral treatments for youth depression across 31 RCTs, two meta-analyses have supported CBT, both as an effective treatment for adolescent depression (Klein, Jacobs, & Reinecke, 2007) and also as an effective intervention for adolescent depression prevention (Hetrick, Cox, & Merry, 2015). It is important to note that the treatment effects of CBT have decreased from the large effects seen in early trials, most likely due to methodological differences, including greater methodological rigor (Klein et al., 2007).

Hetrick et al. (2015) observe that across the 43 trials included in the adolescent depression prevention meta-analysis, the only feature common to every program was some form of cognitive restructuring. The heterogeneity of interventions under the umbrella of CBT makes it difficult to pinpoint the mechanisms and process variables that are most effective for treatment. The field is calling for further research to identify components of treatment that are most strongly associated with clinical improvements in adolescent depression (Klein et al., 2007; Webb, Auerbach, & DeRubeis, 2012; Weersing et al., 2016).

Interpersonal Approaches Therapies focused on enhancing interpersonal functioning vary widely and include group-based social skills training, individually based interpersonal psychotherapy, and family-based interventions. While they share common goals of improving interpersonal relationships, decreasing social isolation, and enhancing interpersonal skills, these interventions vary greatly in their formats, techniques, and foci.

Two studies examining the efficacy of social skills training for depressed adolescents have yielded mixed results. First, Fine et al. (1991) compared a 12-session social skills training group to a therapeutic support group. Although both groups had improved significantly posttreatment, contrary to expectation, the therapeutic support group was superior in reducing depressive symptoms to the nonclinical range. Second, Reed (1994) compared social skills training to an attention placebo control condition. Although participants in the overall skills group showed a greater improvement in clinicians' ratings, there were significant gender effects with boys showing some improvements and girls deteriorating. The small sample size in this study (18 participants) makes it is difficult to draw firm conclusions. Overall, the limited available data do not suggest that social skills training alone is an efficacious treatment for adolescent depression.

Interpersonal psychotherapy (IPT) has received a fair amount of attention in the literature and demonstrates promising results. In IPT clinicians focus on reducing depressive symptoms and enhancing interpersonal functioning using an active, collaborative approach and focusing on one or two primary interpersonal problem areas. A recent meta-analysis combining research on adults and adolescents (Cuijpers et al., 2011) found that IPT produced strong results when compared to waitlist control or treatment as usual, with a mean effect size (Cohen's d) of 0.63. They also found that pharmacotherapy was slightly more efficacious than IPT, although the combination of the two may produce stronger results. There was no effect of age group (adult versus adolescent) on these results (Cuijpers et al., 2011).

We examined five RCTs that investigated the impact of IPT for the treatment of adolescent depression and all show strong support for this intervention. In an initial study, Mufson and colleagues (Mufson et al., 1999) compared IPT to clinician monitoring in 48 depressed adolescents. Those patients in IPT showed greater improvements in depressive symptoms, social functioning, and problem-solving compared to those in the clinical monitoring condition. Significantly more patients in IPT showed recovery from depression as well. Second, Rosselló and Bernal (1999) adapted the IPT model specifically for Puerto Rican adolescents. They compared IPT to

CBT and waitlist control conditions. Both CBT and IPT were superior to the waitlist in reducing depression, and IPT was associated with greater gains in social functioning and self-esteem compared to the waitlist condition and exhibited a larger overall effect size (0.73) than did CBT (0.43). Third, Mufson et al. (2004) replicated their original findings by comparing IPT to treatment as usual in a school-based health clinic. Those receiving IPT showed greater reductions in symptoms of depression and improvements on social and global functioning. Fourth, Rosselló et al. (2008) compared the impact of IPT and CBT in a group and individual formats, with both approaches culturally adapted for a predominantly Latino sample. They found similar results regardless of whether treatment was delivered in a group versus individual format, with a slightly greater impact of individual treatment. This finding is important given the cost reductions associated with group treatment as compared to individual. While both conditions resulted in improvements in depressive symptoms, the CBT group experienced greater reductions and increased positive self-concept, with 62% of participants functioning in the nonclinical range compared to 57% of the IPT group. Lastly, O'Shea et al. (2015) compared IPT delivered in a group versus individual format. They did not have another type of treatment since the goal of the study was to determine if the two formats produced similar results. Using intent-to-treat analysis, their results demonstrated significant improvements in depression, as well as anxiety, at the posttreatment assessment. There was no significant difference between the two formats and gains were maintained at 12 months. Overall, IPT appears to be a powerful treatment for depression in youth that is flexible in its adaptation to other cultural contexts. Given its focus on interpersonal functioning, IPT necessarily emphasizes family relationships and often includes parents in some sessions (Mufson et al., 2004). While long-term effects of IPT were reported in one study, more research is needed. Most follow-ups occurred only immediately (Mufson et al., 1999, 2004) or up to 3 months following treatment completion.

Two studies examined IPT for adolescents with elevated depressive symptoms. Young et al. (2006) examined a group IPT treatment for adolescents as compared to school counseling. Students were eligible if they had scores between 16 and 39 on the Center for Epidemiologic Studies Depression Scale (CES-D) and at least two subthreshold or threshold symptoms on the K-SADS-PL. There were 41 students enrolled in the study who were in grades 7–10. Adolescents in the IPT-AST group had lower depressive symptoms at all follow-ups (post, 3 months, and 6 month). Furthermore, fewer participants in the IPT-AST group met criteria for depression at any point in the study (3.7%) than in the SC group (28.6%). In a follow-up study, investigators enrolled 57 participants in a similarly designed study, but this time extended the follow-up period out to 12 months (Young et al., 2010). Eligibility criteria and the interventions remained the same. As compared to the SC group, participants in the IPT-AST group again displayed fewer depressive symptoms as well as improved overall functioning at the posttreatment assessment as well as at 6 months. It is interesting to note, however, that at the 12-month follow-up, the difference in depressive symptoms and overall functioning between the groups was no longer significant (Young et al., 2010).

The importance of family support and involvement in youth treatment is often considered a clinical given, but few studies have examined the role of family treatments in adolescent depression. Brent, Poling, McKain, and Baugher (1993) demonstrated that a two-hour psychoeducational session for parents was associated with their greater knowledge and fewer dysfunctional beliefs about depression and its treatment. Most parents (97%) found such psychoeducation to be worthwhile. Indeed, in their large adolescent depression treatment study, Brent et al. (1997) included brief family psychoeducation in all treatment conditions with the goal of minimizing dropout and supporting treatment. However, the outcomes of more extended interventions aimed at altering family relationships have been more mixed. First, Brent et al. (1997) compared systemic-behavioral family therapy to individual

CBT and individual nondirective supportive therapy for the treatment of adolescents with major depressive disorder. The systemic-behavioral family therapy focused on altering family interaction patterns through the use of reframing and communication and problem-solving skills interventions. However, this family therapy was significantly less effective than CBT and comparable to nondirective supportive therapy. Second, Diamond and colleagues developed and examined attachment-based family therapy (ABFT; Diamond et al., 2002), a family treatment model for depressed adolescents that is derived from attachment theory. This treatment focuses on building alliances between the therapist and both the parent and the adolescent, repairing the parent-child bond, and (with parental support) building the adolescent's competencies. An initial evaluation of this model, comparing it to a waitlist control group, found substantially greater rates of recovery (81% versus 47%) from depression; these recovery rates were maintained at 6-month follow-up. Results from an RCT revealed that ABFT was more efficacious than enhanced usual care in reducing suicidal ideation and depressive symptomatology in adolescents (Diamond et al., 2010).

Overall, interventions that focus on interpersonal functioning appear promising in the treatment of adolescent depression. However, the appropriate role of family involvement has yet to be clarified in treating depression during this developmental period, and clinicians tread a difficult path in balancing the need to enhance family support and functioning while supporting the adolescent's burgeoning autonomy.

Medication Trials Although the use of antidepressants, specifically selective serotonin reuptake inhibitors (SSRIs), is commonly used in the treatment of depressive disorders in youth, efficacy as a stand-alone treatment is questionable. Recent studies indicate that SSRIs are a rather heterogeneous group, with some consistently outperforming others. Several recent meta-analyses demonstrated that fluoxetine was the only SSRI more efficacious than a placebo group (Bridge et al., 2007; Cipriani et al., 2016) and was found to be more tolerable than duloxetine and imipramine (Cipriani et al., 2016). There have also been concerns over the past decade about the potential for increased risk of self-harm associated with SRRIs in youth (US Food and Drug Administration, 2004). Although the overall risk for treatment-emergent suicidal ideation/attempt is fairly low (less than 1% in one meta-analysis), there is a small, but increased, risk following SSRI use in youth (Bridge et al., 2007). Cipriani et al. (2016) found that imipramine, duloxetine, and venlafaxine had more adverse events than did placebo groups, with venlafaxine, a selective serotonin noradrenergic reuptake inhibitor (SNRI), significantly increasing the risk for suicidal ideation/behavior in younger children. Additionally, although there are fewer medication trials with younger children, studies have indicated that placebo response rates tend to be higher among youth under age 12 (Bridge et al., 2007), with the exception of fluoxetine (Mayes et al., 2007). Therefore, further research is necessary in order to better understand the differences in antidepressant medication response in children compared to adolescents.

Given that only approximately 60% of adolescents respond to initial SSRI treatment, one study examined the most efficacious treatment strategy for adolescents who do not initially respond to an initial adequate SSRI treatment (Brent et al., 2008). Adolescents in the study who did not respond to an initial trial of SSRI treatment were randomized to one of four groups that included treatment with a different SSRI alone, venlafaxine alone, or one of the two plus CBT. After 12 weeks of intervention, CBT plus either a different SSRI or venlafaxine showed a greater response rate than a switch to medication alone (Brent et al., 2008). By 24 weeks of treatment, approximately 60% of participants achieved remission, although initial treatment assignment did not predict likelihood of remission (Vitiello et al., 2010). However, the SSRI group had a more rapid decline in self-reported depressive symptoms and suicidal ideation compared to those in the venlafaxine group (Vitiello et al., 2010). Moreover, likelihood of remission and time to remission were more likely if demonstrated after

12 weeks of treatment, suggesting that early intervention may be particularly important among a non-responder group (Emslie et al., 2010).

As these findings demonstrate, the relative efficacy of a combined treatment of SSRI and CBT compared to monotherapies remains unclear, although the combination of fluoxetine and CBT may be more effective than fluoxetine or CBT alone in treatment-resistant depression (Brent et al., 2008). However, given the evidence for the effectiveness of psychotherapy for the treatment of child and adolescent depression (described earlier in this chapter) and the unclear findings regarding the use of combination or mono-pharmacological interventions in treating child and adolescent depression, it stands that psychotherapy may be the best choice for a first line treatment. Currently, in line with the findings presented above, fluoxetine is the only SSRI approved by the FDA for the treatment of child and adolescent depression, although it should be noted that there have been fewer studies assessing its use specifically with children under the age of 12. Current practice parameters do not include the use of tricyclic antidepressants in the treatment of youth depression, given lack of efficacy and side effect profiles in comparison to SSRIs.

Preadolescent Depression

Although CBT is the most widely and thoroughly investigated intervention approach for adolescent depression, far less evidence exists for any intervention for childhood depression (Forti-Buratti, Saikia, Wilkinson, & Ramchandani, 2016), and most studies are conducted with youth with high depressive symptoms rather than those with diagnosed depressive disorders. Table 3 illustrates the small literature that exists on RCTs of interventions for preadolescent depression. The most commonly examined intervention was CBT. Several studies examined social skills approaches, one assessed family-based IPT (FB-IPT) and another investigated an adapted form of parent-child interaction therapy (PCIT). Some preliminary treatment development studies have shown promising results with diagnosed school-aged youth (Flory, 2004; Kaslow, Baskin, Wyckoff, & Kaslow, 2002; Tompson et al., 2007), and one with preschool-aged youth (Lenze, Pautsch, & Luby, 2011), but the majority of RCTs have focused on preadolescents with high levels of depressive symptoms, with only three studies that exclusively targeted preadolescents with diagnosed clinical depression (Dietz et al., 2015; Luby et al., 2012; Tompson et al., 2017). Moreover, of the studies including preadolescents, several have not separated adolescents and preadolescents. Three of the studies discussed under adolescent depression treatments (Goodyer et al., 2007; Vostanis et al., 1996; Wood et al., 1996) include children under the age of 12 and up to the age of 17. Three of the studies we included in our preadolescent review also included children 12 years and older (Dietz et al., 2015; Gillham et al., 2006; Tompson et al., 2017).These issues of diagnosis and heterogeneity make it difficult to parse out the exact roles that development and depression status may play in treatment efficacy.

Of the 13 studies listed in Table 3, ten used a group format. These ten either include a CBT intervention explicitly or examine a particular component of this approach. However, unlike interventions for adolescent depression, these interventions focused heavily on improving interpersonal functioning and building interpersonal skills, combining cognitive behavioral and interpersonal approaches. The types of skills included problem-solving, self-monitoring, and social ability. For example, Asarnow and colleagues (Asarnow et al., 2002) have a specific portion of the protocol devoted to helping children build friendships in a developmentally appropriate way that acknowledges the social challenges of late elementary and middle school youth. Compared to interventions for adolescents, those designed for children have more incorporation of parents in sessions. For example, the intervention elaborated by Gillham et al. (2006) added a parent component on the basis that children learn interpretive and coping styles from their parents and caregivers. Across six sessions, parents learned the core skills of the program their children received and learned how to incorporate the skills into their parenting.

Table 3 Randomized clinical interventions trials for preadolescents with depression

Reference	Subjects	Diagnostic/risk assessment	Treatment format(s)	Intervention type(s)	Post-intervention assessment	Impact of treatment
Asarnow, Scott, and Mintz (2002)	4th–6th graders (*n* = 23)	School screening; CDI	Group	(1) CBT and family education (2) Waitlist control	Immediate	Children in the intervention group were more likely to show reductions in depressive symptoms, negative cognitions, and internalizing coping
Butler, Miezitis, Friedman, and Cole (1980)	5th–6th graders (*n* = 56)	Teacher referral; high scores on CDI	Group	(1) Role-play problem-solving (2) Cognitive restructuring (3) Attention control	Immediate	Role-play group showed significant reduction on CDI and improved classroom functioning. One of two groups in cognitive restructuring showed significant reductions on CDI
De Cuyper, Timbremont, Braet, De Backer, and Wullaert (2004)	Ages 10–12 (*n* = 20)	CDI score >11 and/or T score >23 on CBCL internalizing and anxious/depressed subscale; at least one MDD criterion but without other apparent Axis I	Group	(1) CBT program (“taking action”) (2) Waitlist control group	Immediate; 4 months; 12 months	Four-month follow-up comparisons with baseline measures showed significant improvement on the CDI and the self-perception profile only for CBT group. At the 12-month follow-up, CBT group showed further improvement and significant decreases on the CDI, STAI, and CBCL
Dietz et al. (2015)	Ages 7–12 (*n* = 42)	DSM-IV diagnoses of MDD	Family	(1) FB-IPT (2) CCT	Immediate	Greater depression remission rates in FB-IPT group (66%) as compared to CCT group (31%). FB-IPT participants also had significantly lower depressive symptoms, anxiety symptoms, and interpersonal impairment as compared to the CCT group
Gillham et al. (2006)	Ages 11–12 (*n* = 44)	School-based sample selected for higher CDI scores (mean = 10.56; SD = 5.99)	Group	(1) School-based cognitive behavioral depression prevention program with parent intervention component (2) No intervention control	Immediate; 6 months; 12 months	Students in intervention arm reported lower levels of depressive symptoms over the follow-up period. The intervention effect was not significant at post-assessment but was significant at 6- and 12-month follow-ups

Jaycox, Reivich, Gillham, and Seligman (1994), and Gillham, Reivich, Jaycox, and Seligman (1995)	Ages 10–13 ($n = 143$)	Z-scores on CDI + Child Perception Questionnaire >0.50	Group	(1) Cognitive (2) Social problem-solving (3) Combined (both above treatments) (4) Wait list control (5) No participation control	Immediate; 6 months; 12 months; 18 months; 24 months	No differences between treated groups who had fewer depressive symptoms at posttest and at follow-up and improved classroom behavior (teacher report) than untreated groups. Effects more pronounced among children from high-conflict homes. Follow-up revealed even greater group differences in depressive symptoms over time
Kahn, Kehle, Jensen, and Clark (1990)	Ages 10–14 ($n = 68$)	Multistage gating: Stage 1: CDI >14; RADS >71. Stage 2: Reassessment 1 month later with CDI and RADS. Stage 3: Interview, BDI>19. No other depression treatment	Group	(1) Cognitive behavioral (2) Relaxation training (3) Self-modeling (4) Wait list control	Immediate; 1 month	All active treatment groups showed significant improvement in depression compared to control. Most children in CBT and relaxation groups went from dysfunctional to functional range on depressive symptoms; self-modeling group less improved than other groups
King and Kirschenbaum (1990)	KG- 4 graders ($n = 135$)	Children who scored above a cutoff on the activity mood screening questionnaire	Group	(1) Social skills training plus consultation with parents and teachers (2) Consultation only	Immediate	Combined program showed reduced depression as compared to consultation only. Multidimensional ratings of behavior and skills improved across both groups
Liddle and Spence (1990)	Ages 7–11 ($n = 31$)	CDI $\geq$19 CDRS-R $\geq$40	Group	(1) Social competence training (2) Attention placebo (3) Waitlist control	Immediate; 3 months	No group differences at pretest, posttest, or follow-up. All groups declined on CDI scores and increased on teacher's reports of problem behavior

(continued)

Table 3 (continued)

Reference	Subjects	Diagnostic/risk assessment	Treatment format(s)	Intervention type(s)	Post-intervention assessment	Impact of treatment
Luby et al. (2012)	Ages 3–7 (*n* = 54)	Research diagnostic DSM-IV criteria for MDD as assessed by the PAPA	Parent training	(1) PCIT-ED (2) Psychoeducation parent group on child development	Immediate	Both groups showed significant decreases in depression severity. There were no differences in PAPA MDD severity scores between groups. The PCIT-ED group showed significant improvement in a larger number of clinical symptom categories. PCIT-ED resulted in statistically significant improvements in ratings of executive functioning and emotion regulation
Stark, Reynolds, and Kaslow (1987)	4th–5th graders (*n* = 29)	CDI scores >12 on 2 administrations	Group	(1) Behavioral problem-solving (2) Self-control (3) Waitlist control	Immediate; 8 weeks	Both active treatment groups showed significant reductions in depressive symptoms; however, in behavioral problem-solving, both mothers and children reported differences, whereas in self-control only children reported differences
Weisz et al. (1997)	3rd–6th graders (*n* = 48)	CDI ≥10 and/or identified by teachers/counselor as depressed; and CDRS-R interview score ≥34	Group	(1) Primary and secondary control enhancement training (2) No-treatment control	Immediate; 9 months	At posttest and follow-up, treated group showed significantly greater reductions on both CDI and CDRS-R
Tompson et al. (2017b)	Ages 7–14 (*n* = 134)	Diagnosis of MDD, DD, or DDNOS based on K-SADS-PL interview	(1) Individual (2) Family	(1) Supportive Therapy (2) FFT-CD (Family-Focused Treatment for Childhood Depression)	Immediate	FFT-CD was associated with greater adequate clinical response compared to individual; FFT-CD parents reported more understanding of youth depression and more ability to help their child; FFT-CD children reported more ability to deal with problems

BDI Beck Depression Inventory, *BID* Bellevue Index of Depression, *CCT* child-centered therapy, *CDI* Children's Depression Inventory, *CDRS-R* Revised Children's Depression Rating Scale, *CES-D* Center for Epidemiologic Studies Depression Scale, *DD* dysthymic disorder, *DDNOS* depressive disorder not otherwise specified, *FB-IPT* family-based IPT, *GAF* Global Assessment of Functioning Scale, *K-SADS* Schedule for Affective Disorders and Schizophrenia for school-aged children, *MDD* major depressive disorder, *PCIT-ED* Parent-Child Interaction Therapy-Emotion Development, *PAPA* Preschool Age Psychiatric Assessment, *RADS* Reynolds Adolescent Depression Scale

Of the ten CBT intervention studies presented, treated groups showed significant improvements over untreated groups in reduction of depressive symptoms in nine of the studies (Asarnow et al., 2002; Butler et al., 1980; De Cuyper et al., 2004; Gillham et al., 2006; Jaycox et al., 1994; Kahn et al., 1990; King & Kirschenbaum, 1990; Stark et al., 1987; Weisz et al., 1997). Liddle and Spence (1990) found that children treated with social competence therapy, attention control, and no treatment all improved over time and showed no group differences.

Despite positive post-intervention results and preliminary evidence of good maintenance of treatment gains (De Cuyper et al., 2004; Gillham et al., 1995; Jaycox et al., 1994; Weisz et al., 1997), there is currently no evidence of relative superiority of one type of CBT-oriented psychotherapy over another for child depression. Five of the group-based CBT (and CBT component) studies listed in Table 3 compared different treatments to one another and three of those included a full CBT component. In terms of CBT efficacy, this small literature points to no significant advantage of CBT over role-play problem-solving (Butler et al., 1980), social problem-solving (Gillham et al., 1995; Jaycox et al., 1994), or relaxation training (Kahn et al., 1990).

The role of the family in the treatment of depression in school-aged youth remains to be clarified. Although the interventions examined at this point have focused on group formats, several have included family involvement (Asarnow et al., 2002; Stark, 1990). Given the embeddedness of school-aged youth within their families, there are strong reasons to believe that family-based approaches may be particularly potent during this developmental period. Indeed, in a study of family intervention for childhood anxiety disorders comparing individual CBT, CBT plus family treatment, and a waitlist control group, Barrett, Dadds, and Rapee (1996) found a significant age effect; younger children showed better outcomes in CBT plus family treatment, whereas older children did equally well in both active treatments. These findings highlight the importance of examining family-based treatments in school-aged youth.

Three studies incorporated interventions that included work with parents and families. In the first study, Dietz et al. (2015) conducted an intervention trial comparing family-based interpersonal therapy (FB-IPT) and child-centered therapy (CCT). They enrolled 42 children between the ages of 7 and 12 who met DSM-IV criteria for a depressive disorder. At posttreatment, children in the FB-IPT condition experienced greater remission rates (66%) than those in the CCT group (31%). Also, FB-IPT was associated with significantly less depressive symptoms, anxiety symptoms, and interpersonal impairment (Dietz et al., 2015).

In the largest study to examine treatment for preadolescent youth with depression, Tompson et al. (2017) conducted a clinical trial comparing family-focused treatment for childhood depression (FFT-CD) to an individual client-centered therapy (IP). The FFT-CD involved parents in 15 sessions focused on enhancing family relationships and building skills for communicating and solving problems (Tompson, Langer, Hughes, & Asarnow, 2017a). Although youth in both treatment conditions demonstrated significant improvement over time on depressive symptoms, comorbid problems, and functional outcomes, depression response was greater in the FFT-CD condition (78%) than in the IP group (60%).

Finally, after an open trial to adapt parent-child interaction therapy (PCIT) for preschool-aged children, meeting criteria for depression (Lenze et al., 2011) Luby et al. (2012) conducted a pilot RCT to address the need for research on depression interventions for this younger age group. PCIT was developed as a therapeutic approach that uses therapist coaching to help parents handle difficult child externalizing behaviors by enhancing the parent-child relationship and teaching parents more effective behavior management (Eyberg, 1988). Partly based on PCIT adaptations to address child anxiety (Pincus, Eyberg, & Choate, 2005), study investigators adapted PCIT to treat preschool-onset depression by incorporating an emotion development (ED) component. Therapists coach parents on supporting the child's emotion regulation, using techniques such as relaxation training, labeling and validating emotions, identifying triggers, and addressing parental factors that may hinder their ability to respond consistently and calmly to intense child emotions (Lenze et al., 2011; Luby et al., 2012). Fifty-four children who met criteria for MDD based on clinical assessment using the Preschool Age Psychiatric Assessment (PAPA) were enrolled in the trial. The comparison intervention was a parent psychoeducation group that provided parents with information on child social and emotional development. Children in both groups experienced reductions in depression severity; however, as a small pilot RCT, the study was not powered to detect statistically significant differences. Nonetheless, the PCIT-ED group experienced improvements in a larger number of symptom areas and improved executive functioning (based on parental report on the BRIEF measure of executive functioning) as compared to the psychoeducation group (Luby et al., 2012). These two studies provide preliminary data showing that incorporating parents and families in treatment is likely important, especially for preadolescents and preschool-aged children. The paucity of research in this area supports the need for more studies on the development of family and parental interventions for children with a depression diagnosis.

Directions for Future Research

Treatment research to date supports the value of psychosocial approaches for the treatment of youth depression. However, many issues remain and further research is necessary to determine optimal strategies for the comprehensive treatment of depression. Areas of concern include incomplete treatment efficacy, lack of adequate understanding of the mechanisms of effective treatment, paucity of research examining specific populations of youth with depression, and limited data examining treatments in "real world" clinical settings.

First, treatments to date, both pharmacological and psychosocial, have demonstrated limited efficacy. Although earlier meta-analytic studies of psychosocial treatments for youth depression optimistically suggested very large effect sizes (Lewinsohn & Clarke, 1999; Reinecke, Ryan, & DuBois, 1998), more recent meta-analyses with more comprehensive inclusion of treatment studies indicate modest effect sizes (Forti-Buratti et al., 2016; Weisz et al., 2006). Medication interventions appear equally limited (Cipriani et al., 2016). A substantial portion of clinically depressed youth fail to show significant recovery or remission in trials of either psychosocial or pharmacologic treatments. These findings highlight the critical need to develop new efficacious treatment strategies and enhance the impact of current treatments.

Second, there remains a need to understand the mechanisms underlying effective treatment. Mediators are variables that may explain changes in treatment that are essential to influencing outcomes of interest. By understanding mediation we can discover how treatments operate to effect change. Unfortunately, few RCTs have adequately evaluated mediation. Several have examined cognitive changes as a mediator in trials of CBT for depression, but findings have been equivocal. Understanding mechanisms underlying effective treatment may help us to design and alter interventions to maximize their impact.

Third, special populations of youth with depression have received inadequate attention. For example, compared to work on adolescent depression treatment, far fewer studies have focused on preadolescent depression. Developmental considerations during early, middle, and late childhood, including greater dependence on parents and rapidly changing cognitive capacity, point to a need for developmentally informed treatment specifically for children. Recent clinical trials provide support for integrating families in treatment specifically focused on interpersonal coping. As another example, there is a paucity of research on depression in individuals with developmental and intellectual disabilities. Although limited, studies suggest that individuals with developmental disabilities and/or intellectual disabilities can experience high levels of depressive symptoms (Magnuson & Constantino, 2011), and those on the autism spectrum with higher levels of insight may be at particular risk (Ghaziuddin et al., 2002; Matson & Nebel-Schwalm, 2007; Saulnier & Volkmar, 2007). There are no clinical trials examining depression treatments for these special populations, and there is a strong need to develop and test treatments for these populations.

Finally, although RCTs indicate efficacy for CBT and other interventions for depressed youth, effectiveness trials in which these interventions have been implemented in usual care settings (i.e., community clinics, pediatric settings) have produced mixed results. Several studies have indicated weak effects when CBT was implemented in community mental health clinics (Clarke et al., 2002; Clarke et al., 2005; TADS, 2004; Weisz et al., 1995), while others have indicated positive impact in these clinics (Weersing & Weisz, 2002) and in primary care (Asarnow et al., 2005; Richardson et al., 2014). Interestingly, those in primary care were part of an integrated collaborative care model, suggesting the importance of considering a more comprehensive treatment delivery system. Overall, findings highlight the need to both examine and enhance depression treatment in real-world settings.

Conclusions

Our understanding of depression and its treatment in youth has advanced significantly in the past 20 years, and guidelines for clinical practice have been developed. In addition to medication strategies, interpersonal interventions, family-based strategies, and both individually based and group-based cognitive behavioral interventions are treatment options for depressed youth. However, additional research is required to enhance and develop treatment approaches, to understand underlying mechanisms, and to address the needs of specific populations of depressed youth. Importantly, the effective treatments described in this chapter need to be more widely available across settings and in care models that will optimize outcomes for youth. Much work remains in effectively intervening to enhance the lives and futures of youth suffering from depression and their families.

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Treating Bipolar Disorders

Johnny L. Matson and Claire O. Burns

Contents

Bipolar Disorder Defined

Bipolar disorder and related disorders, as they are referenced in DSM-5 (American Psychiatric Association [APA], 2013), are severe forms of psychopathology that are distinct from schizophrenia and other forms of psychosis. Bipolar I and Bipolar II fall under this category as do cyclothymic disorder, substance-/medication-induced bipolar disorder, bipolar and related disorders due to another medical condition, other specified bipolar and related disorders, and unspecified bipolar and related disorder. For the purposes of this chapter, our discussion will be confined to Bipolar I and Bipolar II disorder. As the reader may be aware, a Bipolar I diagnosis must meet criteria for a manic episode which consists of elevated, expansive, or irritable mood for at least a week and for most of the day every day. Before or after the manic episode, a hypomanic or major episode should be present. Symptom presentation for a hypomanic episode is similar to a manic episode, but of shorter duration (i.e., 4 days). A major depressive episode must occur for at least 2 weeks, but the symptoms vary markedly from hypomanic and manic behaviors. Diminished interest or pleasure in activities, less energy, insomnia, feelings of uselessness or being slowed down, fatigue, feelings of worthlessness, diminished ability to concentrate, and suicidal ideation are among the symptoms that are present.

Bipolar II differs in that no manic episode has ever been present. The person will have experienced at least one hypomanic episode and one major depressive episode. Symptoms for the hypomanic and major depressive episodes will mirror the symptoms noted in Bipolar I. For this

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chapter, bipolar disorder will be used, and no distinction between Bipolar I and II will be noted. This approach is applicable since interpretation strategies do not vary markedly between Bipolar I and Bipolar II. Similarly, these distinctions are not evident in much of the published treatment literature.

Prevalence

For many years, bipolar disorder was considered to be largely present exclusively among adults. However, more recently, this thinking has changed, with greater and greater numbers of children being identified for treatment. Additionally, age of onset is becoming earlier and earlier, with children as young as 4 years of age being diagnosed. Also, age of onset, prevalence, and comorbid conditions are greater among children in the USA versus Europe. Post and colleagues (2016) compared offspring of 132 parents and their children from Germany and the Netherlands to 356 parents from the USA. The children of the US adults were more likely to express depression, bipolar disorder, drug abuse, and "other illnesses" than their European counterparts.

Stebbins and Corcoran (2016) have also addressed what they characterized as the "considerable rise in pediatric bipolar disorder." They interviewed ten child psychiatrists regarding this issue. The professionals were of the opinion that bipolar disorder in children was often misdiagnosed and/or overdiagnosed. The need for more and better diagnostic methods and more uniformity in diagnostic practices may also be a contributing factor. Having said that, much more research on this topic is warranted.

As noted, the diagnosis of bipolar disorder in children is controversial (Van Meter, Burke, Kowatch, Findling, & Youngstrom, 2016). In their paper, the authors reviewed 20 studies on bipolar disorder in youth ($N = 2226$). They noted that symptoms used for diagnosis varied widely across studies. The most commonly reported symptoms include increased energy, irritability, mood lability, distractibility, goal-directed activity, euphoric/elevated mood, pressured speech, hyperactivity, racing thoughts, poor judgment, grandiosity, inappropriate laughter, decreased need for sleep, and flight of ideas. In our view, this broad list of symptoms, many of which do not map precisely onto the DSM-5 diagnostic criterion for bipolar disorder, may at least in part account for this marked increase in children diagnosed with the condition. This approach may also account for the views of some practitioners that pediatric bipolar disorder is overdiagnosed.

Vedel Kessing, Vradi, and Andersen (2015) underscore another factor that may add to the increased prevalence of pediatric bipolar disorder: long-term involvement with the mental health system. They used ICD-10 and reported on children and adolescents below age 19 who received a bipolar diagnosis in Denmark. Of the 354 individuals they studied who had received a diagnosis of bipolar disorder, 144 were given the diagnosis at first contact. For the remainder, about 1 year of treatment occurred before the diagnosis was given. Why a subgroup of individuals did not receive a diagnosis early on is not known but warrants further study.

Whatever the reason may be, researchers are aware that pediatric bipolar disorder has become one of the more commonly diagnosed childhood conditions. Obviously, these increased rates have important implications for treatment. Additionally, much of this intervention is geared toward psychotropic medications.

Risk Factors

Prevention and early intervention are important for all mental health issues. However, this topic is no more critical than for children who may be experiencing severe psychopathology. These deficits markedly impede normal development and can have a lifetime impact on adjustment across social contact, work, family relationships, and a host of other factors.

Betts, Williams, Naiman, and Alati (2016) conducted a longitudinal study with children who were assessed for a range of neurodevelopmental factors at age 5. At age 21 these same people were evaluated for symptoms of mental health problems. Developmental delay predicted manic symptoms, while behavior problems predicted depression symptoms as well as behavioral descriptors of psychosis. More research of this type is needed. Identifying reliable risk factors can be very useful for establishing prevention programs.

Biederman and colleagues (2009) report that a diagnosis of bipolar disorder in mothers was a strong predictor of bipolar disorders in offspring. These data are underscored by Hunt, Schwartz, Nye, and Frazier (2016) who emphasize the importance of addressing offspring of bipolar parents as a “high-risk cohort.” Insel (2012) asserts that this phenomenon may result in clinical symptoms being present years before a formal diagnosis is made. However, the study of this topic is in its infancy at present.

These authors argue for the need to identify symptoms likely to lead to pediatric bipolar disorder as early as possible so that early intervention may be initiated. As noted however, these symptoms early on may be nonspecific to bipolar disorder. Therefore, these nonspecific behaviors do not always lead later on to a diagnosable bipolar disorder using standardized tests and diagnostic symptoms. For example, children with anxiety and sleep problems have a significant likelihood of developing serious emotional disorders. However, in addition to bipolar disorder, major depression and schizoaffective disorder are also implicated (Duffy, Aldo, Hajek, Sherry, & Grof, 2010; Ritter et al., 2012).

Duffy, Jones, Goodday, and Bentall (2015) assert that pediatric bipolar disorders are likely caused by a combination of genetic, environmental, and epigenetic variables. This theory is a good bet since current thinking on a broad range of neurodevelopmental disorders asserts similar broad risk factors. Also, an important takeaway from current causative models is that disorders develop gradually over time until a diagnostic threshold is reached versus rapid onset. This model, which again applies to a wide range of neurodevelopmental conditions (e.g., autism, ADHD), has led investigators to hunt for these more subtle early warning signs of later, more severe, psychopathology. Of course, where parental bipolar disorder is present, a chicken and egg analogy will most likely be present with respect to the extent of genetics versus parenting which may influence the manifestation of bipolar disorder. However, it is known that increased duration of exposure to a parent with bipolar disorder increases the risks of bipolar disorder for the offspring (Doucette, Horrocks, Grof, Keown-Stoneman, & Duffy, 2013). Thus, it is possible that genetic factors are embellished when long-term environmental stressors are also present.

Benarous, Mikita, Goodman, and Stringaris (2015) looked at a different set of factors that may be associated with pediatric bipolar disorder, social aptitude (skills). This factor is an important consideration in the evaluation and treatment of pediatric bipolar disorder, yet it has rarely been studied to date. These authors measured skills that involved identifying social and emotional cues in everyday social interactions. Specific behaviors assessed included being easy to talk to, being able to read between the lines, and judging emotions. As might be expected, children with parent reported manic symptoms scored lower on social skills than the general population. These data are important, since teaching social coping skills would seem to be an important element of a comprehensive treatment plan for pediatric bipolar disorder.

Selten, Lundberg, Rai, and Magnusson (2015) examined a very large group of children and adolescents under the age of 17 diagnosed with autism spectrum disorder ($N = 9062$). The intent was to determine the rate at which bipolar disorder occurred in this group. These authors note that children with autism spectrum disorder are at greater risk compared to the general population for the development of bipolar disorder. They also theorize that some genetic overlap exists between these conditions, but their study did not confirm this assumption.

Another study looking at the potential comorbidity of bipolar disorder compared it to ADHD in a nationwide study conducted in Taiwan. A total of 144,920 children diagnosed with ADHD were studied. Wong et al. (2016) found that children with ADHD when compared to the general population were seven times more likely to develop bipolar disorder. Also, age of first diagnosis of bipolar disorder was earlier for the ADHD group. Children treated with methylphenidate were less likely than others with an ADHD diagnosis to receive a bipolar diagnosis.

Researchers have attempted to link immunological problems to bipolar as well. Chen and colleagues (2015) employed an insurance research database of 9506 children and adolescents 12–18 years of age. These participants, who were from Taiwan, all had been diagnosed with allergic rhinitis. These individuals were significantly more likely to develop bipolar disorder compared to controls. Of course, most of these studies are correlational at this point, so specific causality is unknown.

Duffy et al. (2015) provide an excellent review of multiple risk factors for bipolar disorder in children. They make several general conclusions. Increased risk of psychopathology and early exposure to stressors such as parental illness and neglect from the child's mothers were associated with bipolar disorder. Other markers of vulnerability include reward sensitivity, disturbances in circadian rhythm, unstable self-esteem, immune dysfunction, rumination, and positive self-appraisal.

Environmental risk factors have also been hypothesized as possible factors associated with juvenile bipolar disorder. Marangoni, Hernandez, and Faedda (2016) suggested that environmental risk factors could be grouped into three categories: neurodevelopmental, encompassing having the flu while pregnant and/or fetal development; substance abuse of alcohol, cannabis, cocaine, opioids, stimulants, sedative, or tranquilizers; and psychological/physiological stressors such as parental loss, abuse, and brain injury. All of these variables were associated with pediatric bipolar disorder.

These studies demonstrate robust initial efforts to establish factors associated with pediatric bipolar disorder. Risk factors are helpful for early identification of the condition. In other cases, the ability to identify and track persons likely to be at risk for developing pediatric bipolar disorder or a group of subclinical symptoms that may also require treatment is essential. Various service models on hard to treat pediatric bipolar disorders as proposed by researchers follow.

Service Models

Fristad and colleagues (2012) describe an outpatient program to screen for manic symptoms. They evaluated 707 6–12-year-olds using the Parent General Behavior Inventory. This scale was a ten-item mania scale. In addition to this measure, parent history of mania and parental stress were also evaluated. They particularly underscore the need for a careful, detailed assessment since most of the risk factors they addressed were not particularly accurate for predicting mania.

Potter and colleagues (2009) also discuss the treatment of pediatric bipolar disorder in a specialty outpatient clinic. They evaluated 53 children using the Clinical Global Impression Scales (Severity and Improvement). The average number of medications per person was three. The authors attribute this phenomenon to the fact that 68% of the children diagnosed with pediatric bipolar disorder had at least one comorbid mental health condition. They underscore the need to employ psychological interventions as a method to minimize total drug use. Similar drug use patterns and recommendations for psychosocial treatment for pediatric bipolar disorder were noted by Vande Voort and colleagues (2016). However, in the 85 youth with bipolar disorder, a cautionary note was added. They underscore that for both medication and psychosocial treatments, visits to the clinic were only once every 2 months. This may be associated with the fact that almost half of the sample experienced relapses.

Benarous, Consoli, Milhiet, and Cohen (2016) emphasize the need for early intervention programs for children at high risk for bipolar disorder. They note that the lack of specific diagnostic markers does make it difficult to identify preteens. Additionally, for young children, there do not appear to be well-delineated intervention packages for these children. Researchers do know that medications, particularly lithium and antipsychotic drugs, along with "supportive" parent and child therapy are treatments which are emphasized. Other components of intervention such as social skills, adaptive skills, and coping skills should also be considered.

Medications and Supplements

Singh, Ketter, and Chang (2010) stress that medication in combination with psychologically based therapies is essential in the treatment of children's bipolar disorder. They recommend these treatments for acute mania or mixed symptoms. These authors stress that this approach is useful for stabilizing symptoms.

Lithium has the best track record for stabilizing symptoms of bipolar disorder for adults. This medication has also been used with childhood populations. Findling, Kafantaris, and colleagues (2013) treated 41 outpatients between 7 and 17 years of age. Additionally, for 25 of these individuals, antipsychotic drugs were used as an add-on therapy. Dependent variables consisted of the Young Mania Rating Scale and the Clinical Global Impression-Improvement. They note that children who initially responded to lithium therapy for acute manic symptoms also found the drug to be effective for maintenance. Side effects noted were vomiting, headache, abdominal pain, and tremor.

Another study using lithium and add-on medications to treat pediatric bipolar disorder is described by Geller and colleagues (2012). They treated 279 children, 6–15 years of age for elevated mood and ideas of grandiosity. All of the children displayed these symptoms, while almost 80% of the population evinced symptoms of psychosis. Over 90% of the sample also shared mixed mania and daily rapid cycling. The drug treatment was lithium, risperidone, or divalproex sodium. Children treated with risperidone had a better response than persons receiving lithium or divalproex sodium. There was no difference in treatment response for the latter two drugs.

In a review of lithium treatment for children, Naguy (2016) reviewed several studies that demonstrate the superiority of this drug over a placebo for treating bipolar mood disorder. However, there are several reservations to the current research. Many of the studies are open-label (noncontrolled case studies). We do not believe studies of this type provide adequate methodological controls to consider the results valid.

Lithium has a narrow therapeutic window, and toxicity is always an issue. This latter point is particularly critical with children where monitoring may be more difficult and where the child may have difficulty in accurately self-reporting side effects. This problem is underscored by Landersdorfer, Findling, Frazier, Kafantaris, and Kirkpatrick (2016) who point out there is a dearth of information on lithium dosage levels for children. Given the substantial research database using lithium to treat bipolar disorder in adults, further study is warranted. However, given the current database, clinicians should proceed with caution when addressing the pediatric bipolar population.

Antipsychotics

Antipsychotic medications, and particularly the atypical antipsychotics, have been used in many studies of pediatric bipolar disorder. For example, in one chart review study of nine, 14–17-year-olds diagnosed with bipolar disorder were prescribed paliperidone, palmitate, risperidone, fluphenazine, or aripiprazole (Pope & Zaraa, 2016). Similarly, in a review of existing studies, Doey (2012) reported that there were 140 book chapters and articles describing aripiprazole to treat schizophrenia, bipolar disorder, or psychosis in children and adolescents. Only seven of these papers were double-blind controlled studies with the bulk of the papers being chart reviews, case studies, or meta-analyses. Given the potency of these medications and the vulnerability of pediatric populations, researchers in the field need to do better. A much more extensive database using rigorous experimental designs is needed.

Youngstrom and colleagues (2013) tested aripiprazole and discussed the need to have appropriate, reliable, and valid methods of evaluating treatment effectiveness for children and adolescents with Bipolar I disorder. Among the measures they used were the Clinical Global Impression-Bipolar Disorder, the Children's Global Assessment Scale, and the Young Mania Rating Scale. The Young Mania Rating Scale was the most sensitive measure of the three with respect to monitoring treatment effects in this study.

Findling, Correll, and colleagues (2013b) reported a double-blind, 30-week study for children and adolescents 10–17 years of age. The participants (*N* = 296) were diagnosed with Bipolar I disorder with or without psychotic features. Two hundred and ten of these individuals completed the aripiprazole treatment. The authors report that medication was superior to placebo for decreasing symptoms measured on the Young Mania Rating Scale, the Global Assessment of Functioning Scale, and the Clinical Global Impression-Bipolar scale. In a review of studies, using aripiprazole as a treatment for pediatric bipolar disorder largely using double-blind studies further supports the efficacy of this medication (Uttley, Kearns, Ren, & Stevenson, 2013).

Risperidone has also been studied in the treatment of pediatric bipolar disorder in a number of studies. Carlson, Potegal, Margulies, Basile, and Gutkovich (2010) studied 49 of 151 5–12-year-olds treated for "rage." A subgroup of these children possibly also evince bipolar disorder, according to the authors. The procedure was one use of seclusion for the first episode of rage, followed by medication when a second episode occurred. The restrictive nature of the treatments, particularly given that the children were so young, suggests the need for a different first step. Clinicians should consider using a functional assessment, followed by behaviorally based interventions such as teaching triggers to the challenging behaviors, relaxation and other coping skills, modifying stressful situations, and teaching replacement behaviors.

Pavuluri and colleagues (2010) have also treated pediatric bipolar disorder with risperidone. They describe a double-blind randomized outpatient experiment. There were 66 children in the study with an age range of 8–15 years. Risperidone was compared to divalproex. Risperidone was the more effective drug for decreasing bipolar symptoms, although 24% of the sample dropped out before the study was completed.

Haas and colleagues (2009) also tested risperidone for 169 10–17-year-olds with a DSM-IV diagnosis of Bipolar I. Of their sample, 58 received a placebo while 50 received doses of risperidone at 0.05–2.5 mg per day, and a third group (*n* = 61) received at 3–6 mg per day. The two risperidone groups produced significantly lower scores on the Young Mania Rating Scale compared to the placebo group.

Other new-generation antipsychotics have been employed to treat pediatric bipolar disorder. Detke, DelBello, Landry, and Usher (2015) treated 10–17-year-olds with olanzapine/fluoxetine (*n* = 170) or a placebo (*n* = 85). The active drug group produced significantly greater reductions in symptoms on the Children's Depression Rating Scale-Revised and the Young Mania Rating Scale.

Other Medications

Other medications have also been used to treat pediatric bipolar disorder. Carbamazepine is one of these. Findling and Ginsberg (2014) describe an "open-label" study (no experimental controls). One hundred and fifty-seven children and adolescents between 10 and 17 years of age diagnosed with acute manic or mixed episodes of pediatric bipolar disorder were studied. The dependent measure was the Young Mania Rating Scale (for which lower scores indicate less symptomology). Average scores went from 28.6 before intervention to 13.8 at the end of the 26-week treatment phase.

Another open-label carbamazepine study was reported for 16 children who completed an 8-week treatment regimen. All children were diagnosed with pediatric bipolar disorder. Dependent variables for the studies included the Young Mania Rating Scale, the Children's Depression Rating Scale, and the Brief Psychiatric Rating Scale. Joshi and colleagues

(2010) reported that the medication trial was generally beneficial as assessed with these measures (e.g., improved scores).

Azorin and Findling (2007) provide a review of yet another medication used for pediatric bipolar disorder, valproate. They reviewed papers that used randomized controlled trials when valproate was used alone or in combination with an atypical antipsychotic medication. A positive aspect of these papers is that the Young Mania Rating Scale was used. Thus, the indirect comparison of effectiveness across medications for pediatric bipolar disorder can be made. They note that these studies support the efficacy of this treatment approach.

Quetiapine for children with bipolar disorder have also been reported. Scheffer, Tripathi, Kirkpatrick, and Schultz (2010) studied rapid quetiapine loading for 75 children and adolescents 6–16 years of age who were diagnosed with pediatric bipolar disorder. They used specific cutoff scores on the Young Mania Rating Scale and the Clinical Global Impression-Improvement scale that the authors defined as remission. The researchers reported a 70% remission rate 6 months after initiating the drug trial.

Joshi and colleagues (2012) in another study testing quetiapine treated 49 children and adolescents aged 4–15 years. Thirty-four of the participants completed the drug trial. It was reported that these individuals with bipolar disorder significantly improved on scores with the Young Mania Rating Scale. The authors also report significant weight gain among those individuals who were treated.

Findling, Pathak, Earley, Liu, and DelBello (2014) studied quetiapine extended-release in 193 10–17-year-olds who had been diagnosed with acute bipolar depression. One hundred forty-four patients completed the study. This study had good experimental control and used the Children's Depression Rating Scale-Revised as the primary outcome measure. They reported that the clinical trial demonstrated the efficacy of this treatment.

Lamotrigine has also been used to treat pediatric bipolar disorder (Pavuluri et al., 2009). These authors used a 14-week open trial for 46 children with mania or hypomania. Their primary dependent variables were the Children's Depression Rating Scale-Revised and the Young Mania Rating Scale. They reported improvement in about three-fourth of the participants, with further gains noted during the remission period.

Another medication used for children and adolescents diagnosed with bipolar disorder is divalproex sodium. Redden and colleagues (2009) used the slow-release form of the drug in an open-label study with 226 children and adolescents 9–17 years of age. One hundred and nine participants completed the 6-month study. From pretest to posttest, Young Mania Rating Scale scores dropped on average 12.4, a marked reduction in symptoms.

Supplements

In addition to conventional mental health medications, other treatments have also been tried. Gracious, Chirieac, Costescu, Youngstrom, and Hibbeln (2010) prescribed flax oil which contains omega-3 fatty acid. Children and adolescents diagnosed with bipolar disorder who were 6–17 years old ($N = 51$) were given 12 capsules a day for 16 weeks. Outcome measures included the Young Mania Rating Scale, the Children's Depression Rating Scale-Revised, and the Clinical Global Impressions-Bipolar scale. No significant therapeutic effects were detected.

More positive effects were noted by Wozniak and colleagues (2015). They used a randomized double-blind experimental design over 12 weeks with 5–12-year-old children diagnosed with bipolar disorder. Seven children received inositol, seven received omega-3 fatty acid, and ten children received both. A little over half of the persons treated completed the drug trial. The greatest improvements as measured with the Children's Depression Rating Scale were the children receiving both treatments.

What is clear at this point is that the bulk of the intervention attempts have focused on medication and supplements for pediatric bipolar disorder. More needs to be done to enhance the specificity and sensitivity of the diagnostic process itself. It is laudable that a few standard checklist measures have been consistently used to evaluate treatment outcome and are rarely reported. However, more sensitive observational measures of target behaviors should be used to augment these normed scales. Also, standardized methods of evaluating drug side effects are needed. This latter point is particularly salient with highly vulnerable populations such as children.

Many of the studies involve open-label research designs. This approach is not particularly productive. Using controlled quasi-randomized double-blind studies is needed, particularly as a means of comparing various drug treatments that are showing some promise. Also, more emphasis on psychologically based intervention is urgently needed. Trials of drug psychological intervention as combined treatments are needed as well. At present the available research is still somewhat preliminary in nature.

Psychological Treatments

Early in the chapter the authors lamented the lack of studies using psychological intervention plus medication for pediatric bipolar disorder. An exception to this problem is a paper by Fristad and colleagues (2015). They report a controlled trial of omega-3 fatty acids plus family psychoeducational psychotherapy. A 12-week trial was run on several conditions. The groups included omega-3 plus psychoeducational treatment ($n = 5$), omega-3 and active monitoring ($n = 5$), placebo plus psychoeducational psychotherapy ($n = 7$), and placebo plus active monitoring ($n = 6$). The 7–14-year-olds were all diagnosed with bipolar disorder with dependent variables consisting of the Kiddie Schedule for Affective Disorder-Depression and Mania subscales, the Children's Depression Rating Scale-Revised, and the Young Mania Rating Scale. Over four-fifths of the sample completed the 12-week trial. Some improvement was noted across groups, but not at statistically significant levels.

A treatment based on dialectic behavior therapy is described by Goldstein and colleagues (2015). The participants were 12–18 years old, and all of the individuals had a primary diagnosis of bipolar disorder. Clients were from an outpatient clinic and were randomly assigned to the behavior therapy ($n = 14$) or psychosocial treatment as usual condition ($n = 6$). All participants also were receiving medication management independent of the study. Dialectic behavior therapy consisted of 36 sessions, half of which focused on family skills. The treatment as usual condition consisted of "eclectic" psychotherapy that was primarily supportive in nature. Target symptoms included suicidal ideation, self-injury, and emotional dysregulation. The dialectic behavior therapy groups improved more than controls on manic symptoms and emotional dysregulation.

Young et al. (2016) also describe a treatment using psychoeducational methods and omega-3 supplements. They studied 94 children 7–14 years of age in an open-label (nonrandomized or controlled) study. Outcome measures included the Clinical Global Impression-Improvement, Children's Depression Rating Scale-Revised, and Young Mania Rating Scale. The authors concluded that this approved may have some benefit for bipolar disorder, particularly for externalizing symptoms.

As just noted, the efforts to develop psychologically based treatment for children diagnosed with bipolar disorder are very limited, much more so than research on medications. A few efforts have been described in the empirical literature. Cognitive or cognitive behavior therapy is the descriptors most commonly used for these psychological approaches. Typical of this methodology is a paper by Strawn and colleagues (2016). They studied nine children and adolescents 11–15 years of age. The authors employed what they described as a mindfulness-based cognitive behavior therapy (CBT) approach. They suggest that the treatment they used enhanced brain activity in those anxious youth with parents who were diagnosed with bipolar disorder. The problem here is the sample size, the experimental design, and the indirect nature of the dependent measures.

Another CBT study is described by Knutsson, Backstrom, Daukantaite, and Lecerof (2016). Seven adolescents diagnosed with pediatric bipolar disorder and 11 parents, all in Sweden, participated. Using a case series design, the researchers focused on improving social skills, parental knowledge about how to cope with their children's problems, and family communication. The authors conclude that CBT may help in dealing with the problem areas noted alone. They also note that this intervention can be provided on an outpatient basis.

Dickstein, Cushman, Kim, Weissman, and Wegbreit (2015) advocate for using CBT in the treatment of pediatric bipolar disorder. In their review, particular emphasis is placed on training response inhibition, face processing, and cognitive flexibility. When looking at these studies, the goals for intervention vary a good deal. Having a template of psychological treatment goals would be very useful.

Cotton and colleagues (2016) also talk about using CBT. They follow a mindfulness model. These authors treated ten children and adolescents using 12 weekly sessions. Cognitive behavior therapy and mindfulness were used to enhance attention and nonjudgmental acceptance of thoughts. They reported decreases in childhood anxiety and improved parent emotional regulation. However, this was an uncontrolled study, and the results therefore must be interpreted with caution.

Early intervention for children at risk for pediatric bipolar disorder is also a topic that has received some attention. Miklouitz and colleagues (2013) studied 40 children and adolescents 9–17 years of age who had been diagnosed with bipolar disorder, major depressive disorder, or cyclothymic disorder. The primary outcome measure was the Young Mania Rating Scale. Participants were designed on educational control/treatment as usual or a 12-session psychoeducational program that was more intensive and focused on teaching communication and problem-solving skills. This more intensive and structured intervention resulted in greater improvements. Benefits were more rapid recovery from core symptoms. These improvements continued over the following year.

Miklouitz and colleagues (2011) conducted another study with a similar methodology. They studied 13 children and adolescents 10–17 years of age. All the participants had a parent with bipolar disorder, while all of the participants were diagnosed with bipolar disorder, major depression, or cyclothymic disorder. The 12-session manualized treatment described in the previous study was used here. The authors note improvements in depression, hypomania, and social behavior. A major problem with the study was that psychotropic medications were "adjusted" as needed during the course of the study. In our view this renders the results uninterpretable.

A concern with this intervention and for most of the psychologically based interventions reported is their brevity. Given the chronic nature of bipolar disorder, more extended interventions of a year or more may be in order, at least for some of the more treatment-resistant cases. Also, going from weekly sessions and abruptly stopping intervention may not be the most effective model in all instances. Gradually titrating sessions from weekly to biweekly to monthly might be another approach worth considering as a means of maximizing treatment gains over time.

Conclusions

Peruzzolo, Tramontina, Rohde, and Zeni (2013) note that there has been increased attention and research on pediatric bipolar disorder. Most of the research has been on medication, and as these authors note, the most researched area has been the use of second-generation antipsychotics. These medications have potentially very serious side effects, particularly when given at high doses and/or over long time periods. Several issues apply with respect to this drug class in particular but also to medication in general.

First, we recognized that when pediatric bipolar disorder is present, the use of medication may be unavoidable. There is enough data available at this point to suggest that a number of medications appear to have some positive effects on core symptoms of bipolar disorder.

Second, make sure the diagnosis is accurate and err on the side of under- versus overdiagnosing. This point is particularly salient when considering the data of Karanti and colleagues (2016) who discuss prescription patterns for adults with bipolar disorder. They report a dramatic uptick in the use of second-generation antipsychotics and decrease in the use of mood stabilizers alone. These patterns of drug prescription seem to apply to children and adolescents as well (Peruzzolo et al., 2013).

Third, to minimize risks, better assessment of drug side effects is needed. Also needed are protocols to minimize dosing and to titrate and terminate drug trials. This point can't be emphasized enough because often in clinical practice, once started, medications continue with no systematic attempt to follow up and adjust medications based on a systematic review of symptoms and their exposure to treatment.

Fourth, where are the psychological interventions? Very little has been done on this front, but the meager results available to date appear to be promising. Treatment development in this area should be a top priority.

Pediatric bipolar disorder has gone from a rarely diagnosed condition to one of the high-profile diagnoses in children's mental health. Given the severity and chronicity of the condition and the intrusive nature of preferred treatments, much more focus on how to enhance therapeutic effects while minimizing harm should be considered.

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Specific Phobias

Peter Muris

Contents

Introduction

> Dear doctor, all of my children were wary of dogs when they were younger, but the fear of my youngest daughter, Kim (11 years), is far more extreme. Whenever she sees one of these animals, she will start to yell and cry hysterically, clinging to me like a little baby. Over the years, the problem has gotten worse. Her fear of dogs is currently so extreme that she does not dare to go on the street anymore. If she has to go out, for example on school days, we have to survey the area first before she can cross the street (luckily our house is opposite to the school). She is able to go in our garden since we have put a fence around it, but only after we have checked it carefully. We cannot take her to the town center for shopping or to a park, and our last holiday on a campsite was a complete disaster.

This letter written by a mother provides a nice example of a child with a specific phobia. Kim displays marked and persistent fear and anxiety, and this extreme emotional reaction does not become manifest in relation to all types of stimuli and situations but specifically occurs when being confronted with dogs. In addition, fear and anxiety hinder Kim in her daily functioning, giving fear a pathological flavor and justifying the diagnosis of a clinical disorder. With a mean age of onset of 10 years (Kessler et al., 2007), specific phobias typically appear early in life. Thus, it makes sense that when interested in the pathogenesis and treatment of this anxiety disorder, one should focus on the childhood years (Ollendick & Muris, 2015). In this chapter, the knowledge on specific phobias in children and adolescents that has accumulated over the years will be summarized. First, the phenomenology of specific phobias will be addressed, followed by a brief exposé of the epidemiology of this anxiety disorder in youths. In the next section, factors involved in the etiology of specific phobias in children and adolescents will be discussed. Finally, an overview will be given of the most commonly used treatments of this condition.

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Phenomenology

The term phobia stems from the Greek word "phobos," meaning fear. Since the beginning of the nineteenth century, the term phobia was increasingly used in its current sense to denote an intense fear that is out of proportion to the stimulus or situation that provokes it. Only in 1952, phobias became a diagnostic category in the Diagnostic and Statistical Manual of Mental Disorders (DSM). In the early editions of this psychiatric classification system, all phobias were grouped together, but from DSM-III onward, simple phobias were regarded as a separate disorder that was distinct from other phobic disorders such agoraphobia and social phobia. In DSM-IV simple phobias were relabeled as specific phobias, but the criteria for defining this anxiety disorder have remained more or less the same. In the current edition of the DSM (i.e., DSM-5; American Psychiatric Association [APA], 2015), the following criteria need to be met:

A. Marked fear or anxiety about a specific object or situation.
B. The phobic object or situation almost always provokes immediate fear or anxiety.
C. The phobic object or situation is actively avoided or endured with intense fear or anxiety.
D. The fear or anxiety is out of proportion of the actual danger posed by the specific object or situation and to the sociocultural context.
E. The fear, anxiety, or avoidance is persistent, typically lasting for 6 months or more.
F. The fear, anxiety, or avoidance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
G. The disturbance is not better explained by the symptoms of another mental disorder, including fear, anxiety, and avoidance of situations associated with panic-like symptoms or other incapacitating symptoms (as in agoraphobia), objects or situations related to obsessions (as in obsessive-compulsive disorder), reminder of traumatic events (as in posttraumatic stress disorder), separation from home or attachment figures (as in separation anxiety disorder), or social situations (as in social anxiety disorder).

The DSM discerns five subtypes of specific phobias, namely animal type (e.g., dogs, snakes, spiders), blood-injection-injury type (e.g., sight of blood, needles, invasive medical procedures), natural environment type (e.g., heights, thunderstorms, deep water), situational type (e.g., airplanes, elevators, tunnels), and other type (e.g., choking, costumed characters, loud sounds). There is some empirical support for the subtyping of specific phobias in young people. For example, in a factor analytic study performed on the fear ratings of 996 children and adolescents aged between 7 and 19 years, Muris, Schmidt, and Merckelbach (1999) noted that fears clustered in three primary factors. The first factor consisted of animal phobias, the second factor contained blood-injection-injury phobias, whereas the third factor was a combination of natural environment and situational phobias.

Phobias present themselves in three response systems (Lang, 1968). That is, the marked fear and anxiety are typically accompanied by (1) subjective feelings of apprehension (e.g., fear of harm or injury, fear of losing control), (2) physical symptoms (e.g., heart rate acceleration, sweating, increased respiration), and (3) avoidance or escape behavior (e.g., evading the phobic stimulus, running away, staying close to a familiar person). There may be differences in symptom presentation across various subtypes of specific phobias (LeBeau et al., 2010). For instance, although all phobias are accompanied by subjective feelings of fear and anxiety, in some animal and blood-injection-injury phobias, strong feelings of disgust and revulsion are also present (Olatunji & McKay, 2009). In a similar vein, whereas all specific phobias are characterized by cognitions related to fear of harm or injury, there are several phobias, especially situational phobias (e.g., claustrophobia), that involve additional anxiety expectations such as fear of going crazy or fear of losing control (Craske, Mohlman, Yi, Glover, & Valeri, 1995).

Further, confrontation with the phobic stimulus usually elicits sympathetic arousal (tachycardia or increased heart rate) in most phobia subtypes, but in blood-injection-injury phobia, a biphasic physiological response pattern is typically noted (i.e., initial tachycardia followed by a bradycardia or heart rate slowing; Page, 1994).

There may also be differences in the responsivity of the three systems among phobic youths. In a study by Ollendick, Allen, Benoit, and Cowart (2011), 73 clinically referred children and adolescents with various types of specific phobias provided subjective fear ratings, participated in a behavioral approach test (BAT), and underwent a physiological recording of their heart rate. The results showed that although various indices of fear were significantly correlated with each other, there was also quite some variation with some youths being concordant and others being discordant across the three response systems. Ollendick et al. (2011) found some evidence to suggest that concordant activation of all systems is indicative for the severity of the disorder. Another example of individual differences in fear responses can be found when looking at the behavioral system. Whereas most phobic youths will try to avoid or escape from the stimulus or situation that they fear, there is a subgroup of children expressing their fear or anxiety by crying, tantrums, freezing, or clinging (APA, 2015). Again, it might be the case that these atypical behaviors are mainly found in youths with severe specific phobias, but there may also be a link with age/developmental level, children's temperament, and characteristics of the phobic stimulus or situation (e.g., imminence of threat).

Epidemiology

Anxiety disorders in general are one of the most prevalent types of psychopathology in youths (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), and among the anxiety disorders specific phobias are most common. Using the data of 14 epidemiological studies that included children and adolescents of various ages, Costello, Egger, and Angold (2004) found a point-prevalence rate of 3.6% for specific phobias. The National Comorbidity Survey-Replication that was conducted in the United States recently documented a lifetime prevalence rate of 20% among 13- to 17-year-olds (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Specific phobias of animals such as dogs, spiders, and snakes are quite frequent, and the same is true for phobias of blood, injections, and injuries and environmental phobias of heights and thunderstorms (Benjet, Borges, Stein, Mendez, & Medina-Mora, 2012).

Specific phobias tend to be more prevalent among girls than boys (with a rate of approximately 2:1; APA, 2015) and in older than younger children (e.g., Ollendick, King, & Muris, 2002). Further, in nonclinical samples, specific phobias often occur in isolation without the presence of other comorbid problems. This is different in clinical populations where the majority of the youngsters with specific phobias also meet the diagnostic criteria of other psychiatric disorders. For example, in an older study by Last, Strauss, and Francis (1987), it was found that 64% of the children and adolescents with a primary diagnosis of a specific phobia also presented with one or more additional diagnoses including generalized anxiety disorder, social anxiety disorder, obsessive-compulsive disorder, panic disorder, major depressive disorder, dysthymia, and oppositional defiant disorder.

The results regarding the continuity of childhood specific phobias indicate that this anxiety problem is not always stable over time. For example, in a study by Last, Perrin, Hersen, and Kazdin (1996), it was found that 31% of the children and adolescents with an initial diagnosis of a specific phobia on time 1 no longer fulfilled the diagnostic criteria at a 3- to 4-year follow-up. However, in comparison with other anxiety disorders (such as separation anxiety disorder and social anxiety disorder), this recovery percentage was quite modest, leading the authors to conclude that specific phobias represent one of the most persistent anxiety problems. Recent evidence also showed that specific phobias in young people are a "precursor" disorder predicting the subsequent onset of other types of psychopathology (Lieb et al., 2016).

Etiology

Some scholars assume that specific phobias are inborn, evolutionary prepared responses that protect children against environmental threats. Briefly, this preparedness account assumes that evolution has selected for fear and avoidance of certain stimuli (e.g., snakes, spiders, water, heights) to protect the defenseless young offspring of human beings (Seligman, 1971). Although this theory has attracted a lot of research attention (McNally, 1996), questions remain about its empirical validity. An alternative account for the etiology of specific phobias adopts a developmental psychopathology perspective. In this view, children's phobias are in essence normal developmental fears that due to an interaction of genetic vulnerability and detrimental learning experiences have radicalized into a persistent anxiety problem (Muris, 2007; Muris & Field, 2011; Muris & Merckelbach, 2001; Muris, Merckelbach, De Jong, & Ollendick, 2002). It is important to keep in mind that the origins of specific phobias cannot be explained by a single process. This is illustrated in the next paragraphs of this section in which I will discuss a number of pathogenic factors, including genetic influences, aberrant brain processes, temperament, negative learning experiences, avoidance, and cognitive biases.

Genetic Influences Few behavioral-genetic studies have been conducted to explore the role of heritability in specific phobias of children and adolescents. A notable exception is the investigation by Lichtenstein and Annas (2000) who employed parent report data of specific fears and phobias in 1106 pairs of 8–9-year-old Swedish twins. The results indicated that the total concordance of specific phobia was significantly higher in monozygotic than in dizygotic twins (52% versus 25%), which produced an overall heritability estimate of 65%. Further analysis conducted on the separate phobia types revealed that the genetic contribution was larger in animal (58%) and situational/environmental phobias (50%) than in blood-injection-injury phobias (28%). These results are reasonably in line with what is generally found in comparable studies conducted in adult populations (Van Houtem et al., 2013) and indicate that specific phobias are at least in part heritable.

Aberrant Brain Processes In recent decades, considerable advancements have been made with the study of brain processes in individuals suffering from specific phobias. This research has mainly been conducted with adults using a symptom provocation procedure. During such a procedure, the phobic individual is exposed to, for example, a picture of fear-relevant stimulus, while a scanner assesses the activation in various areas of the brain. By comparing these data to those obtained for healthy control participants, it is possible to detect aberrations in the brain processing of fear. Typically, this type of studies demonstrate that individuals with a specific phobia show more activation in the brain areas that are involved in the perception and early amplification of fear – including the formation of an autonomic arousal response – such as the amygdala, anterior cingulate cortex, thalamus, and insula. At the same time, brain areas in the prefrontal cortex, which are normally activated in healthy controls to regulate fear, are less activated in individuals with a specific phobia (see for a review Del Casale et al., 2012). Altogether, this suggests that at a structural brain level, individuals with a specific phobia are more easily and more strongly aroused when being confronted with fear-relevant stimuli, while they have less capability to regulate this hyperactivation.

Temperament Behavioral inhibition refers to the habitual tendency of some youths to interrupt ongoing behavior and to react with distress and withdrawal when confronted with unfamiliar stimuli and situations (Kagan, 1994). For children many stimuli and situations are novel, and so it is well-conceivable that those who score high on behavioral inhibition are particularly prone to show more intense fear reactions and to engage in avoidance. An investigation by Biederman, Rosenbaum, Bolduc, Faraone, and Hirshfeld (1991) has indicated that young children with this temperamental disposition indeed are at higher risk for developing anxiety problems and that this is also true for specific phobias. In this study, a structured clinical interview was used to assess anxiety disorders in two samples of children: an at-risk sample of children of adult patients with panic disorder and agoraphobia and a longitudinal cohort of children who had been followed from a very young age. In both samples, it was found that inhibited children showed significantly more anxiety disorders than the uninhibited children, and the difference was particularly clear-cut for generalized anxiety disorder (in the at-risk sample) and specific phobias (in the longitudinal cohort). Interestingly, when the combined samples were reassessed at a follow-up of 3 years, it was noted that inhibited children displayed a marked increase in specific phobias and other anxiety disorders (Biederman et al., 1993). In another study by Muris, Merckelbach, Wessel, and Van der Ven (1999), adolescents aged 12–14 years were provided with a definition of behavioral inhibition and then asked to identify themselves as low, middle, or high on this temperament characteristic. In addition, the young adolescents completed a standardized questionnaire of anxiety disorder symptoms that included separate scales for the main types of specific phobias (i.e., animal, situational/environmental, blood-injection-injury). The results indicated that children in the high behavioral inhibition group more often reported specific phobia symptoms than did children in the low and middle behavioral inhibition groups. It is good to keep in mind that behavioral inhibition might be the observable manifestation of the genetic/biological liability to specific phobias that has been described in previous paragraphs.

Conditioning and Other Learning Experiences Environmental influences are also thought to play a crucial role in the etiology of specific phobias. In this context, conditioning experiences are particularly relevant. The well-known case study of Little Albert (Watson & Rayner, 1920) nicely demonstrated that it is possible to instill a phobia in a healthy child via classical conditioning. An 11-month-old boy was exposed to a white rat and initially the toddler showed no fear for this animal. This changed after the experimenters paired the presentation of the rat with an aversive loud noise (the unconditioned stimulus or UCS) that was produced by striking a steel bar hideously behind the boy's back, and which caused him great fright (the unconditioned response or UCR). After five such experiences, Albert became very upset (the conditioned response or CR) by the sight of the white rat, even without the presentation of the loud noise. Obviously, the fear originally associated with the loud noise was now elicited by the previously neutral stimulus, the white rat (now the conditioned stimulus or CS).

There are certainly some children for which their specific phobia can be explained by a distinct aversive conditioning event (Dadds, Davey, & Field, 2001), but in many cases the learning history of a phobia is much more complicated. This is nicely illustrated in a study by Ten Berge, Veerkamp, and Hoogstraten (2002) who explored the treatment history of children with varying levels of dental fear. The results indicated that high and low fearful children did not differ with regard to the number of aversive, curative treatments (potential conditioning events). The most important difference was that low fearful children had experienced more innocuous dental visits before their first curative treatment took place as compared to high fearful children. Apparently, previous neutral experiences with a CS immunize against the impact of an aversive event, a phenomenon that has been labeled as latent inhibition. Further, Ten Berge et al. noted that children's personal emotional reactions to the curative treatment enhanced the aversiveness of the UCS (UCS inflation), which suggests that subjective perceptions of threat play a decisive role during fear conditioning. Both latent inhibition and UCS inflation fit well with the current theoretical perspective that fear conditioning should not be viewed as simple, reflex-like stimulus-response learning but rather as a process during which individuals learn that one stimulus (the CS) is likely to predict the occurrence of another stimulus (the UCS), which in turn will elicit a CR under certain conditions (Field, 2006).

Classical conditioning requires that the person has had direct experience with the CS and the UCS, but fears and phobias can also be learned by observing other people's responses to a stimulus or situation (modeling) or by hearing that a stimulus or situation might be dangerous or has some other negative connotation (negative information transmission; Rachman, 1991). Evidence for these indirect learning pathways mainly comes from experimental laboratory studies. For example, Gerull and Rapee (2002) examined the role of modeling in children's fear acquisition in 15- to 20-month-old toddlers who were confronted with novel rubber toy spiders and snakes. During the experiment, mothers were also present and instructed to display either a positive or a negative facial expression, while their offspring was exposed to the toy animals. The results showed that toddlers whose mothers displayed a negative facial expression were more fearful and more hesitant to approach the toy animals than toddlers whose mothers had exhibited a positive facial expression.

Field, Argyris, and Knowles (2001) were the first to investigate the negative information pathway using a paradigm in which children aged 7–9 years received either negative or positive information about two unknown monster dolls. Results indicated that fear-related beliefs changed as a function of the verbal information: Negative information increased children's self-reported fear, whereas positive information decreased their fear level. Subsequent research has shown that negative information transmission has fear-enhancing effects in all fear modalities (i.e., subjective, physical, behavioral; Muris & Field, 2010) and is also involved in the transfer of fear from parents to offspring (Muris, Van Zwol, Huijding, & Mayer, 2010). However, for both modeling and negative information transmission, it remains to be demonstrated that they are sufficiently powerful to produce clinical levels of phobic symptoms.

Avoidance and Cognitive Biases Behavior therapists assume that avoidance is the key mechanism in the conservation of phobic fear. That is, avoidance serves to minimize direct and prolonged contact with the phobic stimulus or situation and hence does not allow the phobic person to learn that the CS is in fact harmless. Meanwhile, by evading the phobic stimulus or situation, subjective feelings of fear and physiological arousal decrease, thereby negatively reinforcing the avoidance behavior (Ollendick, Vasey, & King, 2001). Especially in children, parents seem to play an important role in either the continuation or elimination of avoidance behavior of their offspring. For example, Ollendick, Lewis, Cowart, and Davis (2012) found that clinically referred youths with a specific phobia, who had to approach the phobic object in a stepwise manner (i.e., behavioral approach task), were in general less avoidant when one of their parents was present as compared to when they had to conduct the approach task on their own. However, parent characteristics had an impact on children's performance: when their parent was less warm and less involved during the task, children displayed higher levels of avoidance.

Cognitive biases are also thought to be involved in the maintenance of specific phobias. These biases reflect enhanced processing of fear-related information, which fuel the phobic fear over and over again. A nice example is attention bias, which refers to phobic individuals' hypervigilance in the perception of threat cues. Martin, Horder, and Jones (1992) were one of the first to demonstrate that this type of bias is present in phobic youths. Using a modified version of Stroop task, these researchers found that spider fearful children, as compared to non-fearful controls, displayed slower response times when they were asked to color-name spider-related words (e.g., "web") but not when they had to color-name neutral words (e.g., "fly"). Another type of bias that operates in specific phobias is covariation bias, which is concerned with a tendency to overestimate the association between fear- and phobia-related stimuli (CS) and negative outcomes (UCS). In an experiment conducted by Muris, Huijding, Mayer, Den Breejen, and Makkelie (2007), first evidence was obtained for the existence of this type of bias in youths. Children and adolescents aged 8–16 years played a computer game during which they were exposed to pictures of spiders (i.e., negative fear-relevant stimulus), guns (i.e., negative fear-irrelevant stimulus), and flowers (i.e., neutral control stimulus). Following each picture, a smiley was generated by the computer signaling an outcome: a happy smile indicated that the child had won three pieces of candy, and a sad smiley indicated that the child had lost three pieces of candy, whereas a neutral smiley signaled no positive or negative consequences. The pictures were shown in a random order, and the computer game was programmed in such a way that each picture type was equally often followed by a happy, sad, or neutral smiley. After the computer game, children were asked to provide estimates on the observed contingencies between the three picture types and various outcomes. Results indicated that children in general displayed an inclination to link the negative outcome to negatively valenced pictures (i.e., they believed that they had more often lost candy following pictures of spiders and guns). Most importantly, the findings also demonstrated that this covariation bias was modulated by fear. That is, spider fearful youths showed a stronger tendency to specifically associate the spider pictures with a negative outcome (i.e., losing candy).

Treatment

Exposure is generally regarded as the key element in the treatment of specific phobias, and there is sufficient evidence from controlled treatment outcome research indicating that exposure-based treatments are indeed effective in reducing fear and anxiety in phobic children and adolescents. Exposure-based treatment of childhood phobias can be delivered in many ways, and below I will summarize a number of commonly employed variants.

Systematic Desensitization Based on the idea that two emotional states cannot occur simultaneously, Wolpe (1958) developed the treatment approach of "systematic desensitization," during which fear and anxiety elicited by a phobic stimulus are terminated by a previously learned relaxation response. Briefly, Wolpe assumed that a response antagonistic to anxiety (e.g., physiological relaxation) inhibits the emotional fear response. Various studies have demonstrated that systematic desensitization yields positive effects when treating phobic youths, and this is especially true when real-life exposure to the phobic stimulus is used to provoke fear and anxiety during the therapeutic procedure. For example, Ultee, Griffoen, and Schellekens (1982) divided 24 water-phobic children aged between 5 and 10 years in 3 groups: (1) an in vitro desensitization group in which children received gradual imaginal exposure to fear-evoking stimuli plus relaxation, (2) an in vivo desensitization group in which children were treated with gradual real-life exposure in combination with relaxation, and (3) a no-treatment control group. The results indicated that both desensitization procedures were effective in reducing children's fear of water, whereas no such effect could be observed in the no-treatment condition. Further, evidence was found showing that in vivo exposure yielded better treatment effects than in vitro exposure. In spite of the fact that various other studies have documented positive effects of systematic desensitization in the treatment of childhood phobias, this type of intervention seems somewhat outdated. This is because research has demonstrated that Wolpe's (1958) basic ideas about the underlying mechanism of systematic desensitization are not correct. In fact, there is clear evidence showing that the relaxation component of this treatment is not necessary to achieve the positive effects of the intervention.

Systematic desensitization pairs exposure with relaxation, but it is good to note that for some specific phobias, this type of treatment is less applicable. As noted earlier, blood-injection-injury phobias are typically accompanied by a biphasic physiological response pattern (i.e., initial tachycardia followed by a bradycardia or heart rate slowing), which may result in a fall of blood pressure and ultimately fainting. For these phobias, it appears preferable to combine exposure with muscle tension exercises. This treatment, also known as applied tension, prevents the blood pressure drops and the individual is capable of maintaining the exposure to blood and other prototypical stimuli (e.g., needles; Öst & Sterner, 1987). In children and adolescents, there is still little evidence for the efficacy of the applied tension technique. A protocol for treating blood-injection-injury phobias in youths (Oar, Farrell, & Ollendick, 2015) prescribes psychoeducation about fainting and the use of simple coping strategies such as lying down, drinking cool water, and wiggling one's toes as ways of dealing with the physiological symptoms of these phobias. Obviously, this intervention might further profit from the inclusion of applied tension exercises.

Emotive Imagery Although the therapeutic procedure of systematic desensitization is less frequently employed nowadays, it is of interest to note that there is an age-downward variant that may still be feasible to apply, in particular when working with younger children. This technique has been described as "emotive imagery" (Lazarus & Abramovitz, 1962). An important feature of the emotive imagery procedure is that the child identifies himself with a "personal hero" (usually a person or cartoon character seen on television) and then makes up a narrative, in which the phobic stimulus is gradually introduced. After the imaginal exposure, during which the child – supported by the personal hero – effectively deals with the phobic stimulus, he/she is encouraged to apply these newly learned skills in real-life situations (King, Molloy, Heyne, Murphy, & Ollendick, 1998). In an attempt to examine the effectiveness of emotive imagery, Cornwall, Spence, and Schotte (1996) assigned 24 clinically referred 7- to 10-year-old children with a severe darkness phobia to either emotive imagery treatment or a waiting-list control condition. The results demonstrated that children in the emotive imagery group showed significant reductions in self-reports of darkness fear and clear improvement on a darkness tolerance test, whereas no such effects were observed in the waiting-list control group.

Participant Modeling As noted in the Etiology section, modeling represents one way through which children can acquire a fear or phobia. However, modeling can also be exploited therapeutically by asking children to observe a nonfearful person who approaches the phobic stimulus without displaying any fear. This procedure can be conducted in various ways. The first way is filmed modeling, during which the child watches a film in which a model interacts with the phobic stimulus. The second way is live modeling: the phobic child observes a real model interacting and dealing with the phobic stimulus. Finally, during participant modeling, the child and the model work together: the model demonstrates how to approach and deal with the phobic stimulus and then instructs the child to imitate this behavior. There is some research comparing the relative efficacy of these modeling variants. For example, Menzies and Clarke (1993) assigned 3- to 8-year-old children with water phobia to various interventions involving exposure, live modeling, or a combination of these two procedures (which can best be viewed as a variant of participant modeling). Most importantly, this study demonstrated that modeling merely yielded significant treatment effects when combined with exposure exercises. Clearly, this finding can be taken as support for the notion that participant modeling is more effective than live modeling (Ollendick, Davis, & Muris, 2004).

Reinforced Practice During "reinforced practice" (also known as "contingency management"), an attempt is made to weaken the negative associations with the phobic stimulus that result in avoidance behavior by strengthening positive associations through reinforcement of approach behavior. This is achieved via exposure exercises during which successful approaches of the phobic stimulus are reinforced by means of rewards. There is ample evidence supporting the efficacy of reinforced practice in treating phobic children and adolescents. For example, Silverman et al. (1999) treated 33 6- to 16-year-old youths with phobic disorders by means of a reinforced practice program during which children had to perform increasingly difficult exposure tasks that were reinforced by their parents every time they completed a task successfully. Results revealed that this treatment program was equally effective in reducing fear and anxiety levels as a cognitive-behavioral intervention. Further, it was found that the positive treatment effects of reinforcement practice were largely maintained at a 1-year follow-up. In terms of clinical significant improvement, it was found that more than half of the youths (55%) no longer met the diagnostic criteria of a phobic disorder after the completion of the treatment.

Cognitive Behavioral Therapy (CBT) CBT is an intervention that has been originally developed for children and adolescents with anxiety disorders in general, but that can also be employed in youths with specific phobias (Kendall, 1994). A key element of this treatment is exposure to the feared stimuli and situations, but CBT also incorporates a range of other behavioral and cognitive techniques (including relaxation, positive self-talk, cognitive restructuring, reinforcement, etc.) that may be helpful to reduce fear and anxiety. Although CBT is thought to be particularly appropriate for major anxiety disorders (e.g., social anxiety disorder, separation anxiety disorder, and generalized anxiety disorder; Rapee, Schniering, & Hudson, 2009), this intervention has certainly proven useful in the treatment of children and adolescents with specific phobias (Ollendick & King, 1998).

One-Session Therapy (OST) OST consists of a single, 3-h session of graduated hierarchical exposure in combination with elements of psychoeducation, participant modeling, reinforced practice, skills training, and cognitive restructuring (Öst, 2012). The therapist first provides a rationale for the treatment and identifies the child and therapist as a "team" who are working together to overcome the child's fear. Treatment is comprised of a series of behavioral "experiments" during which the child is encouraged to approach the feared stimulus while thinking of him- or herself as a "scientist" or "detective" who is testing out phobic cognitions. The therapist acts as a model demonstrating how to handle the fearful situation, kindly encouraging the child to participate in the exercises, and providing reinforcement following successful approach behavior. Öst, Svensson, Hellstrom, and Lindwall (2001) tested the effectiveness of one-session therapy in a large sample of children and adolescents ($N = 60$) with various types of specific phobias. For this purpose, youths were randomly assigned to (1) regular one-session therapy, (2) one-session therapy with one of the child's parents present, or (3) a waiting-list control group. Various outcome measures were used including self-report inventories, independent assessor ratings, a behavioral approach test, and physiological indexes (e.g., blood pressure, heart rate), most of which were obtained at pretreatment, posttreatment, and 1-year follow-up. The results consistently showed that one-session therapy produced significantly better results than the waiting-list control condition. Further, both variants of the one-session therapy did equally well on most outcome measures, indicating that the presence of a parent did neither promote nor hinder the treatment effects. Finally, the treatment effects of OST were maintained at a follow-up of 1 year. Other studies have shown that this type of treatment is also more effective than other psychological interventions (Muris, Merckelbach, Holdrinet, & Sijsenaar, 1998; Ollendick et al., 2009), and so the conclusion seems justified that this type of intervention is highly effective for treating phobias in children and adolescents (Davis, Jenkins, & Rudy, 2012).

A final note on treatment concerns the involvement of parents in the intervention of children with specific phobias. The evidence described in the section on the etiology clearly suggests that parents can be involved in the onset and maintenance of specific phobias, and so it seems logical to assume that this family factor also needs to be addressed in the treatment of this anxiety problem. However, up till now, there is little support for this proposition. For instance, a study by Ollendick et al. (2015) compared the efficacy of regular OST (that only focused on the child) with that of a parent-augmented OST in 97 youths aged 6–15 years diagnosed with at least one specific phobia. Both treatment conditions produced similar outcomes, with approximately 50% of the children and adolescents being diagnosis-free and judged to be much to very much improved. At a 6-month follow-up, the child-only OST was found to be slightly better that the intervention that also involved parents, but the main conclusion was that "parent augmentation of OST produced no appreciable gains in treatment outcomes" (p. 141).

Back to the case of Kim, the 11-year-old girl described in the introduction, after making the classification of a specific phobia – animal type – it was decided to treat the girl with OST. The therapist first explained the basic idea behind the intervention and then together with Kim created a fear hierarchy consisting of dreaded situations with dogs. Treatment started with a small mild-tempered dog (a Bichon Frisé): a series of steps was carried out, beginning with entering the room and standing 3 m from the animal that was caged in a bench and ending with standing next to the dog and petting it. Each step was first modeled by the therapist, who while performing the step carefully described the animal's benign behavior in an attempt to correct Kim's dysfunctional thoughts about dogs. Next, the therapist encouraged the girl to conduct the step herself, and if she succeeded in doing so, she received a small reward (i.e., a sticker; at the end of the intervention, these stickers were awarded with a price, a stuffed toy dog). After a hesitating start, Kim successfully completed the full hierarchy with the small dog within 1 h. Following this, a larger dog (a golden retriever) was introduced and again the full fear hierarchy was conducted. It took Kim 45 min to carry out all the steps. During the final part of the OST, Kim did some additional exercises with the purpose to generalize the newly acquired skills with dogs to other more "natural" situations, for example, entering a room with an unleashed dog, walking the dog, staying calm when the dog starts barking, and demonstrating her father and mother how she played with the dog. Within one 3-h session, Kim was capable of "handling" both animals. Three months later, a telephone call revealed that the girl's phobic complaints were still largely in remission: she dared to go alone outside on the street and did not panic when she was unexpectedly confronted with dogs. Following the therapist's instructions, her parents encouraged her to approach the animals, which she occasionally (but not always) did.

Conclusion

Specific phobias comprise a class of anxiety disorders that frequently occur in children and adolescents. This psychiatric condition is characterized by marked fear of a specific stimulus or situation, which are typically linked to a number of select categories (i.e., animal, blood-injection-injury, situational, environmental, and other). The fear manifests itself in three response systems (i.e., subjective/cognitive, physiological, and behavioral) and is excessive and unreasonable, thereby hindering the young person's daily functioning. Specific phobias tend to have a multi-facet origin, involving various genetic/biological, temperamental, and environmental risk and vulnerability factors, and are maintained by avoidance and various types of cognitive biases. The effective treatment is straightforward and usually involves some kind of exposure to the feared stimulus or situation, preferably in vivo. In this way, young people like Kim can be successfully rescued from their phobic fear, ultimately raising their chances to have a normal life and a more healthy development toward adulthood.

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Treatment of Anxiety Disorders

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Treatment of Anxiety Disorders

Anxiety is a normal emotional and behavioral response that occurs across development and serves an adaptive function. According to Lang's (1979) tripartite model, physiological responses (e.g., sweating, elevated heart rate), behaviors (e.g., enduring a situation with distress, avoiding situations that provoke anxiety), and negative cognitions (e.g., thoughts about the worst possible outcomes of the feared stimuli, environment, or situation) all interact to produce the anxiety and fear response. These components may occur together in varied intensities. When individuals experience severe anxiety and fear that impairs daily functioning, these problems are classified as anxiety disorders. Individuals with anxiety disorders experience excessive fear or worry, usually an immediate physiological response (e.g., increased heart rate), dysfunctional beliefs, and avoidance of certain situations and/or stimuli. These disorders impact the ability to function properly in several contexts (e.g., family, school, peer relationships, occupation; American Psychiatric Association, 2013). The lifetime prevalence of any anxiety disorder is estimated to be approximately 30%, and the 12-month prevalence rate for children and adolescents is about 1–7%, with variability across the different anxiety disorders (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Thus, the demand for effective treatments is incredibly high. In order to better understand and effectively treat anxiety, research initiatives, including those to recommend "evidence-based practice" (EBP) guidelines in psychology and to further identify "empirically supported treatments" (EST), have begun to systematically gather and evaluate the evidence for psychological treatments of individuals affected by anxiety disorders. This chapter will focus on treatments for some of the

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DSM-5 categories for anxiety and obsessive-compulsive disorders (i.e., separation anxiety disorder, social anxiety disorder, selective mutism, panic disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder; for information on specific phobia, see chapter "Tics and Tourette Syndrome").

Children with anxiety disorders are likely to experience significant impairments in broad areas of functioning. Many children are initially referred to treatment due to concerns about academic functioning, which is significantly correlated with anxiety severity across race, gender, and age (Nail et al., 2015). Academic functioning is also positively correlated with global functioning, suggesting that children's academic functioning may greatly impact other areas of their functioning. Notably, both anxiety severity and academic impairments have been found to decrease with treatments such as cognitive behavioral therapy (Nail et al., 2015).

It has also been noted that the level of impairment may differ not only across anxiety severity but also across disorders (see Table 1 for more information on select anxiety disorders). Researchers have found that both adults and children with certain anxiety disorders [i.e., generalized anxiety disorder, social anxiety disorder, and panic disorder] have less satisfaction with their overall quality of life as compared to non-anxious individuals (Barrera & Norton, 2009; Ramsawh & Chavira, 2016). Naragon-Gainey, Gallagher, & Brown (2014) assessed the degree to which symptoms of anxiety interfered with five different areas of daily functioning (i.e., private leisure, work, household tasks, social leisure, family relationships) throughout a period of 2 years. When comparing treatment-seeking individuals with diagnoses of generalized anxiety disorder, social anxiety disorder, and/or panic disorder, results suggested that individuals with a primary diagnosis of generalized anxiety disorder experienced the most impairment at baseline. While anxiety symptoms and impairment in all groups declined over time with treatment, change in severity of symptoms of generalized anxiety disorder was most specifically related to change in impairment. This finding has important implications for treatment, as it suggests that when treating individuals with comorbid anxiety disorders, clinicians may wish to focus on treatment of generalized anxiety disorder symptoms first. Clinicians may also treat symptoms of generalized anxiety transdiagnostically in order to have the largest effects on severity and impairment of functioning.

Table 1 Characteristic symptoms of select anxiety disorders

Disorder	Description
Separation anxiety disorder	Persistent worry, disproportionate concern, and distress about separating from an attachment figure or from the home; worries may include harm befalling on the parents, the child him-/herself, or the home when separated or fears that the parent will never return
Social anxiety disorder	Intense distress/fear in or anxiety about social situations or performances in which the primary concern is negative evaluation from others, typically leading to the avoidance of those situations
Generalized anxiety disorder	Persistent, uncontrollable worry across multiple domains (e.g., doing things perfectly, making good impressions on others, performance, world events) occurring more days than not that is associated with the presence of at least one physical symptom (e.g., aches and pains, feelings of restlessness, trouble concentrating)
Panic disorder	Usually unexpected anxiety reaction (i.e., panic attack) leading to intense physiological symptoms (e.g., heart palpitations, sweating, shortness of breath); the person may experience significant worry and concern about these reactions and avoid situations where these reactions could occur
Selective mutism	Consistent failure to speak in certain situations where the person is required to do so due to debilitating fear; the behavior causes significant impairment in academic, occupational, and/or social settings
Obsessive-compulsive disorder	Persistent and distressing obsessions (thoughts or impulses) and/or compulsions (repetitive compensatory behaviors) that significantly impair functioning for at least an hour per day

Developmental and (Trans) diagnostic Considerations

The prevalence, phenomenology, and etiology of a child's anxiety are often dependent on the child's developmental stage. For example, younger children are much more likely to develop separation anxiety than a more generalized worry due to developmental (particularly cognitive) constraints (Gullone, 2000). Younger children may experience fear only in the moment of separation without also experiencing the typically occurring persistent worry following the separation. As these children get older and their cognitive abilities become more advanced, future-oriented worries about specific dangers (e.g., accidents, kidnapping, death) or vague concerns about families not reuniting may emerge. In general, children tend to move from more specific, concrete fears (e.g., separation, loud noises) to more abstract anxiety and worries (e.g., criticism, anticipatory worries, war) as their cognitive abilities develop (Gullone, 2000). Another important developmental consideration includes the child's language abilities, which may facilitate or contribute to anxiety in social situations. For example, selective mutism often has an early onset (i.e., on or near initial entry into school), and research has suggested that children with selective mutism may experience expressive language deficits compared to their peers, contributing to anxiety in social situations (McInnes, Fung, Manassis, Fiksenbaum, & Tannock, 2004). Similarly, the onset of social anxiety disorder (formally known as social phobia) is usually much later in childhood, when peers are of greater importance to the child and peer rejection becomes an increasingly salient stressor (Coie, Dodge, & Kupersmidt, 1990).

Etiology of Anxiety and Anxiety Disorders

Most researchers agree that anxiety disorders develop through a complex integration of biological, cognitive, and environmental factors. These factors may change in prominence in the maintenance of anxiety disorders not only across child development but also across the life-span. Thus, these biological, cognitive, and environmental factors are important to dissect individually in order to further understand their relations to each other across development and to treatment outcome.

Temperamental Differences

Behavioral inhibition, or the tendency to withdraw from or be fearful in unfamiliar situations, is often discussed as a contributing factor to the development of anxiety disorders. Biederman and colleagues (2001) suggested that children aged 2–6 years who were classified as "behaviorally inhibited" were more likely to develop anxiety disorders than their peers without behavioral inhibition. Children are more likely to be behaviorally inhibited if one or more parent(s) has an anxiety disorder (e.g., agoraphobia and/or panic disorder) themselves (Hirshfeld, Biederman, Brody, Faraone, & Rosenbaum, 1997; Rosenbaum et al., 1992). These results are an example of the high rates of parental psychopathology seen across children with anxiety disorders, presenting questions about the roles of genetics and parenting styles.

Biological Differences

Genetic There is substantial evidence that children who have a parent (or parents) with anxiety are more likely to develop anxiety disorders themselves. Studies on the etiology of internalizing disorders suggest that approximately 30% of variance in anxiety can be explained by genetic factors (Schrock & Woodruff-Borden, 2010). Large-scale studies have identified genetic factors that account for about half of the genetic variance across anxiety disorders (Middledorp, Cath, van Dyck, & Boomsa, 2005). Notably, the level of genetic vulnerability is inconsistent across studies of broad anxiety disorders, as well as within different anxiety disorders. Some researchers have been able to find specific candidate genes in specific anxiety disorders (e.g., associates with the serotonergic (5-HT) and dopaminergic pathways in social anxiety disorder, SAPAP3 variants in obsessive-compulsive disorder; Boardman et al., 2011). However, similar studies have been unsuccessful in finding the same specific genes associated with specific disorders; due to this inconsistency, some researchers believe these genes reflect the general familial predisposition to anxiety as opposed to a specific gene-to-disorder match (Knappe, Sasagawa, & Creswell, 2015). Within genetic studies, there are underlying biological and temperamental vulnerabilities that should be noted (e.g., Hirshfeld et al., 1997; Rosenbaum et al., 1992; the abovementioned studies that found that behavioral inhibition is more common in children of parents with anxiety disorders).

Neurological Youth with anxiety disorders may show a biological predisposition to an increased vigilance for threat, which can be demonstrated through neuroimaging research. Monk et al. (2008) found that children and adolescents with a diagnosis of generalized anxiety disorder were more likely than comparison peers without a psychological/psychiatric diagnosis to show right amygdala hyperactivation in response to rapidly presented threatening stimuli. Although such studies are still preliminary in nature, there is some evidence to suggest that youth with a “behaviorally inhibited” temperament show heightened striatal reactivity in the caudate nucleus and the putamen region, suggestive of increased sensitivity to rewards, heightened vigilance toward evaluation their performance, and excessive valuing of positive outcomes (Caouette & Guyer, 2014). Individuals with anxiety disorders may also have deficits in inhibitory learning, which prevents the extinguishing of an anxious response, even after repeated experiences with the object of the fear or anxiety (Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014). These findings might explain the maintenance of anxiety if and when youth experience a negative interaction with an anxiety-provoking stimulus and additionally suggest a powerful target for treatment. Similarly, children with social anxiety disorder may exhibit different physiological responses associated with fear pathways compared to non-anxious children. For example, children with social anxiety disorder display indicators of higher baseline sympathetic activity and lower parasympathetic activation (Krämer et al., 2012; Schmitz, Krämer, Tuschen-Caffier, Heinrichs, & Blechert, 2011). Similarly, children with anxiety disorders have even been found to have lower scores on IQ tests than children without psychopathology (Davis, Ollendick, & Nebel-Schwalm, 2008), and the combination of anxiety and attention-deficit/hyperactivity disorder has been shown to lead to greater impairment than simply attention-deficit/hyperactivity disorder alone (e.g., working memory impairments; Jarrett, Wolff, Davis, Cowart, & Ollendick, 2016).

Environmental Differences

The differences in environment between youth with and without anxiety disorders have also been the focus of much research. Specifically, the family environment has been of great interest due to both the amount of time children spend in the home and the significant influence family environment has on the child. This environment may be even more influential if the environment is characterized as “high risk” (Burt, 2009). Relevant factors within the family environment to consider include parental anxiety, parental control, parental modeling, attachment styles, and stressors such as low socioeconomic status (Ollendick & Benoit, 2012).

Parental Anxiety An anxious parenting style, including displaying excessive worry and concern about children’s safety, may increase children’s symptoms of anxiety; however, this effect was only found when children reported perceiving their parents’ anxiety level (Grüner, Muris, & Merckelbach, 1999). Researchers have investigated the impact of parental anxiety alone on child anxiety, after controlling for family size, socioeconomic status, child birth order, parental education level, and parental occupation. Results suggest that parental anxiety is associated with less parental communication with children and a more controlling parenting style. Thus, the parent-child relationship was less warm and affectionate, and children reported more feelings of disappointment, rejection, and unhappiness. Children with anxious parents also exhibited more withdrawn behavior than children without anxious parents; this withdrawn behavior had a negative impact on academic functioning, extracurricular activities, and social skills. These findings suggest that parental anxiety can even affect the child's ability to establish future secure relationships (Rao & Ram, 1984).

Anxiety in adults may hinder the development of adaptive coping skills, which may cause anxiety-enhancing parenting behaviors such as modeling avoidance of unknown or unfamiliar situations (Ginsburg & Schlossberg, 2002). Additionally, anxious parents may have a tendency to interpret ambiguous or novel situations as threatening for their children, perhaps leading to increased control as a means of ensuring avoidance of these situations (van der Bruggen, Stams, & Bögels, 2008). Rapee (2001) suggested parents may grow accustomed to making decisions for their anxious children, eventually exerting control in anticipation of their anxious child's distress. While these parental behaviors prevent the child from experiencing anxiety-related distress, they also serve to exacerbate and maintain the child's anxiety.

Parental control Parental control may contribute to the development and/or maintenance of childhood anxiety by increasing the child's perception of threat; for example, children may observe their parent(s) taking over for them in situations and conclude that the situation must be too dangerous or risky for them to navigate on their own (Rapee, 2001). Subsequently, high levels of parental control may reduce the child's perceived control over threat, decreasing the child's confidence and perceived competence. Additionally, parental overcontrol reduces the number of opportunities a child has to explore their environment and obtain and practice appropriate coping skills (van der Bruggen et al., 2008). While parents may wish to protect their children from anxiety-provoking or distressing situations, children need opportunities to test hypotheses and coping strategies; after all, it is only through experience that children learn what situations they can and cannot navigate independently. For example, a child with a predisposition to fear dogs may not have the opportunity to interact with dogs, understand what distinguishes a friendly dog from an unfriendly dog, and test out his own capacity to tolerate fear if the child's overcontrolling parent limits or abbreviates the child's interactions with dogs due to a desire to reduce the child's anxiety-related distress (cf. Davis, Ollendick, & Öst, 2009, 2012).

There is a strong theoretical foundation for the linkages between parental anxiety, child anxiety, and parental control, suggesting that parents who are anxious seek to exert control in unknown or uncertain situations, thereby increasing the child's level of anxiety in these situations (Wood, McLeod, Sigman, Hwang, & Chu, 2003). A meta-analysis of 17 studies examined the connection between child anxiety and parental control, finding a medium-to-large and significant effect size of $d = 0.58$ (CI $0.51 < d < 0.64$; van der Bruggen et al., 2008). These findings strongly suggest higher levels of child anxiety are associated with higher levels of parental control. Further research has indicated that parenting variables, such as parental control and parental warmth, may account for approximately 4% of the variance in child anxiety (McLeod, Weisz, & Wood, 2007).

Parental modeling Parents may model anxiety for their children through their own behaviors (e.g., worrying aloud; screaming, crying, or panicking when encountering feared stimuli or situations; avoiding feared, unfamiliar, or uncertain stimuli or situations), through relaying negative information (e.g., suggesting an abundance of threat, providing incomplete or skewed information on the likelihood that a negative outcome might occur), and/or through reinforcing their children's avoidant behavior (e.g., allowing their children to escape or avoid encountering feared, unfamiliar, or uncertain stimuli or situations).

This theory of parental modeling may account for anxiety in children, particularly for social worries (Fisak & Grills-Taquechel, 2007). Anxious parents may model specific behaviors such as social inhibition for their children, leading to the development of anxiety disorders such as selective mutism (Kristensen & Torgersen, 2001). Parental modeling and its relation to restriction of appropriate learning experiences has also been examined. Findings suggest that families with anxious parents behave differently than non-anxious controls even during routine activities: although anxious parents did not directly restrict their children's activities, they did display visible distress, while their children engaged in both routine tasks and structured play activities. Through observational learning, children may begin to associate such typical, age-appropriate activities with a stress response that their parent(s) previously displayed, increasing the likelihood of an anxiety disorder (Turner, Beidel, Roberson-Nay, & Tervo, 2003).

Thus far, child temperament, parental anxiety, parental overcontrol, and parental modeling and their relationships to the development and maintenance of child anxiety have been discussed. Although these factors were introduced somewhat separately, it is important to note that they are not orthogonal but rather are related in several specific ways. Ollendick and Benoit (2012) identified a five-risk factor model that explains a large proportion of the variance in the development of social anxiety disorder: the child's level of "behavioral inhibition" or anxious temperament (as discussed above), parental anxiety, attachment process, information processing biases, and parenting practices (including modeling). While behavioral inhibition is often thought to be genetic and stable, it can be further reinforced by parenting practices. For example, anxious parents can reinforce behavioral inhibition in their children through modeling of avoidance and providing negative information about sources of fear or worry.

Maintaining Factors of Anxiety

Cognitive Theories

Negative patterns of thinking, such as conscious perceptions of sensations, stimuli, and situations and expectancies for outcomes, are significant factors in the maintenance of anxiety. Therefore, these mechanisms of change are important to understand in order to effectively treat anxiety. Individuals with anxiety disorders often perceive objectively neutral or ambiguous stimuli and situations as threatening, which triggers a maladaptive cycle of thoughts, perceptions, and behaviors. This preoccupation in turn interferes with the child's ability to focus attention on the details of the stimuli/situation that are nonthreatening (e.g., noticing the peers who are kindly smiling or who are not even focused on the child), further exacerbating and maintaining the anxiety (Alfano, Beidel, & Turner, 2006).

Overall, there is an evidence to show that children and adolescents with anxiety disorders, particularly those with generalized anxiety disorder and/or social anxiety disorder, experience more negative cognitions than their non-anxious peers both before entering a situation/encountering a feared stimulus (i.e., anticipatory cognitions about the possible negative outcomes of situations, underestimating their ability to cope with a negative outcome) and while engaged in a situation/facing a feared stimulus (i.e., more negative cognitions regarding the quality of their own performance, more negative self-talk during a task or while in a situation; Alfano et al., 2006; Blöte, Miers, Heyne, Clark, & Westenberg, 2014; Bögels & Zigterman, 2000; Castagna, Davis, & Lilly, in press; Kley, Tuschen-Caffier, & Heinrichs, 2012; Ranta, Tuomisto, Kaltiala-Heino, Rantanen, & Marttunen, 2014). These negative cognitions have also been found to persist after children or adolescents with anxiety disorders exit a situation/experience with a feared stimulus, in the form of more negative post-event processing, excessive rumination, and persistently negative, distorted self-perceptions (Hodson, McManus, Clark, & Doll, 2008; Schmitz, Krämer, Blechert, & Tuschen-Caffier, 2010; Spence & Rapee, 2016). This cycle of negative cognitions increases the likelihood that youth encountering a similar situation/stimulus in the future will again experience a significant anxiety response or avoid the encounter entirely, and both responses work to maintain and exacerbate anxiety. This makes cognitions a powerful target for treatment.

Behavioral Theories

Avoidance Anxiety often manifests behaviorally as general avoidance of the feared stimulus or situation; for example, a child who fears negative evaluation from peers may withdraw from or avoid situations involving peer interactions or performance evaluation, choosing not to read aloud in class or play on a sports team. Avoidance may reduce a child's distress in the short term, but avoidant behavior actually maintains anxiety by restricting the possibility of a positive or neutral experience with the feared situation/stimulus, reducing the opportunities to challenge dysfunctional, negative cognitions about the situation/stimulus, and decreasing the occasions the child has to practice appropriate coping skills or strategies (Rapee, 2001). As well, the decrease in physiological sensations accompanying withdrawal from an anxiety-provoking situation is often observed to be negatively reinforcing itself (Mowrer, 1947).

Research in cognitive psychology has led to some interesting findings regarding anxious populations and avoidant behavior. The vigilance-avoidance model states that anxiety dictates initial vigilant attention (often hypervigilance) toward the threatening stimulus followed by a rapid avoidance of attention from the stimulus. This effect has been demonstrated through eye tracking technology in both adults and children with anxiety disorders, including separation anxiety disorder and social anxiety disorder (In-Albon, Kossowsky, & Schneider, 2010; Seefeldt, Krämer, Tuschen-Caffier, & Heinrichs, 2014). However, this phenomenon reduces significantly after the provision of treatment for anxiety disorders; for example, a sample of 18 children with separation anxiety disorder showed significant improvement in both symptomology and hypervigilance toward threat after cognitive behavioral therapy (CBT). This finding lends strong support to the efficacy of treatment for both the apparent and automatic symptoms of anxiety disorders (In-Albon & Schneider, 2012).

Safety behaviors Avoiding feared situations or stimuli completely is not always a possibility, especially for children and adolescents who may be unable to control their environments. When avoidance is not possible, youth with anxiety disorders may engage in safety behaviors, which are strategies that individuals engage in the presence of the feared stimulus or situation in order to reduce feelings of anxiety and the possibility of a negative outcome. A child who is afraid of heights might close his eyes while going down a slide, a child with anxiety about speaking to adults might avoid eye contact, or a teenager with social concerns might cover her face while speaking to disguise perceived flushing or sweating. Although youth with anxiety disorders engage in safety behaviors with the intention to prevent negative outcomes, the safety behaviors typically have the opposite effect, by drawing more attention to the youth or increasing the likelihood of a negative outcome (e.g., covering one's face may be perceived as unusual). Additionally, safety behaviors typically prime anxious individuals to attribute any positive or neutral outcome to the safety behavior rather than to any fact of the situation/stimulus or to the individuals' own skills or knowledge. This prevents full exposure to the stimulus or situation and reduces the likelihood that the experience will generalize (Kley et al., 2012). Thus, safety behaviors help to maintain threat expectancies and other negative cognitions about the situation/stimulus, even in the absence of negative experiences (Spence & Rapee, 2016). The extinction of safety behaviors should be a part of treatment, as they serve to increase the likelihood of negative outcomes, facilitate further avoidant behavior, and hamper realistic interpretations of positive or neutral experiences.

Skill deficits In some circumstances, youth with anxiety disorders may be exhibiting avoidance or safety behaviors due to skill deficits, which also need to be addressed in treatment (Davis & Ollendick, 2005). For example, social skills deficits (e.g., poor eye contact, poor reciprocal conversation skills) may have led to negative prior experiences with peers and contributed to the development of symptoms of social anxiety. Without remedy, those social skill deficits may maintain or contribute to increases in anxiety (Miers, Blöte, de Rooij, Bokhorst, & Westenberg, 2013). Additionally, specific skill deficits such as poor eye contact and limited verbal initiations in conversation are also associated with behavioral inhibition, which may interact to further interfere with functioning, facilitate avoidant behaviors, and contribute to negative cognitions (Rapee, 2002). Given that these skill deficits can impede the progress of treatment, targeted skill training as a part of anxiety treatment may increase the likelihood of treatment success and also improve maintenance of treatment gains.

Translating Research into Practice

Evidence-Based Practice in Psychology (EBPP)

Information on the phenomenology, epidemiology, etiology, and maintenance of anxiety disorders in children and adolescents is important to understand in the development and implementation of efficacious treatments. One particular research-based initiative, evidence-based practice in psychology (EBPP), began in 2005 when the American Psychological Association (APA) was charged with developing treatment guidelines for practitioners. In order to better facilitate efficacious treatment of psychological disorders, the APA assembled a task force to integrate research evidence with clinical expertise and client preferences. This entailed examination of both efficacy (i.e., evaluating evidence on causal relationships between treatment and disorders) and clinical utility (i.e., assessing evidence from research and clinical experiences on the generalizability, feasibility, client preferences, and a cost/benefit analysis of each intervention) in order to determine whether a particular intervention approach may be considered evidence-based. The APA's determination of which interventions qualify as EBPP has had significant reverberations in healthcare policy, insurance coverage, and media exposure. For example, specific states require mental health interventions to be listed as EBPP in order to be covered under Medicaid programs (American Psychological Association Presidential Task Force on Evidence-Based Practice [APA Presidential Task Force], 2006). While the EBPP movement is not without controversy, it has made significant progress in consolidating the available evidence from research and practice to determine that psychological interventions are both safe and effective for all age groups and for a variety of psychological and relational concerns (Kazdin & Weisz, 2003; Weisz, Hawley, & Doss, 2004). Additionally, the EBPP movement has determined that psychological therapy often pays for itself in terms of medical cost offset, increased productivity (e.g., regained or improved occupational, relational, academic, social competencies), and quality of life (Chiles, Lambert, & Hatch, 2002; Yates, 1994). However, the quality and efficacy of psychological interventions are of paramount importance in order to see these benefits.

Evaluating research evidence and clinical expertise While EBPP evaluated scientific results from multiple research designs (e.g., clinical observation, systematic case studies, experimental designs, public health studies, meta-analyses), randomized controlled trials (RCTs) were weighted most heavily in drawing conclusions about intervention efficacy. According to the APA Presidential Task Force (2006), RCTs "are the most effective way to rule out threats to internal validity [i.e., avoiding confounding variables] in a single experiment" (p. 275). In evaluating the available evidence, it was found that the type of treatment, qualities related to the practitioner him-/herself (e.g., training and competencies), the therapeutic relationship, and variables associated with the client him-/herself are all related to the efficacy of interventions. The APA Presidential Task Force (2006) did not rely on only empirical evidence; they also worked with professionals to identify relevant tips for treatment coming from clinical expertise (i.e., competencies acquired through formal education, training, and experiences). The committee recommended that psychologists avoid errors in judgment such as overgeneralizations or confirmatory biases based on previous experiences by being cognizant of the limitations of one's knowledge and skills, learning about heuristics and biases in judgment, seeking consultation or supervision from other professionals, and obtaining systematic feedback from the client (APA Presidential Task Force, 2006).

Recommendations before beginning treatment According to the APA Presidential Task Force (2006), expert clinicians must be able to conduct a sound assessment before beginning treatment, including developing a clear case conceptualization based upon information about the client/client's family sociocultural context, assessment of psychopathology and strengths (i.e., clinically relevant strengths that can be incorporated in or used to reinforce treatment), and an accurate profile of diagnostic impressions. Additionally, it is crucial to continually revisit and amend the case conceptualizations throughout the treatment process. In selecting an intervention strategy for children and adolescents with anxiety disorders, clinicians should first understand the clients' needs, skill level, and strengths. According to the APA Presidential Task Force (2006)'s compendium of research on interventions, many other client-related variables may significantly influence treatment implementation and outcomes; these variables are displayed in Table 2 along with corresponding examples of modifications that may be beneficial.

Second, clinicians should select a treatment by balancing knowledge of client preferences and unique characteristics, professional judgment, and the available research evidence for a particular psychological disorder or class of disorders. If there is no sufficient or strong research support on a particular disorder or clinical need, clinicians should exercise judgment in interpreting extant evidence and applying the best available intervention while carefully monitoring client progress and modifying treatment as needed (Lambert, Harmon, Slade, Whipple, & Hawkins, 2005). Finally, clinicians must critically evaluate their own levels of training and expertise—a clinician without the proper competencies to implement a specific treatment must refer the client elsewhere or seek consultation from other professionals (APA Presidential Task Force, 2006). A core set of therapeutic competencies have been identified by Sburlati, Schniering, Lyneham, and Rapee (2011); most centrally, these competencies include understanding of and adherence to professional, legal, and ethical codes in addition to the following abilities: accessing, critically evaluating, and using research to advise practice, honestly judging one's own skill levels, integrating multiple methods (e.g., diagnostic interviews, questionnaires, observations) and multiple informants (e.g., child, parent, teacher) in conducting a thorough psychological assessment, engaging and maintaining a positive therapeutic alliance with the client, communicating rationale for specific techniques and skills chosen in treatment, and pacing and structuring a session appropriately for a child's developmental level and skillset (e.g., using age-appropriate worksheets, token economies, interactive activities).

It is recommended that clinicians incorporate clients in planning intervention by asking clients to identify their goals for treatment (APA Presidential Task Force, 2006). When working with children and adolescents, it may be helpful to ask incorporate family members in the goal-setting process, as youth may have limited insight into the interference caused by their anxiety and/or limited ability to articulate what they would like to see change in their lives. Clinicians may ask youth specific questions to guide their thinking and goal setting, such as: "Is there anywhere that you cannot go because you get nervous or scared?," "Does being nervous ever get in the way of doing the things that you want or need to do?," and/or "If we could wave a magic wand and

Table 2 Client variables to consider when choosing and implementing intervention

Client-related variable	Example of modification
Level of functioning (e.g., cognitive, adaptive, executive, academic)	A child or adolescent functioning at a lower level may require more concrete visual stimuli (e.g., pictures, visual reminders, charts) during treatment as well as a slower pace of treatment with more time dedicated to review and practice of skills
Readiness for change and motivation for treatment	A child or adolescent with low motivation may benefit from reevaluation of goals for treatment and implementation of a reward system contingent on desired behaviors (e.g., game or activity before session for completing homework, sticker chart during session for effort)
Level of social support (e.g., strength of peer and familial relationships, experience of peer victimization, community membership)	A child or adolescent who is experiencing peer victimization may require additional sessions on communication training (e.g., assertive communication) and problem-solving skills
Variations in presenting problems, etiology of symptoms, and comorbidity	A child or adolescent who is depressed in addition to being highly anxious may benefit from adding behavioral activation to the treatment plan
Behavioral difficulties, such as disruptive behaviors or defiance	A child or adolescent with disruptive or defiant behaviors may require supplemental strategies such as parent management training, particularly if these behaviors interfere with treatment
Chronological age, developmental status, developmental history, and life stage	A child typically requires simpler language and more concrete examples than an adolescent
Sociocultural factors (e.g., gender, gender identity, race, ethnicity, social class, language acquisition status)	A child or adolescent from a marginalized group may benefit from more extensive rapport building in order to address concerns such as medical mistrust based on power differentials in therapy
Environmental context (e.g., safety of home and neighborhood, access to resources) and current stressors (e.g., life events such as moves, deaths in the family, parent unemployment, divorce)	A child or adolescent from a turbulent home environment may benefit from more practice with relaxation and coping skills
Personal preferences, values, and expectations for treatment	A child or adolescent may benefit from more explicit norm setting at the beginning of treatment to build realistic expectations for how therapy sessions are structured, what is expected of each person, and how much can change through intervention

get rid of your worries right now, how would your life change?." These goals should be revisited with the client throughout treatment and considered an important outcome of intervention success along with overall symptom reduction, prevention of future episodes, quality of life, and adaptive functioning across domains.

Empirically Supported Treatments

Often compared (and often confused) with EBPP are empirically supported treatments (ESTs). While the two initiatives are both fueled by research and a desire for better client outcomes, they differ in approach. EBPP is a more holistic, comprehensive approach to using research to improve clinical practice; it incorporates a broad range of clinical activities, beginning with psychological assessment, delving into case formulation and treatment planning, and including aspects of the therapeutic relationship, which permeate the treatment process. EBPP begins by examining a particular type of client and questions what evidence may guide the practitioner in achieving the best outcome for the particular client. Through the process of EBPP, a practitioner is (ideally) able to shape the entire scope of intervention, making decisions about which treatment(s) to select and how to implement and modify treatment through the use of an integrated stream of esearch, clinical judgment and previous experiences, and knowledge of patient characteristics and preferences (APA Presidential Task Force, 2006).

In contrast, EST is more focused on the treatment itself; in fact, it begins with a particular type of treatment (e.g., cognitive behavioral therapy) and then examines the extant evidence on that treatment approach, using the research to guide recommendations on how practitioners may improve client outcomes using that treatment. Therefore, specific psychological treatments which have been found to be efficacious in controlled clinical trials are said to be ESTs (APA Presidential Task Force, 2006; Ollendick, King, & Chorpita, 2006). There are four categories of treatment efficacy, Level I, well-established treatments; Level II, probably efficacious treatments; Level III, possibly efficacious treatments; and Level IV, experimental treatments, as described in Table 3. In evaluating treatments, the task force behind ESTs emphasizes "good" experimental designs, that is, experiments where variables are controlled so that effects observed may reasonably be attributed to the intervention (rather than changes due to chance, the passage of time, or another confounding variable). Therefore, there is a heavy focus on evaluating RCTs to determine ESTs, similar to the EBPP approach. However, there are few RCTs that focus on individual childhood anxiety disorders (Ollendick et al., 2006).

Table 3 Criteria for evaluating empirically supported treatments

Level of evidence	Criteria
Level I: well-established treatment	A. A minimum of two good between-group design experiments demonstrating efficacy in one or more of these ways:
	1. Statistically superior to psychological placebo, pill, or another treatment
	2. Equivalent to an already established treatment in experiments with adequate statistical power (i.e., about 30 participants per group)
	Or
	B. A large series of single-case design experiments ($n > 9$) demonstrating considerable efficacy using good experimental design and comparing the intervention to another treatment
	All well-established treatments must have:
	A treatment manual
	Reliably defined inclusion criteria
	Clearly described sample characteristics
	Reliable and valid outcome measure
	Appropriate data analyses
	Effects must have been demonstrated by at least two independent researchers or research teams
Level II: probably efficacious treatment	A. At least two experiments showing the experiment is superior to a waitlist control group
	Or
	B. At least one experiment meeting the Level I criteria with the exception of having been conducted in at least two independent research settings and by independent investigatory teams
Level III: possibly efficacious treatment	At least one good study showing the treatment to be efficacious in the absence of conflicting evidence
Level IV: experimental treatments	Treatments which have not yet been tested in trials which meet criteria for methodology, including newly developed treatments

Adapted from Chambless and Hollon (1998)

Cognitive Behavioral Therapy According to Davis, May, and Whiting (2011), cognitive behavioral therapy (CBT) meets criteria for a well-established treatment for both general childhood anxiety disorders and obsessive-compulsive disorder. A recent landmark RCT (Child/Adolescent Anxiety Multimodal Study) compared outcomes for 488 youth with diagnoses of either separation anxiety disorder, generalized anxiety disorder, or social anxiety disorder who were randomized to one of the following groups: CBT alone, medication alone, combination of CBT and medication, or placebo (i.e., pill placebo with "medication management" check-ins with a provider; Compton et al., 2010). When treatment response, remission rates, and changes in anxiety severity were compared between groups, the combination of CBT and medication slightly outperformed both monotherapies, while CBT alone and medication alone provided statistically equivalent benefits. Notably, however, at follow-up, the differences between the three active treatment groups (i.e., CBT alone, medication alone, and combined) were no longer significant, and all three groups showcased sustained benefit from treatment. This provides strong evidence for the efficacy of CBT across anxiety disorders and is particularly significant given the common negative side effects associated with medication (Piacentini et al., 2014).

Incorporating Family Members CBT with the addition of family anxiety management (a component wherein parents/caregivers receive training to identify and target their own anxiety, learn communication and problem-solving skills, and are trained in contingency management strategies to improve their responses to their child's anxiety) meets criteria for a probably efficacious treatment at this time (Davis et al., 2011; Kendall & Suveg, 2006; Ollendick et al., 2006). However, the evidence on incorporating family members into treatment is mixed and inconclusive at this time, with some studies showing incremental benefits and others suggesting no difference between parent-augmented CBT and CBT alone (as noted in Kendall & Suveg, 2006). Inclusion of family members in the child's anxiety treatment through separate parent training sessions, separate adult anxiety management sessions, and/or active involvement in the child's sessions may benefit some clients and not others; for example, highly anxious parents, parents who lack foundational behavior management skills, or children who lack insight may benefit from such modification of CBT.

Components of Efficacious Treatments for Childhood Anxiety Disorders

As CBT is likely the most efficacious course of treatment for youth with anxiety disorders (Davis et al., 2011; Piacentini et al., 2014; Read, Puleo, Wei, Cummings, & Kendall, 2013), this chapter will largely focus on components of CBT. CBT addresses three core areas: distorted and catastrophic cognitions, dysfunctional behaviors (e.g., avoidance), and identification of emotions and physiological symptoms (Chorpita, 2007; Davis & Ollendick, 2005; Friedberg & McClure, 2015). While individual treatment manuals may differ in ordering and pacing of components, the following steps are recommended in treating anxious children: psychoeducation, relaxation training/somatic management, cognitive restructuring, problem solving, and exposure tasks (Read et al., 2013). Additional components or alterations may be beneficial based on a client's specific characteristics, including presence of comorbidities, level of functioning, and motivation for treatment (refer to Table 2 for examples of treatment modifications).

Specific Components of CBT

Exposure Behavioral avoidance is an extremely common and impairing feature of anxiety disorders, and it works to maintain problematic fear and anxiety responses. Exposure is a systematic and hierarchical presentation of feared situations/stimuli that provides clients with the opportunity to practice learned skills and cope with their fear/anxiety without resorting to avoidance. Exposure is used in approximately 80% of all anxiety treatment models (CBT and other models; Chorpita & Daleiden, 2009). When conducting exposure, the first step is building a fear hierarchy using the client's ratings of feared situations/stimuli, from the least feared (and likely easiest step) to the most catastrophic (and likely most impairing) fear. Younger or lower functioning children may have more difficulty with the abstract nature of this process; therefore, the parents' ratings of the child's fears are typically incorporated. During the exposures, clients test out their coping skills (i.e., relaxation, somatic management, cognitive restructuring, problem solving) and differentiate between their anxious perceptions and the facts about the actual threat. Through exposure exercises, clients discover that the expected/feared outcome (e.g., "Everyone will laugh at me") does not match the actual outcome, finding that they are able to successfully manage fear and cope with the eventual outcome. The goal is for clients to have successful experiences dealing with distressing situations without avoidance or safety behaviors (Chorpita & Daleiden, 2009; Read et al., 2013).

There are two primary methods of conducting exposures: feared situations/stimuli can either be directly experienced in session (in vivo) or imagined (imaginal; in vitro). Imaginal exposures are helpful when the object of fear or anxiety is difficult to procure (e.g., worries about traveling in airplanes) or unsafe or impractical to simulate in a session (e.g., being in a burning building, getting a serious illness). In imaginal exposures, clinicians and clients collaborate to depict an intense, detailed scene of the feared situation/environment/stimuli; this may be enhanced through manipulating the room's lighting and use of an anxiety-inducing audiotape of the situation, videos, and/or pictures (Davis, 2009). Clinicians may prompt clients throughout the exposure to report on their level of distress and subjective anxiety using a simple system, such as scale of varying degrees of smiling/frowning faces or a numerical scale from 0 to 10. This helps clinicians structure exposure sessions (e.g., knowing when the client has habituated and exposure can end) and helps reinforce for clients that anxiety levels can and will decrease over the course of the exposure (Friedberg & McClure, 2015).

Exposures are repeated in order to allow clients to build a history of adaptive coping, accruing more positive or neutral experiences with the once-feared situation/stimuli. This also allows clients to habituate more quickly to successive exposures and sets the stage for more challenging items on the hierarchy (Davis, 2009). Tracking exposures using progress monitoring sheets can improve clients' feelings of autonomy and self-efficacy. It is recommended that, as appropriate, exposure exercises occur in multiple settings to facilitate generalization of learning and coping (Chorpita, 2007).

Variations on exposure Although exposure exercises may look very different from client to client, many forms of exposure have been found to be efficacious. A meta-analysis concluded that interventions with in vivo exposures outperform alternative forms of exposure (e.g., virtual reality exposure, imaginal exposure) directly after treatment; however, the discrepancy was absent at follow-up, suggesting that alternative modes of exposure are as effective as direct exposures in maintaining treatment gains (Wolitzky-Taylor, Horowitz, Powers, & Telch, 2008). Exposures using virtual reality, for example, have been found to be efficacious in treating anxiety disorders and well-tolerated by clients (Parsons & Rizzo, 2008). Another variant of exposure integrates specific therapeutic strategies to enhance inhibitory learning in anxious children and adults. For example, therapists may continue exposure exercises until the client's expectancy of an adverse outcome significantly drops (i.e., as opposed to measuring fear reduction or habituation) and increase variability throughout exposures (e.g., conducting exposures in a random order as opposed to following a specific fear hierarchy; Craske et al., 2014). Variants of exposure also include changing the pacing of exposure within sessions and spacing between sessions. Although there is no evidence to support a difference in efficacy between gradual exposure (i.e., working through the fear hierarchy) and flooding (i.e., beginning exposure exercises with the most challenging step in the hierarchy), gradual exposure is typically regarded to be more tolerable and ethical than flooding, reducing likelihood of attrition or loss of motivation (Davis, 2009). The most important aspect of exposure timing may be allowing clients adequate time to consolidate the learned experience, not the number of sessions or the spacing between them (Moscovitch, Antony, & Swinson, 2009). Notably, a recent research trend involves a single exposure-based treatment session (i.e., one-session treatment, OST), with exposures typically paced over a single 3-h session. The efficacy of OST has been well documented across specific phobias in youth; however, OST has not yet been systematically evaluated in broad categories of anxiety disorders (Davis et al., 2011; Davis & Ollendick, 2005).

Modeling For each skill, it is helpful for clinicians to operate as "coping models" for clients, explaining and demonstrating skills for clients before requesting that clients join them in practicing skills. This has dual benefits: it can help children visualize appropriate coping strategies and makes rehearsal and role-playing experiences less threatening. For example, the clinician self-disclosure during the psychoeducation step can be an appropriate method to normalize fear and anxiety, build rapport, set the tone for an open discussion of feelings, and model coping skills for the client (Kendall & Suveg, 2006). An example of appropriate self-disclosure follows: "Everyone in the world gets scared or nervous sometimes. You know, I used to get really nervous on rollercoasters. Sometimes, I would even refuse to watch while my friends rode rollercoasters! Of course, that didn't help me feel better about rollercoasters, and it actually stopped me from having fun with my friends. Have you ever felt so nervous about something that it stopped you from doing something you wanted to do?." Additionally, therapists should take advantage of incidental opportunities for modeling coping skills in uncertain or distressing situations—for example, if the session is interrupted by the loud sound of a door slamming in the hallway, clinicians may use the opportunity to model realistic thinking skills (e.g., "These doors can be really heavy. It sounds like someone accidentally let the door slam behind them").

Praise and rewards Many clinicians naturally integrate praise throughout the intervention process as a mechanism of building and maintaining rapport with clients. While praise and rewards work well throughout treatment, it may be particularly important to praise clients' effort and progress during challenging activities, such as exposures. However, it is recommended that clinicians use reinforcement on a contingent basis; that is, clients should earn reinforcers such as verbal praise or rewards (e.g., break time to play a game, small trinket like a decorative pencil, piece of candy) for desired behavior (e.g., completing progress monitoring worksheets, participating or providing examples in session, mastering a step on an exposure hierarchy). Additionally, clinicians must take care not to inadvertently reinforce anxious or avoidant behaviors (Davis, 2009).

Psychoeducation In most CBT manuals, practitioners begin by teaching clients about the nature of the anxiety response (i.e., physiological, cognitive, and behavioral components) and the factors that contribute to the maintenance of anxiety (e.g., distorted cognitions, avoidance). At this time, clients learn that anxiety is neither something that is defective within them nor a response that is unique to them but rather a universal and often adaptive reaction to stressors. Children often benefit from the inclusion of family members at this stage in order to better understand the environmental triggers, physiological responses, and factors that maintain their problems with anxiety (Chorpita, 2007). Clinicians working with younger children or lower functioning youth may incorporate more concrete language, pictures or videos, developmentally appropriate metaphors (e.g., anxiety as false alarms), and additional practice with emotional identification and establishing connections between cognitions, emotions, and behaviors (Davis, 2009; Read et al., 2013).

Relaxation and somatic management This aspect of intervention often includes both muscle relaxation and breathing exercises. Here, it is helpful to begin by reviewing the physiological components of anxiety and probing for the client's specific symptoms. Youth then learn to tense and relax specific muscle groups successively;

the duration and scope of this step may be varied according to the specific client's needs or the particular treatment manual chosen. For example, some muscle relaxation techniques focus on a specific part of the body (e.g., tensing the hands into fists, relaxing them, tensing them again), while others focus on the client's entire body (e.g., starting with the muscles in their toes, working up to their foreheads, and then working back down to the toes). Analogies may be used to increase attention and comprehension of the task: for example, children may be asked to squeeze their fists tightly, as if they are squeezing all of the juice out of a lemon. Deep diaphragmatic breathing is also taught as a mechanism to counter the rapid and shallow breaths that accompany anxious physiological arousal (Read et al., 2013). This step provides clients with skills to ameliorate the uncomfortable physiological sensations (e.g., muscle tension, hyperventilation) caused by anxiety. These skills may be used as part of the intervention (e.g., if a client becomes too anxious during an exposure) or added to the client's repertoire or "toolkit" of coping skills (Kendall & Suveg, 2006).

Cognitive restructuring By this time, clinicians have already covered the important connections between cognitions, emotions, and behaviors; thus, clients are able to understand that addressing biased "self-talk" (i.e., what children think and say to themselves when they feel anxious) is one way to tackle anxiety. After establishing the rationale for this step of treatment, clinicians should lead clients in identifying thoughts which may facilitate and maintain their anxious feelings (e.g., subjective feelings of fear or nervousness) and physiological hyperarousal (e.g., racing heart, tense muscles). Next, clients begin to identify and categorize patterns in their biased thinking. Clinicians are encouraged to teach clients cognitive coping strategies to reduce negative self-cognitions (i.e., self-referential thoughts, such as "I always do something embarrassing"); challenge unrealistic self-cognitions, threat expectancies (i.e., estimated probability that something bad will happen, such as "If I go down this slide, I will definitely fall on my face"), and catastrophic cognitions (i.e., feared outcome or the worst possible thing that could happen, such as "If I fall on my face, everyone will laugh at me, and no one will play with me"); and generate alternative and realistic interpretations (Kendall & Suveg, 2006). Clients are encouraged to "think like detectives," using clues to challenge the nature of their anxious conclusions—for example, the above child who is anxious about going down the slide may be asked questions to challenge his/her unrealistic threat expectancies (e.g., "What usually happens when people go down slides?," "What happened the last time you saw someone go down a slide?," "What else could happen other than falling on your face?") and catastrophic cognitions (e.g., "What usually happens when people fall down?," "If you do fall down, what else could happen other than everyone laughing at you?," "How likely is it that all of your friends will stop playing with you if you fall down?"). Clinicians may incorporate discussions and activities on cognitive distortions, such as "all-or-nothing" thinking or "fortune-telling," to help clients identify patterns in their thoughts and generate alternatives (Read et al., 2013).

Problem solving Many clients may erroneously characterize their anxious distress as uncontrollable, inevitable, and catastrophic in nature. Clients are taught to view anxiety as a problem that can be solved. Clinicians and clients act as teams to brainstorm ideas on how to decrease distress and effectively master daily challenges. The first step involves problem orientation and identification, acknowledging that everyone encounters problems sometimes and that it is important to work to solve problems rather than avoiding or ignoring them and selecting a problem to work on (Kendall & Suveg, 2006). The second step involves thoroughly defining the problem (e.g., asking clients "Why is this a problem?," "When does this problem happen?," "What do you usually do when faced with this problem?"). Next, it is recommended that clinicians encourage clients to brainstorm many possible alternative solutions to solve the identified problem without yet judging or filtering out impractical solutions. Here, clinician modeling, participation, and positive reinforcement may be particularly beneficial in helping clients generate their own solutions without self-criticism. Last is the evaluation phase, in which clinicians encourage clients to systematically "test" the viability (e.g., consider likely outcomes or consequences) of each possible solution in order to achieve the best outcome (Friedberg & McClure, 2015). Some children might have difficulty with this skill or be overwhelmed by the process; in these circumstances, therapists should use concrete examples of problems (e.g., looking for a lost toy) to explain the steps of problem solving (Read et al., 2013).

Assigning "homework" In order to master techniques and generalize learned coping skills, clients must practice outside of the weekly sessions. Therefore, it is recommended that clinicians assign "homework" to be completed throughout the week between therapy sessions. Of course, many children react negatively to the term "homework"; therefore, alternative terms (e.g., practice, "Show That I Can" tasks) are encouraged to increase motivation and rapport (Kendall & Suveg, 2006). These assignments are essential for monitoring client progress, holding clients accountable for incorporating the skills learned in sessions in their daily lives, and fostering client feelings of autonomy and mastery in treatment. Assignments should be explained to youth before the end of each session, and it is often helpful to do an example or two with children to ensure comprehension. Finally, the completed assignments must be reviewed and incorporated into the following week's treatment (Friedberg & McClure, 2015).

Pulling it all together These components of CBT are combined to create a cohesive and integrated skills-based treatment program. Although individual treatment manuals may vary pacing within or between therapy sessions, sessions typically last 1 h per week with homework assigned for completion between sessions. Most treatment programs recommend a total of 15–20 sessions in order to allow the child to learn, practice, and exhibit mastery over skills covered in therapy. One common CBT program, Coping Cat, organizes the components of anxiety treatment using the FEAR acronym. Step one, F: Feeling frightened?, focuses on teaching anxious youth emotional identification skills, including how to recognize physiological symptoms of anxiety. Step two, E: Expecting bad things to happen?, covers identification of anxious thoughts, including unrealistic threat expectancies and catastrophic cognitions. Step three, A: Attitudes and actions that can help, involves the development of healthy coping strategies, such as problem solving, cognitive restructuring, and relaxation techniques. Finally, step four, R: Results and rewards, teaches children how to realistically evaluate their progress and reward themselves accordingly (Kendall & Suveg, 2006). The Coping Cat program has also been adapted as an interactive computer-assisted treatment (Camp Cope-A-Lot) for anxious children aged 7–13 years (Khanna & Kendall, 2010). Due to the wide range of symptoms in anxiety disorders, some treatment manuals specifically target certain disorders (e.g., *Talking Back to OCD* describes a specific program for children with obsessive-compulsive disorder; March, 2006). Flexible approaches to CBT, including *Modular Cognitive-Behavioral Therapy for Childhood Anxiety Disorders* by Chorpita (2007), allow clinicians to customize treatment with additional modules based on the client's presenting concerns (e.g., modules on improving child motivation or disruptive behavior).

Conclusions and Future Directions

Anxiety disorders, if left untreated, can be persistent and extremely impairing. At present, there is a significant movement in clinical psychology to identify evidence-based practices and empirically supported treatments in order to ameliorate symptoms, improve quality of life, and reduce functional impairment for individuals with anxiety disorders. Although CBT has been identified as a well-established treatment, the highest level of EST, there is still work to be done in differentiating between treatment responders and nonresponders (e.g., identifying variables that may affect treatment outcomes) as well as identifying new methods and applications of delivering treatment (e.g., teleconferencing, augmented reality treatments, online therapies). Additionally, it is important to note that systematic evaluations of modification trends (e.g., simplifying language, incorporating more review and practice) have not been conducted. Future studies should also target specific anxiety disorders in order to identify specific components of treatment or alternative forms of treatment that may be efficacious.

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Tics and Tourette Syndrome

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Contents

Abbreviations

A-TAC	Autism—Tics, AD/HD, and other Comorbidities inventory
ADHD	Attention-deficit/hyperactivity disorder
BOLD	Blood oxygenation level-dependent
CBIT	Comprehensive behavioral intervention for tics
CBT	Cognitive-behavioral therapy
CSTC	Corticostriatal-thalamo-cortical
CTD	Chronic tic disorder
D2	Dopamine 2
EMG	Electromyography
HRT	Habit reversal training
MOVES	Motor tic, Obsessions and compulsions, Vocal tic Evaluation Survey
OCD	Obsessive-compulsive disorder
PMd	Dorsal premotor cortex
PMT	Parent management training
PPI	Prepulse inhibition
PUTS	Premonitory Urge for Tics Scale
SMA	Supplementary motor area
STSS	Shapiro TS Severity Scale
TODS	Tourette's Disorder Scale
TS	Tourette syndrome
TS-CGI	Tourette Syndrome Clinical Global Impression
VSP	Visuospatial priming
YGTSS	Yale Global Tic Severity Scale

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Clinical Characteristics of Tics and Tourette Syndrome

Tics are sudden, purposeless, repetitive, and stereotyped movements and vocalizations which can be characterized by their anatomical location, number, frequency, intensity, and complexity (Leckman, Bloch, Sukhodosky, Scahill, & King, 2013). For example, blinking, nose twitching, and rapid jerking of any part of the body are common motor tics, and throat clearing, coughing, and grunting are simple phonic tics. The complexity of tics ranges from brief and meaningless to longer and seemingly purposeful behaviors. Some examples of complex motor tics are facial gestures, touching objects or people, thrusting arms, gyrating, and bending. Complex phonic tics are also diverse and may include syllables, words, phrases, and speech atypicalities such as sudden changes in pitch or volume, echolalia (repeating another person's words), and coprolalia (uttering obscene or inappropriate words and phrases).

Regarding diagnostic criteria and features, in 1885 Gilles de la Tourette described nine patients with motor and phonic tics and noted that tics were characterized by childhood-onset, lifelong duration, and a waxing and waning course. These characteristics have been since confirmed in a large number of clinical series worldwide (Lin et al., 2002; Robertson, Trimble, & Lees, 1988). Of note, coprolalia, a feature that has become engraved in the public view of TS (Olson, 2004), is present only in 15–20% of cases in clinical samples (Freeman et al., 2009). Since the introduction of the DSM-III (American Psychiatric Association, 1980), motor or phonic tics that are present for 2 weeks but less than 12 months are diagnosed as Transient Tic Disorder. In Chronic Tic Disorder (CTD) the motor or phonic tics last for more than a year. Tourette disorder or Tourette syndrome (TS) is diagnosed when there are multiple motor tics and at least one phonic tic that persist for more than a year. These diagnostic categories of tic disorders have been largely preserved in the DSM-5 which contains four diagnostic categories: Tourette disorder, persistent (chronic) motor or vocal tic disorder, provisional tic disorder, and the other specified and unspecified tic disorders (American Psychiatric Association, 2013). Diagnosis of any tic disorder is based on the presence of tics, duration of tic symptoms, age of onset before 18 years, and absence of any known medical causes. The historical distinction between the diagnoses of TS and CTD is the presence of chronic tics in one or two (motor and phonic) modalities. However, distinctions between motor and vocal tics have been questioned, as vocal tics are due to muscle contractions of the oropharynx or diaphragm (Leckman et al., 2013) and some experts in the field suggested that neurologically these disorders are the same (McNaught & Mink, 2011). Because tics tend to wax and wane in number and severity and some individuals may have tic-free periods for weeks and months, the 1-year minimum duration of tics assures a sufficient period of time to confirm the persistent nature of tic disorders. Frequency and intensity of tics can vary considerably among individuals with TS, and so can the level of impairment associated with the tics. In some cases, tics are frequent and forceful, resulting in social impairment or, rarely, physical disability. However, in some individuals tics may be frequent but may go unnoticed and do not interfere with daily living (Coffey et al., 2004). Overall impairment, however, may not be directly related to tic severity. Some patients with TS and mild tics may be distressed and impaired whereas some patients are seemingly unaffected by their more prominent tics. Consequently, the tic-related impairment is not part of the current diagnostic criteria for TS. However, individuals who meet some but not all criteria for TS or CTD but present with clinically significant distress or impairment can be diagnosed with unspecified tic disorder (American Psychiatric Association, 2013).

Regarding developmental course, motor tics usually appear between the ages of 3 and 8 with the average onset at approximately 6 years of age (Leckman et al., 1998). Phonic tics may present first, but typically they appear several years afterward with the average age of onset of 11 years. Fewer than 5% of patients have phonic tics in the absence of motor tics (Leckman, King, & Cohen, 1999). Most children become aware of premonitory sensory urges by the age of 10. Tics follow a well-described waxing and waning course, a temporal pattern of remissions and exacerbations that occur over a course of several weeks or months (Lin et al., 2002). On a shorter timescale of hours and minutes, tics also occur in bouts with periods of bursting followed by periods of relative quiescence (Peterson & Leckman, 1998). Over the course of the disorder, tics multiply and worsen in number and complexity with the period of worst severity estimated to be between 9 and 12 years. At this time, tics may interfere with adaptive functioning and school work. Follow-up studies of clinically referred samples indicate significant decline in tics in up to 80% of the patients by late adolescence (Bloch et al. 2006).

Premonitory Urges

Although TS is defined by motor and phonic tics, individuals with TS also experience premonitory urges, recurrent unpleasant sensations associated with the tics. The urges are commonly described as discomfort, pressure, or tingling localized in the muscles involved in the performance of the tics. These premonitory sensations prompt the performance of the tic, which is followed by momentary relief of the associated discomfort. Up to 90% of individuals with TS report the experience of premonitory urges (Banaschewski, Woerner, & Rothenberger, 2003) and some describe the urges as more bothersome than the tics themselves (Hollenbeck, 2001). Tics involving head, neck, and shoulder movements are associated with particularly prominent urges (Leckman, Walker, & Cohen, 1993). It has been argued that tics may represent a voluntary response aimed at reducing the discomfort associated with premonitory urges (Lang, 1991). As with tics, the occurrences of urges vary in their frequency, intensity, and duration. The intensity of the urge can vary from fleeting and easily ignored to irresistible and inevitably leading to a tic. Despite the growing consensus that the premonitory urges trigger performance of the tics, the mechanisms of premonitory urges remain poorly understood (Leckman, Bloch, Scahill, & King, 2006; Woods, Piacentini, Himle, & Chang, 2005). A closely related phenomenological aspect of TS is the often reported capacity to suppress tics, at least temporarily (Leckman, Vaccarino, Kalanithi, & Rothenberger, 2006). Even though tics are involuntary, they can be suppressed for minutes or even hours, which may result in uncertainty regarding the voluntary control of tics. Many patients report that the intensity of premonitory urges increases during tic suppression.

Contextual Factors and Tic Expression

Another important consideration in assessment and management of tics is the possible association of tic expression with situational or contextual factors. Many studies have documented that tics can be both attenuated and exacerbated by antecedents and consequences that can be either internal states or external stimuli (Conelea & Woods, 2008). For example, doing something that requires focused attention and motor control such as playing a musical instrument has been associated with reduction of tics. In contrast, unstructured activities such as waiting or watching TV can be associated with greater tics. Social situations such as being in a group of peers or sometimes just the presence of another person in the same room can be associated with either decrease or increase in tics (Himle et al., 2014). Remarkably, some tics can be exacerbated while others are attenuated by the same situation. For example, vocal tics may become more prominent during social interaction while motor tics can be suppressed without obvious effort or awareness of the individual with TS. Environmental consequences for displaying tics, such as receiving accommodations or attention from others, can also affect tic expression and have been reported to have a greater influence on children's tic severity than emotional factors (Eaton et al., 2017). Internal states such as stress and anxiety have all been linked to increased likelihood of tic expression (Conelea, Woods, & Brandt, 2011; Lin et al., 2010). The recognition of the role of antecedents and consequences in behavioral interventions for tics has been led to adding functional assessment of tics as part of a comprehensive behavioral intervention for tics (CBIT) that is discussed at length later in this chapter. In addition, recognition of situational and internal factors associated with tics is an important part of educating patients with tics and their families. For example, many parents report exacerbation of their child's tics at home after school which is often attributed to children's effort to suppress their tics at school and "letting the tics out" at home. This interpretation can be true if confirmed by child report on a careful clinical interview. However, an alternative explanation of the relative increase in tics at home after school can be the tendency of tics to be reduced during activities that require concentration such as doing schoolwork and increased by unstructured activities such as relaxing at home after school. This latter explanation is also supported by experimental studies that showed no tic exacerbation or "rebound effect" after relatively short (minutes to hours) periods of tic suppression (Specht et al., 2013; Verdellen, Hoogduin, & Keijsers, 2007; Woods, Himle, et al., 2008).

The Prevalence of Tics and TS

Community studies indicate that transient tics are relatively common and affect 10–20% of school-age children (Cubo et al., 2011; Snider et al., 2002). Epidemiological studies show that the prevalence of TS in children and adolescents varies in the range from 0.15% to 3.0% in the general population (Hornsey, Banerjee, Zeitlin, & Robertson, 2001; Khalifa & von Knorring, 2003; Kraft et al., 2012). These estimates vary depending on the age of the sample as well as the ascertainment methods. Higher estimates are observed in samples of younger children and in studies that use multiple informants and direct observation. The best current estimate of the prevalence of TS was reported to be 14 per 1000 children (Scahill, Dalsgaard, & Bradbury, 2013). Tic disorders are three to four times more common in boys than in girls (Centers for Disease Control and Prevention, 2009).

Co-occurrence of TS with Other Psychiatric Disorders

TS is often associated with psychiatric comorbidity, most notably obsessive-compulsive disorder (OCD) and attention-deficit/hyperactivity disorder (ADHD), with a lifetime prevalence of any 1 psychiatric disorder over 85% and over half of the population with 2 or more disorders. The time of greatest risk of onset for most psychiatric comorbidities is early childhood, between the ages of 4 and 12 years (Hirschtritt et al., 2015). Clinically ascertained cases of TS may be associated with mood and anxiety disorders (Coffey, Biederman, Geller, et al., 2000; Robertson, Banerjee, Eapen, & Fox-Hiley, 2002), disruptive behavior (Sukhodolsky et al., 2003), and learning disabilities (Yeates & Bornstein, 1996). Studies of clinically referred samples reveal that 60–90% of children and adolescents with TS also have ADHD (Coffey, Biederman, Smoller, et al., 2000; Robertson et al., 2002). The co-occurrence of TS and ADHD is somewhat lower in community ascertained samples and ranges from 8% to 58% (Hornsey et al., 2001; Wang & Kuo, 2003). Several controlled studies, including our own work, documented the negative impact of co-occurring ADHD on psychopathology and functioning in children with TS (Hoekstra et al., 2004; Sukhodolsky et al., 2003). A recent prospective longitudinal study of 314 children in the age range from 5 to 19 years who were re-evaluated at follow-up 6 years later reported that reduction in tic severity at follow-up was paralleled by reduction of symptom severity of co-occurring ADHD and OCD (Groth, Mol Debes, Rask, Lange, & Skov, 2017). However, 63% of participants continue to have comorbid psychiatric disorders and only 37% had pure TS.

Anger and Rage Attacks

Anger outbursts and disruptive behavior have long been recognized as common clinical features of TS, and some of the more serious forms of behavioral problems have been described as “rage attacks” or “rage storms” (Budman, Bruun, Park, & Olson, 1998), terms that are attributed to the sudden onset and high intensity that characterize such episodes. Rage attacks may be further characterized by verbal and/or physical aggression, especially to a degree that is out of proportion to the situation at hand (Budman, Bruun, Park, Lesser, & Olson, 2000). Further, these attacks commonly occur toward a family member and are often described as appearing out-of-control and out of character to the otherwise good-natured personality of the child. Understandably, recurrences of these outbursts are described by parents as extremely impairing to child and family functioning (Dooley, Brna, & Gordon, 1999). The extent to which rage attacks in TS represent a feature of associated psychopathology or an emotion regulation deficit unique to TS is not well understood. On a behavioral level, aggression in children with TS has been associated with the presence of co-occurring ADHD, though not necessarily associated with the severity of tics (Budman et al., 2000; Sukhodolsky et al., 2003). There are studies that have reported positive correlation of tic severity with explosive outbursts in children with TS (Chen et al., 2013) and with irritability in adults with TS (Cox & Cavanna, 2015). Similarly, neurocognitive deficits in response inhibition and cognitive control have been associated with co-occurring ADHD and are not impaired in children with TS without co-occurring conditions. Thus, it is possible that the emotion regulation deficits which have been well described in children with ADHD are also at work on children with TS+ADHD. Because of their significant impact on psychological and adaptive functioning, several studies have tested behavioral interventions for anger control in children and adolescents with TS (Scahill, Sukhodolsky, et al., 2006; Sukhodolsky et al., 2009). This work is described in the later section on treatment.

Neuropsychological Function in TS

Neuropsychological functioning in TS has a long history of research in processes that are presumed to be associated with abnormal movement of the involuntary tics and their cognitive control. Thus, children and adults with TS have been reported to have deficits in fine-motor skills and in visual-motor integration (Schultz et al., 1998). Fine-motor skills’ deficits in childhood were also shown to predict tic severity in adulthood (Bloch, Sukhodolsky, Leckman, and Schultz, 2006). Deficits in executive functioning, a broad domain covering planning, goal-directed behavior, inhibitory control, attention, and self-regulation (Diamond, 2013), have also been reported in children and adults with TS. Some studies reported that TS might be characterized by a selective deficit in inhibitory control, the ability to suppress an activated response and avoid interference, which is measured by tasks such as the Stroop (Channon, Pratt, & Robertson, 2003; Marsh, Zhu, Wang, Skudlarski, & Peterson, 2007), Flanker (Crawford, Channon, & Robertson, 2005), Go-NoGo (Müller et al., 2003), and visuospatial priming (Swerdlow, Magulac, Filion, & Zinner, 1996) tasks. However, other studies suggested that deficits in executive functioning in children with TS might be due to co-occurring ADHD (Sukhodolsky, Landeros-Weisenberger, Scahill, Leckman, & Schultz, 2010).

Neurobiology of TS

The basal ganglia model of TS suggests that tics are caused by the aberrantly active striatal neurons which inhibit basal ganglia output neurons, which in turn leads to disinhibition, via the thalamus, of cortical motor areas (Albin & Mink, 2006). This model is supported by animal studies of stereotypies in rodents and nonhuman primates which arise from the imbalance in metabolic activity between medium spiny neurons in the striosomes and matrix compartments of the striatum (Balleine & O’Doherty, 2010; Worbe et al., 2009). In the largest MRI study to date, basal ganglia volumes were examined in 154 children and adults with TS and 130 matched healthy controls (Peterson et al., 2003). The volumes of the caudate nucleus were decreased in all subjects with TS. The volumes of the putamen and globus pallidus were decreased in adults with TS but not in children, suggesting that the smaller lenticular nuclei may reflect a neuroregulatory predisposition to continuing tics into adulthood. Consistent with this suggestion, reduced caudate volumes in childhood were shown to predict severity of tics in adults with TS (Bloch, Leckman, Zhu, & Peterson, 2005). Recent postmortem and brain imaging studies have also provided evidence that the pathogenesis of TS may depend on significant cross talk between neural and immune pathways which is consistent with observations in other neurodevelopmental disorders (Martino, Zis, & Buttiglione, 2015). While anatomical and functional abnormalities in the basal ganglia are implicated in the generation of tics, cortical regions are considered to be involved in the regulation and suppression of tics. Tic suppression, an act of stopping a tic, is thought to rely upon the neural circuitry that regulates response inhibition and cognitive control of motor behavior (Leckman, Bloch, Smith, Larabi, & Hampson, 2010). Although the causes of age-related tic reduction are unknown, it is likely to be associated with increased functional capacity of the frontal cortex subserved by an increased myelinization (Salat et al., 2005) and compensatory increased postnatal generation of inhibitory interneurons (Moll, Heinrich, Gevensleben, & Rothenberger, 2006). This suggestion is in line with the finding of larger prefrontal cortices in children with TS, which was interpreted as an adaptive change enabling successful tic regulation (Peterson et al., 2001). Using the Stroop task in an event-related fMRI study, Marsh and colleagues reported that compared to unaffected controls, children and adults with TS had normal behavioral performance but increased activation in the frontostriatal circuitry of response inhibition including right inferolateral prefrontal cortex and left dorsolateral prefrontal cortex. Similarly, increased activation in prefrontal cortex during the task-switching paradigm requiring cognitive control of motor responses was reported in two smaller studies of children with TS (Baym, Corbett, Wright, & Bunge, 2008; Jackson et al., 2011). It was suggested that increased activation of the frontal areas during tasks requiring cognitive control of motor responses represents a manifestation of a neural compensatory mechanism that develops in children with TS as a result of ongoing efforts to inhibit involuntary tics (Marsh et al., 2007; Serrien, Orth, Evans, Lees, & Brown, 2005).

Pathophysiology of TS remains the focus of active neuroimaging research. Many recent fMRI studies of TS have used tasks involving action inhibition to better understand the role of inhibitory processes in TS. In one recent fMRI study of action inhibition using a stop-signal paradigm, patients with TS showed atypical activation in motor and premotor regions and had higher reaction times and lower accuracy on stop (response inhibition) trials than healthy controls (Thomalla et al., 2014). Another study used a stop-signal reaction time task in adult TS patients and healthy controls during fMRI but adjusted intervals for a 50% inhibition rate. They found that TS patients showed greater dorsal premotor cortex (PMd) activation in go trials, while healthy controls showed greater PMd activation in stop trials. Furthermore, there was a significant positive correlation between motor tic frequency and activations in the right supplementary motor area (SMA)-proper during successful stop trials in patients, suggesting a common neural substrate for action inhibition and tic suppression and involving a global inhibitory mechanism (Ganos et al., 2014). Another measure of response inhibition called the visuospatial priming (VSP) task was used in a recent fMRI study before and after treatment with CBIT. For TS subjects, researchers found a significant decrease in striatal (putamen) activation from pre- to posttreatment. VSP task-related activation from pre- to posttreatment in the inferior frontal gyrus was negatively correlated with changes in tic severity. The authors suggest that CBIT may promote normalization of aberrant corticostriatal-thalamo-cortical (CSTC) associative and motor pathways in TS patients (Deckersbach et al., 2014).

To probe the mechanisms of core motoric manifestations of TS, researchers have also utilized tasks of voluntary motor execution. Zapparoli and colleagues used a task involving executed and imagined movements and also examined how neural patterns correlated with severity of TS. TS patients showed hyperactivation in the premotor and prefrontal areas for executed motor tasks, as anticipated, but additional hyperactivation was seen in rostral prefrontal and temporoparietal regions of the right hemisphere during imagined motor tasks. Additionally, blood oxygenation level-dependent (BOLD) responses in the premotor cortex during motor imagery tasks were significantly correlated with Yale Global Tic Severity Scale (YGTSS) scores. These findings suggest a distinct system of motor control in TS patients that is separate from the actual execution of motor acts and along with other studies could provide further insight into compensatory mechanisms used by TS patients (Zapparoli et al., 2016). Another fMRI study of voluntary motor control was conducted in younger TS patients using a finger-tapping paradigm and revealed distinct motor network recruitment from control participants. The most prominent differences arose from utilizing a nonpreferred hand, which resulted in decreased activation in the contralateral sensorimotor cortex and greater recruitment of premotor and prefrontal regions along with the left inferior parietal lobule (Roessner et al., 2013). Across studies, the left prefrontal cortex also seems to be more active in TS patients during voluntary movement, suggesting that these movements are more cognitively demanding for TS patients (Zapparoli, Porta, & Paulesu, 2015).

Attention in neuroimaging research has also turned to altered sensorimotor gating, a hypothesized core issue in TS. In a study of 22 patients with TS and 22 healthy controls (all males), Buse and colleagues found that prepulse inhibition (PPI) of the startle response, collected by electromyography (EMG) during fMRI, was lower in participants with TS than in healthy controls. There was also decreased BOLD activity in the middle frontal gyrus, postcentral gyrus, superior parietal cortex, cingulate gyrus, and caudate body in participants with TS, and PPI of the startle response was positively correlated with PPI-related BOLD activity. These results indicated that decreased sensorimotor gating in boys with TS is associated with reduced utilization of brain regions implicated in the higher-order integration of somatosensory stimuli (Buse, Beste, Herrmann, & Roessner, 2016).

Clinical Assessment

Comprehensive assessment of individuals with TS should include careful assessment of tics and co-occurring psychiatric disorders as well as detailed assessment of adaptive functioning across developmentally relevant domains. Clinical assessment of TS should include detailed evaluation on tics including their current and past features, age of onset, developmental course, and presence of premonitory urges. For children with TS who present with academic difficulties, psychoeducational assessment is recommended to characterize strengths and weaknesses in learning skills and assure optimal educational planning.

A number of psychometric instruments can be helpful for assessment of tic severity (Martino et al., 2017). The most comprehensive, valid, and reliable instrument is the Yale Global Tic Severity Scale (YGTSS) (Leckman et al., 1989). This instrument besides being most commonly used has been recommended by TS international guidelines. The YGTSS assesses tic dimensions including frequency, intensity, complexity, distribution, as well as interference and impairment. Although relatively longer to administer, this scale highlights relevant exacerbations that can aid in treatment (Lin et al., 2002). The Tourette Syndrome Clinical Global Impression (TS-CGI) and the Shapiro TS Severity Scale (STSS) are quicker to administer but do not include all the tic dimensions. The TS-CGI overall assesses impact of tics on the client's life. The STSS includes assessment of intensity and interference of tics.

To determine severity of TS, the Tourette's Disorder Scale (TODS) measures tics along with common comorbid symptoms including inattention, hyperactivity, obsessions, compulsions, aggression, and emotional symptoms (Shytle et al., 2003). The Premonitory Urge for Tics Scale (PUTS) measures and quantifies sensory phenomena that many individual experience before tics. This self-report scale is only valid for individuals older than 10 years old (Woods et al., 2005).

The two main screening instruments used for tics include the Motor tic, Obsessions and compulsions, Vocal tic Evaluation Survey (MOVES) and the Autism—Tics, AD/HD, and other Comorbidities inventory (A-TAC). Both instruments include a range of abnormal behaviors, including tics. The MOVES includes five subscales: motor tics, vocal tics, obsessions, compulsions, and associated symptoms including echolalia, echopraxia, coprolalia, and copropraxia (Gaffney, Sieg, & Hellings, 1994). The A-TAC is a screening interview for several disorders including autism and ADHD; however, the tic module may be administered independently (Hansson et al., 2005). Table 1 outlines the most used and validated instruments for assessing TS severity.

Treatment

Tics can range considerably in terms of severity and impairment and treatment is warranted only if tics are a source of impairment and interference in the patient's everyday life. Usual clinical practice focuses initially on educational and supportive interventions (Lebowitz & Scahill, 2013). Given the waxing and waning course of the disorders, it is likely that whatever is done (or not done) will lead in the short term to some improvement in tic severity. The decision to employ targeted behavioral interventions or psychoactive medications is usually made after the educational and supportive interventions have been in place for a period of months, and it is clear that the tic symptoms are persistently severe and are themselves a source of impairment in terms of self-esteem, relationships with the family or peers, or school performance.

Table 1 Instruments assessing TS severity

Instrument	Assessment targets	Benefits	Time of administration	Method of administration
Yale Global Tic Severity Scale (YGTSS)	Tic symptoms	Identifies exacerbations that direct treatment	15–20 min	Clinician
The Tourette Syndrome Clinical Global Impression (TS-CGI)	Adverse impact of tics	Quick to administer	<2 min	Clinician
Tourette's Disorder Scale (TODS)	Tics and comorbid symptoms	Includes assessment of the severity of common comorbid behaviors	>20 min	Parent or clinician
Shapiro Tourette Syndrome Severity Scale (STSS)	Intensity and interference of tics	Quick to administer	<5 min	Clinician
Premonitory Urges for Tics Scale (PUTS)	Premonitory urges	Quick to administer, only validated scale to measure tic-related premonitory urges	5–10 min	Patient
Autism—Tics, AD/HD, and other Comorbidities inventory (A-TAC)	Screening instrument for autism, ADHD, tics, and other comorbid disorders	Quick to administer, interviewer may be nonexpert	<2 min for tic module	Clinician
Motor tic, Obsessions and compulsions, Vocal tic Evaluation Survey (MOVES)	Screening instrument for motor tics, vocal tics, obsessions, and compulsions	Quick to administer	<5 min	Clinician

Behavior Therapy for Tics

Since the seminal work on habit reversal training (HRT) by Azrin and Nunn (1973), considerable progress has been made in the development and testing on behavioral interventions for tics (McGuire et al., 2014). A treatment program entitled comprehensive behavioral intervention for tics (CBIT) (Woods, Piacentini, et al., 2008) has received rigorous testing in two randomized controlled trials, one in children (Piacentini et al., 2010) and another in adults with TS (Wilhelm et al., 2012). Medium effect sizes were found in both the pediatric (ES = 0.68) and the adult (ES = 0.57) trials, and based on these studies, CBIT is now considered to be the first-line treatment for tics. The data from both child and adult CBIT studies were recently combined to examine moderators of treatment response. These analyses revealed that presence of co-occurring ADHD, OCD, or anxiety disorders did not moderate response to CBIT. There was a moderating effect of tic medication such that all participants showed improvement after CBIT but the difference between CBIT and PST was greater for participants who were not on tic-suppressing medication (Sukhodolsky et al., 2017).

The key component of CBIT is HRT which involves teaching individuals with TS to detect the initial signs of tics and then performing a "competing response" instead of the tic until the urge to tic dissipates. The treatment starts with tic awareness training which entails self-monitoring of current tics while focusing on the premonitory urge or other early signs that a tic is about to occur. When the patient is able to detect the first sign of the tics, they are taught to perform voluntary behaviors that are physically incompatible with the tic (i.e., competing responses). Competing-response training is different from tic suppression that many individuals may attempt on their own in that it teaches the patient to perform a specific voluntary movement when they notice that a tic is about to occur. CBIT starts with an assessment of tics that is used to create a tic hierarchy where tics are listed from most to least distressing. As a rule, more distressing tics are addressed first although tics with more readily identifiable competing responses can be addressed first too (McGuire et al., 2015). Awareness training and competing response training are then implemented and practiced during CBIT sessions one tic at a time. For example, a child with a neck-jerking tic may be taught to look forward with his chin slightly down while gently tensing neck muscles for 1 min or until the urge goes away. Current guidelines suggest that the competing response does not have to be physically incompatible with the targeted tic to be effective, and any voluntary movement can reduce the desire to perform the tics. This observation is consistent with the commonly reported reduction of tics during periods of goal-directed behavior, especially those that involve both focused attention and fine-motor control, as what occur in musical and athletic performances. Table 2 contains example of competing responses for common tics.

In addition to HRT techniques, CBIT also includes functional assessment and intervention for tics. The purpose of functional assessment is to identify situational factors that may contribute to the performance or worsening of tics. Adding functional assessment as a CBIT component was based on the observation that tics can be worsened by specific situations such as being in public and by activities such as watching TV (Conelea & Woods, 2008; Himle et al., 2014). Functional assessment is conducted as an interview with parent and child where the clinician asks whether each of the antecedent and consequence items is associated with improvement or worsening of each tic. Upon completion of the assessment, an intervention plan is developed for tics that have identifiable situational factors. For example, if a child's throat-clearing tics become more frequent during mealtimes and are associated with siblings' comments and requests to stop, a functional intervention may include asking the child with tics to practice a relaxation exercise for several minutes before dinner and explaining to the siblings that their reactions may inadvertently strengthen the tics. Particular attention is given to evaluating and, if needed, eliminating opportunities for escape and avoidance conditioning in which tics may be reinforced by escaping unpleasant situations. Because stress may be associated with exacerbation of tics (Lin et al., 2007), relaxation training is often used as an auxiliary technique to manage worsening of tics that may be triggered by situational anxiety. Finally, behavioral reward systems can be used to encourage children's engagement in CBIT and practicing tic management strategies at home.

Behavioral Therapy for Irritability and Explosive Outbursts

Targeted behavioral treatments can be helpful for addressing disruptive behaviors in the context of TS. Anger control training is a type of cognitive-behavioral therapy (CBT) that encourages targeted skills to decrease anger, such as identifying anger cues and practicing replacement behaviors, and has been shown to significantly reduce problem behaviors in youth with TS (Sukhodolsky et al., 2009). Among 26 participants, parent ratings of disruptive behavior decreased 52% in active treatment versus 11% in treatment-as-usual. Similarly, parent management training (PMT), which focuses on the prevention and effective response to problem behavior via operant principles (Barkley, 2013), has also been applied to parents of youth with TS with success (Scahill, Sukhodolsky, et al., 2006). In a sample of 24 children, ratings of disruptive behavior decreased 51% in the PMT group versus 19% for treatment-as-usual.

Table 2 Example of tics and competing responses

Common tics	Possible competing responses
Head jerking or nodding	Tilt head down and tense neck muscles
Eye blinking or eye rolling	Controlled, slow blinking or staring ahead while focusing on the same spot
Facial grimaces	Relax facial muscle to produce neutral facial expression
Lip rolling or lip licking	Purse lips together or push tongue in the roof of the mouth
Shoulder shrugging and arm tics	Fold arms across chest or push elbows to the sides
Body jerks	Tighten stomach and back muscles
Tightening stomach muscles	Rhythmic, diaphragmatic breathing
Vocal tics such as throat clearing	Relaxed breathing or purposeful "hard" swallowing

Based on these studies, a cognitive-behavioral approach that combines principles of parent training with teaching skills for managing frustration and improving social functioning can be recommended for managing moderate levels of irritability and noncompliance in children and adolescents with TS (Sukhodolsky & Scahill, 2012). The treatment manual of CBT for anger and noncompliance consists of 10–12 sessions grouped into three modules: emotion regulation, problem-solving, and social skills training. The emotion regulation module is dedicated to learning about anger triggers and physiological cues associated with anger, as well as practice of anger management skills such as relaxation and cognitive reappraisal. Because anger outbursts are most likely to occur in social interaction, children also practice social problem-solving skills, including identifying the consequences of choices taken in common anger-provoking situations and generating alternate solutions based on those consequences. The last portion of the child-focused treatment is dedicated to practicing the core anger management skills through role-play of typical anger-provoking situations involving peers, parents, and teachers. After each session, children are asked to practice the skills they have learned and complete logs describing their experience of successfully managing their anger over the previous week using the skills they have learned. Parents also participate in the treatment, with each session including a parent check-in during which the week is discussed, contents of the session are reviewed, and the clinician troubleshoots any stumbling blocks the family may be encountering. Parenting skills, including identifying observable behaviors and learning about antecedents and consequences that can be used to strengthen appropriate behavior, are also taught to maximize the child's opportunities for success in decreasing the frequency and intensity of their aggression and angry outbursts.

Pharmacotherapy of Tics

A wide variety of therapeutic agents are now available to treat tics (Murphy, Lewin, Storch, & Stock, 2013; Weisman, Qureshi, Leckman, Scahill, & Bloch, 2013). Clonidine and guanfacine are potent α2-receptor agonists that are thought to function by stimulating post-synaptic alpha-2A receptors on dendritic spines of the prefrontal cortical pyramidal cells and by increasing the functional connectivity of the prefrontal cortical networks (Arnsten, 2010). A recent meta-analysis of six randomized, placebo-controlled trials demonstrated that alpha-2 agonists had a medium effect size (ES = 0.68) in reducing tic symptoms in trials in which participants also had ADHD. However, in the absence of ADHD, the efficacy of these agents was small (ES = 0.15) and nonsignificant (Weisman et al., 2013). Although this finding calls into question existing pharmacological treatment guidelines for TS that recommend alpha-2 agonists as first-line pharmacological treatment of tics, the available studies for review were few in number and sample sizes were small. Consequently, firm conclusions cannot be drawn due to the less than adequate state of current evidence. Guanfacine is generally preferred to clonidine because it is less sedating and not associated with rebound hypertension following withdrawal (Leckman & Bloch, 2015).

Dopamine 2 (D2) receptor blocking agents have been the mainstay of treatment for tics. The typical neuroleptics such as haloperidol and pimozide have been the best studied, and on average, these medications show a 50% or greater reduction in tics in controlled studies (Sallee, Nesbitt, Jackson, Sine, & Sethuraman, 1997; Shapiro et al., 1989). Despite the use of relatively low doses, unwanted side effects of typical neuroleptics may include sedation, cognitive dulling, dystonia, dyskinesias, parkinsonism, akathisia, weight gain, and, rarely, tardive dyskinesia (Bruun, 1988; Riddle, Hardin, Towbin, Leckman, & Cohen, 1987). Atypical neuroleptics such as risperidone and ziprasidone were also shown to be superior to placebo and resulted in a 30 to 40% reduction of tics (Sallee et al., 2000; Scahill, Leckman, Schultz, Katsovich, & Peterson, 2003). Side effects noted in these controlled studies of risperidone included weight gain and sedation (Scahill, Erenberg, et al., 2006). The benzodiazepines, such as clonazepam, are occasionally used as an adjunctive treatment for tics, though they have not been well studied (Scahill, Erenberg, et al.) and are associated with side effects including sedation, short-term memory problems, depression, and addiction.

Conclusions and Clinical Implications

In addition to the evaluation of tics and possible co-occurring disorders, a comprehensive clinical evaluation of TS should involve a detailed discussion of social, family, and adaptive functioning. Whenever possible, the clinical evaluation should be complemented by psychometric tools, some of which are listed in this chapter. Many families can benefit from a continuing discussion over the course of several visits about the relative contributions of tics versus ADHD, anxiety, or disruptive behavior disorders to the impairments in daily life and adaptive functioning. Behavioral and pharmacological interventions can be helpful for reduction of tics that result in distress or impairment. At present, behavioral interventions (i.e., CBIT) are recommended as a first-line treatment in multiple practice guidelines (Murphy et al., 2013; Robertson et al., 2017; Verdellen, van de Griendt, Hartmann, Murphy, & Group, 2011). However, more focused interventions such as problem-solving training or academic skills counseling can be helpful to address problems in social, family, and school functioning. There is evidence that tics may be sensitive to environmental events, worsening during times of stress and fatigue and improving during engagement in activities that require mental focus or fine-motor skills. This can inform discussions with children and their families about the choice of hobbies and sports, scheduling of day-to-day activities, and utilizing stress management strategies that may improve tics as well as optimize development across other important areas of functioning. Focusing on personal strengths and building resilience toward the goal of improving quality of life and well-being should inform clinical care for children with TS and their families.

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Treatment Approaches to Aggression and Tantrums in Children with Developmental Disabilities

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Contents

Introduction

Aggression and tantrums occur at high rates in the developmental disabilities population. Though many children may exhibit such behaviors as they grow and develop, approaching such behaviors in children with developmental disabilities differs from typically-developing children because often their intensity and chronicity persists well into adulthood (Matson & Neal, 2009; Murphy et al., 2005). Often a child's aggression or severe tantrum behavior can have various consequences for both the child and their family; these behaviors are highly stigmatized, which can cause social exclusion or isolation, restrict access to services and adequate learning environments, leave children vulnerable to the use of physical restraints, and even reduce future opportunities for independent living and personal relationships with others (Machalicek, O'Reilly, Beretvas, Sigafoos, & Lancioni, 2007; Matson, Dixon, & Matson, 2005). Many children who have these severe forms of challenging behavior lack close friendships with their peers in school or community settings, which may add to their feelings of isolation. Addressing a child's aggressive and tantrum behaviors has lasting impact across many domains of their daily functioning.

Aggression and tantrum behaviors take many forms. One distinction often made is between aggressive behavior directed towards other individuals (i.e. physical or verbal aggression) and aggressive behavior directed toward objects (i.e., property destruction). Physical aggression is defined as hitting, pushing, scratching, kicking, hair pulling, biting, and any other behavior that would injure another person. Verbal aggression takes the form of yelling or threatening someone. Some examples of property destruction include breaking, throwing, and/or hitting objects. Some of these behaviors may have topographic overlap with more severe tantrums, which can include extreme bouts of crying/screaming, falling to the ground, and other related behaviors.

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Historically the fields of psychology, applied behavior analysis (ABA), and psychiatry have each addressed the management and treatment of aggression and tantrum behaviors differently. As Mace and Critchfield (2010) discuss in their review of early ABA studies, much of the early work in this field focused on increasing positive behaviors through reinforcement. Other studies, such as one by Risley (1968) aimed to understand how punishment procedures (i.e. aversive shocks) could decrease problem behavior. Meanwhile, psychiatrists have usually used the means of their training (i.e. medications) to address the issues presented to them. In order to assist clinicians in navigating the treatment of these behaviors with this population, this chapter provides an overview of aggression and tantrums in developmental disabilities, discusses two main avenues of treatment found in the literature, and considers other issues related to managing and treating these behaviors.

Characteristics and Prevalence

Researchers and clinicians must often take extra caution when discussing aggressive behaviors in children. As Gendreau and Archer (2005) discuss, "aggressive" is an emotionally charged term, involving a social and moral judgment. Adding to this complexity, aggressive behavior is often described in terms of an individual's intention to do harm to others. This issue of intent becomes especially concerning when children with developmental disabilities or delays are considered. Often these children do not have the emotional or cognitive capacity to exhibit a typical understanding of intent. Because of this, a fair definition of aggressive behavior in this population is behavior that results or may potentially result in harm to another person or property (i.e. biting, hitting, kicking, throwing objects, etc.). Aggressive behavior typically has an onset in the toddler years, though onset does continue well past age 5 (Dominick, Davis, Lainhart, Tager-Flusberg, & Folstein, 2007). As Tremblay (2000) pointed out, it's possible that aggressive behavior constitutes more of an "impulsive unintended reaction" rather than an intention of doing harm. This understanding is further supported by evidence from Dominick et al. (2007), whose findings suggested that aggression was the only behavior to show a significant relationship with both cognitive and language measures. If children do not have a means of communicating clearly, their difficulty and frustration in trying to express their wants and needs may also lend itself to more aggressive behaviors.

Tantrum behaviors refer to a group of challenging and externalizing behaviors that may manifest as crying, becoming upset, displaying anger, property destruction, and noncompliance (Goldin, Matson, Tureck, Cervantes, & Jang, 2013). Tantrums can also include the aggressive behaviors discussed previously. It is important to note that children of all ability levels occasionally exhibit tantrum behavior even in the absence of psychopathology and/or developmental disabilities (Bhatia et al., 1990). However, as Bhatia and colleagues also report, these behaviors tend to decrease as typically-developing children grow older. This is not always the case for children with developmental disabilities. In a study comparing rates of tantrum behavior in children with comorbid autism spectrum disorder (ASD) and attention deficit/hyperactivity disorder (ADHD), Konst, Matson, and Turygin (2013) did not see a significant influence of age on the exhibition of tantrum behaviors. However, they did find a positive correlation between ASD symptomology and elevations in the severity of such behaviors (Konst et al., 2013).

This relationship between aggression and tantrum behaviors and an ASD diagnosis persists throughout the literature. Dominick et al. (2007) found that 70% of children with autism in their study had experienced a period of severe tantrums either in the past or in the present. Furthermore, 60% of these children exhibited tantrum behavior on a daily basis and so these behaviors were considered a constant problem (Dominick et al., 2007). Findings were similar for rates of aggressive behavior. Dominick and colleagues report that in 88% and 75% of cases, parents and siblings respectively were the targets of the aggressive behavior; teachers were also targets of aggression in 70% of the cases. Aggression was directed toward more than one person in over 90% of the cases observed (Dominick et al.). Another study by Kanne and Mazurek (2011) also found that, among a sample of children and adolescents with autism spectrum disorder, 56% engaged in some form of physical aggressive behavior towards caregivers and another 32% of children and adolescents engaged in physical aggression towards non-caregivers. Higher rates of aggressive behavior were also seen in a study by Farmer and Aman (2011) in children with comorbid ASD and attention deficit/hyperactivity disorder (ADHD) and in a study by McClintock, Hall, and Oliver (2003) in individuals with comorbid ASD and intellectual disability (ID). These high rates of aggressive behavior are also found in young toddlers. For example, Fox, Keller, Grede, and Bartosz (2007) found that 24% of children (age birth to three) referred to early intervention services in their study displayed aggressive behavior, while 41% of these children exhibited tantrum behaviors.

Treating aggression and tantrum behaviors must be a priority for clinicians working with children with disabilities. These behavior problems put the child at risk for limited community involvement, long-term inpatient care, and restricted learning environments, as well as put the child and caregivers at risk for harm. Not surprisingly then, this challenging behavior has also been found to be a strong predictor of parental stress (Baker, Blacher, Crnic, & Edelbrock, 2002; Emerson, 2003). Gardner and Moffatt (1990) also state that the presence of aggressive behavior is one of the strongest predictors of overall quality of life for the child with developmental disabilities. Both Murphy et al. (2005) and Matson and Neal (2009) found that unless effectively treated, these challenging behaviors would remain chronic among children and adolescents. The persistence and severity of aggression and tantrum behaviors across the lifespan necessitate the use of the most powerful evidence-based interventions (Matson, 2009).

Treatment Approaches

Two of the most widely researched approaches to aggressive behavior and tantrums are behavioral treatments and pharmacotherapy. While these two are among the most accepted approaches to aggression and tantrums, there are more issues to consider than some clinicians may realize. First, all treatment decisions must consider the client's dignity; children and adults with developmental disabilities deserve to be treated with respect while their families seek treatment for the challenging behavior. The Association for Behavior Analysis states that a clinician's responsibility is to ensure their client's right to effective treatment; this includes the right to services whose goal is the individual's personal welfare and the right to the most effective interventions available (Association for Behavior Analysis, 1989). However, family differences in culture, socioeconomic status, rural areas, and other such factors could impact which treatment the family feels is best for their child and thus the strength of the treatment and treatment integrity. For example, while some families may embrace medication for their children's behavior, other families may be hesitant to have their young children dependent on medication for a variety of personal reasons. Similarly, access to treatment centers can be an issue for both children from low-income families and children living in rural areas. These just scratch the surface of the complex issues families must manage while also pursuing the best treatments for their child. Therefore, this review of treatment approaches to aggression and tantrums will prioritize not only individual client dignity and personal welfare, but family considerations as well.

Behavioral Approach

Assessment

As Brosnan and Healy (2011) establish in their review of behavioral treatments, aggression is fundamentally a learned set of behaviors related to the consequences which reliably follow it.

If interventions do not accurately alter these consequences, the aggressive behavior may be further reinforced. One review by Matson et al. (2011) of 173 studies in which functional assessment techniques were used to determine the environmental variables related to the challenging behavior of people with ASD revealed that for many of these participants, attention or escape from demands maintained their challenging behaviors. However, as Matson and Nebel-Schwalm (2007) state, though these challenging behaviors may appear straightforward, often their topography does not adequately reflect the complex patterns of behavior maintaining them. Children with developmental disabilities often are unable to communicate their wants and needs, and so often cannot explain why they engaged in certain behaviors. So, in order to alter the consequences that address the learned aggressive behaviors, often clinicians will conduct a functional behavioral assessment. A functional behavioral assessment (FBA) describes the process of gathering and interpreting data related to the function of a problem behavior (O'Neill, Albin, Storey, Horner, & Sprague, 2014). FBA is extremely valuable when designing an effective and efficient behavioral intervention as it provides information about what reinforcers to change to reduce aggressive or tantrum behavior through an individualized treatment. There are many studies which have demonstrated FBAs as effective in identifying the reinforcers that maintain challenging behavior (see Didden, Duker, & Korzilius, 1997; Iwata et al., 1994; Roane, Fisher, & Carr, 2016).

As discussed, when using a behavior approach to aggression, the first step in treatment is to identify the function maintaining the problem behavior. One method for identifying the function of behavior is through a direct observation method. Systematic, direct observation of the aggressive behavior and the environmental variables related to the behavior then provides a descriptive analysis of the behavior's function (O'Neill et al., 2014). The "ABC" approach, collects data regarding the antecedent event ("A"), the behavior ("B") and the immediate consequence of the behavior ("C") (Kozlowski & Matson, 2012) and is one of the most commonly used direct observation method. Observing a behavior using this method can help a clinician formulate their hypothesis for the function of a behavior. For example, imagine a child engages in an extreme tantrum behavior at the grocery store. The antecedent ("A") of this behavior may have been a parent requesting the child stay next to the cart and keep quiet. The tantrum behavior ("B") might then be followed by the parents picking up the child and leaving the store ("C"). Thus, a clinician might hypothesize that the tantrum behavior is maintained by escape from certain environments. Understanding why a child exhibits a behavior then helps a clinician plan the best treatment to address the function of the behavior.

Another method for identifying the function of behavior is an *experimental functional analysis* (EFA). EFA is a method that involves the systematic manipulation of antecedents and consequences associated with the target challenging behavior (O'Neill et al., 2014). However, though this approach gives the best insight into the function of a behavior, these procedures are often long and require a large number of resources. The use of experimental functional analysis with severe aggressive behavior especially should be carefully considered. This is because in an EFA, a clinician manipulates the antecedents to provoke the target behavior, which may have harmful effects in these circumstances. Though these experimental manipulations could give valuable insight and inform more effective intervention strategies, there are potential risks to escalating an individual to the extent that they display severe aggression. Not only could someone get injured if the behavior is not quickly managed, but the issue of client dignity would also be overlooked. Matson (2009) therefore advises the use real-time data recording such as the "ABC" approach in evaluating more serious and severe aggressive behaviors over a complicated/potentially harmful manipulation such as an EFA.

Treatment

Once the clinician has a better understanding of what is reinforcing the aggressive or tantrum behavior, then a plan for treatment can be formulated. Treatments aimed at managing aggressive behaviors should be based upon the descriptive information gathered from the direct observation methods or EFA previously discussed. When treatment procedures address the function of behavior they are more likely to result in successful treatment outcomes. The most commonly used treatments for the developmental disabilities population and aggressive behavior are functional communication training, differential reinforcement of behavior, and extinction procedures (Matson et al., 2005). Most often, a combination of these different procedures is used to address the target behavior.

In Functional Communication Training (FCT), the child's communication of a want or need is reinforced as an alternative to the aggressive or tantrum behavior they are engaging in. This allows the individual to gain control over access to their reinforcer, which varies greatly from individual to individual. By giving the individual more control, FCT aims to increase the use of this functional communication more and decrease the frequency of the aggressive behavior until it is completely gone (Chezan, Drasgow, & Martin, 2014). This communication behavior can be a verbal response (e.g. "I want to play on my iPad"), a signed request (e.g. signing "done" when a child is ready to leave an environment), or can also involve the use of a communication device, such as a Dynavox or PECS system, in which the child can either have their device speak or present their caregiver with a card displaying their desired reinforcer. Using FCT can be incredibly effective for both children and adults with developmental disabilities (Chezan et al., 2014), but the child's cognitive and adaptive functioning must be considered when choosing an appropriate communicative alternative. It would be inappropriate to select a communicative alternative outside of the child's skill set, as this could just increase the child's frustration and engagement in the problem behavior. Ideally, this alternative would be easily accessible to the child and easily understood by their parents, caregivers, and teachers.

Differential reinforcement is another extremely effective treatment in changing aggressive behavior (Cooper, Heron, & Heward, 2007). The differential reinforcement procedure consists of removing reinforcement for the aggressive behavior and establishing a provision of reinforcement either based on an acceptable, positive, alternative behavior or a decrease in the undesired behavior (Cooper et al., 2007). Differential reinforcement has many forms which differ in terms of the form of the reinforcement of the alternative behavior. In terms of treating challenging behavior, there are four types of differential reinforcement: differential reinforcement of incompatible behavior (DRI), differential reinforcement of alternative behavior (DRA), differential reinforcement of other behavior (DRO), and differential reinforcement of low rates (DRL).

Differential reinforcement of incompatible behavior (DRI) and differential reinforcement of alternative behavior (DRA) procedures are similar in that appropriate behavior is reinforced while reinforcement is withheld for the target aggressive or tantrum behavior (Brosnan and Healy, 2011). Because DRA and DRI procedures reinforce the alternative behavior, often they are conducive to the acquisition of new skills in children. Specifically, in a DRI procedure, an incompatible behavior to the aggressive behavior, in which simultaneous occurrence would be impossible, is reinforced (Cooper et al., 2007). This can be as simple as reinforcing a child's hands together in their lap, a behavior that would be incompatible with hitting and pinching. Similarly, a DRA procedure involves reinforcing of an acceptable alternative behavior, but this behavior does not have to be incompatible with the problem behavior.

Another type of differential reinforcement is differential reinforcement of other behavior (DRO). Unlike the DRI and DRA procedures, a DRO procedure tries to reduce the rate of occurrence of the aggressive or tantrum behavior by focusing on reinforcing its absence (Cooper et al., 2007). This absence of the problem behavior could be at a specific time or during an entire time interval. For example, a child could be reinforced after a full afternoon without displaying aggressive behavior. One can see how often these procedures are used in conjunction with others, as they may not be as effective on their own. There is also a final type of differential reinforcement of low rates (DRL). As Cooper et al. (2007) describe, a DRL procedure delivers reinforcement following the occurrence of a problem behavior, then gradually increases the length of time between displays of problem behavior for reinforcement to be delivered. A DRL procedure can be effective at reducing rates of behavior, but it works more slowly than other procedures, making it less appropriate for use with severe aggression and tantrum behaviors that must be addressed quickly.

Finally, there is the procedure of extinction. Aggressive and tantrum behaviors are said to be "put on extinction" when a behavior no longer produces the reinforcing consequences it previously produced (Cooper et al., 2007). In an extinction procedure, the relationship between whatever environmental variable that was maintaining this behavior through reinforcement and the aggressive behavior itself has been broken. A simple example of this could be if a child's tantrum behavior was maintained by the attention from a teacher in the classroom. In this case, attention could be in the form a reprimand from the teacher. An extinction procedure would involve a plan to no longer provide this attention to the child when the tantrum behavior occurs. Removing reinforcement for the tantrum behavior then decreases the likelihood that the behavior will occur again. Instead of engaging in the tantrum behavior, the child could also use an alternative behavior (such as raising their hand) to access the same reinforcement for teacher attention, which is why extinction is often an important procedure to implement in treatment.

However, there are many situations where extinction would not be an appropriate procedure to implement. In the previous example, if the child were biting another student, then ethically the teacher could not simply ignore the behavior. Also, there is the possibility of extinction bursts with these severe behaviors, which is an increase in the behavior immediately following the extinction procedures (Cooper et al., 2007). This burst in aggressive behavior can have obvious and severe consequences for all involved. Additionally, extinction procedures may actually lead to increases in aggression (Lerman, Iwata, & Wallace, 1999). It's important that this procedure be used in conjunction with other behavioral methods, such as the ones previously described. Matson et al. (2005) also found that successful interventions often utilized antecedent alterations, reinforcement-based strategies and consequence manipulations.

Pharmacotherapy Approach

Due to increased collaboration among interdisciplinary teams of clinicians, children with developmental disabilities will often have large team of specialists addressing different aspects of their day-to-day life. In the field of developmental disabilities, pharmacotherapy has been researched most extensively for aggression in children and adults with ASD (Martin, Koenig, Anderson, & Scahill, 2003). In terms of aggression and tantrum behavior, psychiatrists and/or pediatricians may be sought to help manage the presenting problem behavior, in which case an atypical antipsychotic medication is often prescribed to treat the aggressive behavior. There are several reasons why the continued use of psychotropic medications is problematic at best.

Two drugs, risperidone and aripiprazole, are FDA-approved for use in children and adolescents diagnosed with ASD (United States Food and Drug Administration, 2006, 2009). Both risperidone and aripiparazole are atypical antipsychotics known to have adverse effects such as weight gain, increased appetite, sedation, tiredness, drooling, and tremor (Deb et al., 2014). As Deb et al. (2014) describe, these types of medications target specific neurotransmitters to try and stabilize dopamine production. It is important to note that their use is specifically for the symptom of "irritability" and not any of the core symptoms of ASD. Even more troubling, Adler and colleagues (2015) found that for risperidone and aripiprazole, again the only two drugs approved by the US Food and Drug Administration, most challenging behaviors frequently remained drug refractory to both drugs. So, not only did these drugs show negative side effects for the participants, even in the short trial period, but the drugs overall frequently did not decrease or address the aggressive behavior (Adler et al., 2015). This is especially troubling considering the high rates of children with ASD, intellectual disability, or other developmental disabilities found to be on these medications. One study by Spencer et al. (2013) reported as high as 64% of children with ASD were prescribed at least one antipsychotic medication.

Matson and Jang (2014) describe the current prescription drug dilemma as "compromised". Their inspection of the use of prescriptions found that often many drugs often do not target the mechanisms they suggest they do, instead simply sedating the individual into a state of compliance. This is most likely because little is understood about the neural mechanisms involved in the aggressive behavior. Additionally, these complexities are what make this area of treatment difficult to completely disregard. Some studies have shown that children and adolescents treated with appropriate doses of psychotropic medications (including risperidone) did show reductions in aggression, tantrums, or other types of challenging behavior (Shea et al., 2004). Meanwhile, Tyrer et al. (2008) found that individuals assigned to a placebo showed a similar decrease in aggressive behavior as those given risperidone. Much of the research falls between these two extremes. As Farmer, Thurm, and Grant (2013) find in their review, there is simply no evidence that definitively supports the use of pharmacological treatments as effective or efficacious. Though there might be some evidence that drug treatments work for some children with developmental disabilities, it simply is not enough to justify such widespread use of antipsychotic medications.

Further complicating the subject, although many studies continue to show the instability and unreliability of drug treatments (Adler et al., 2015; Cohen et al., 2013; Matson & Wilkins, 2008; Tyrer et al., 2008), a great number of children, adolescents, and adults with disabilities are still prescribed these psychotropic medications. Matson and Dempsey (2008) noticed that many children on these anti-psychotic medications are as young as 4 and 5 years old. Finding this unacceptable, they suggest that aggression and "problem [behaviors] should be chronic, severe and unresponsive to psychological and educationally based treatments" before addressing the behavior with medication. Because children and even adults with profound or severe intellectual disability are often cared for by their legal guardians, they are not legally able to consent to the use of psychotropic medications. When using medications for behavioral management, it is therefore of the utmost importance that practitioners must consider the individual's dignity, as well as use of less restrictive methods first.

Beyond the reasons discussed previously, the evidence that does exist for the use of these medications often do not answer important research questions to improve their claims. For example, one leading limitation of any pharmacological research, especially in this population, is the lack of long-term studies investigating the benefits and costs of long-term drug treatment. It is ethically understood why such studies would be difficult to conduct, because these medications are already known to have adverse side effects. Similarly, research on these anti-psychotic medications often fails to follow up with children as they mature, to investigate how the behavior symptoms continue to be controlled (or not). There is also little research comparing pharmacological approaches to their alternative, namely behavioral approaches as those previously described. These important questions only scratch at the surface of what remains to be answered regarding the use of psychotropic medications in children with developmental disabilities. However, an unfortunate truth as pointed out by Matson and Konst (2015), is that these research studies are often funded by the very people and corporations who stand to benefit from their success – the pharmaceutical manufacturers themselves. This bias, intentional or not, complicates the issues surrounding pharmacological research and interventions even more.

Caregiver, Professional Staff, and Clinician Attitudes Toward Aggression

Often professionals who work with children with developmental disabilities and aggressive behaviors do not realize the emotional toll managing challenging behaviors can place on themselves. Knotter, Wissink, Moonen, Stams, and Jansen (2013) suggest physical aggression often contributes to the individual having a "reputation" for "being" aggressive; caregivers may then associate aggressive behavior as a personal attack against them, which can influence their own emotional reaction to the situation (Knotter et al., 2013). These negative attitudes, though initially toward the aggression, may affect their day to day management of the client's behavior. This study of staff and client interactions by Knotter et al. (2013) found that negative attitudes towards aggression within a team were strongly associated with more frequent use of coercive measures such as physical restraints. Physical restraints are undignified and often traumatic experiences for the individual being restrained. It is important for all those who work with children with developmental disabilities to decrease the use of physical restraints as much as possible. The implications for these findings strongly suggest that training staff to decrease negative attributions with aggression could enhance treatment and the entire environment for both staff and the children or adults being served.

In a similar approach, Singh et al. (2006) found that including mindfulness training increased the staff member's ability to effectively manage the aggressive behavior and learning of the individuals. This evidence suggests that attitudes towards aggressive behavior are not only important and have consequences, but also that they can be managed. There are also larger implications for this in school settings where often children with aggressive behaviors are put in the more restrictive environments. Perhaps implementing mindfulness training for those who work closely with these students can also be helpful to reduce aggressive behaviors in the school system. Additionally, having typically developing students understand why their peers engage in these challenging behaviors could also lead to a more empathetic learning environment, creating a bridge to begin building the social supports and friendships often missing from children with developmental disabilities experience.

Supporting Families

Often families are most overwhelmed by the severe aggressive behaviors their children display. As Lecavalier, Leone, and Wiltz (2006) found, even though caregivers may differ on the rates of aggressive behavior, there is a strong relationship with the stress an individual caregiver experiences. Further, they found that stress and aggressive behavior often exacerbate each other, which can leave parents and caregivers in what can seem like a never-ending cycle (Lecavalier et al., 2006). Huge tantrum behaviors in public places can also make parents feel inadequate and judged by their peers. These fears may not be unwarranted. For example, the concept of the "refrigerator mother" dates back to the late 1960s and was used to explain why some children were "autistic", essentially blaming their mothers as cold women who did not show enough love and affection to their children. Unfortunately, remnants of the "refrigerator mother" era in the thoughts of others in their communities may also leave parents feeling as if their child's aggression and tantrum behavior is their "fault". As clinicians, it is important to understand families' struggle with these types of behaviors in their lives and the many ways it can affect them. Often parents and siblings feel alienated and unsupported in caring for a child with aggressive behaviors; these feelings can be exacerbated when the child grows up and becomes stronger, leaving them more exhausted and desperate for alternatives.

Though it is important to be respectful of a families' culture and beliefs, it is also necessary to be weary of certain unsubstantiated treatments like the ones described by Green et al. (2006). Parents often undertake unusual treatment methods such as special diets, aromatherapy, acupuncture, and other treatments that do not have strong evidence supporting their use; these types of treatments tend to be sought out more often by families with a child with severe autism and aggressive behaviors (Green et al., 2006). However, if parents are continuously pulled between overmedicating their child or implementing treatments that require lengthy amounts of time to take effect, then it is understandable why any alternative treatment offering a quick relief would be welcomed. Guiding parents to the most appropriate evidence-based treatment should always be done respectfully while providing them correct and comprehensive information regarding the effectiveness and potential side effects of such treatments.

Future Directions

The past 50 years have been prolific for research into the function of challenging behaviors, the best approaches to treatment, and many aspects of caring for a child with developmental disabilities with aggression and/or tantrum behaviors. However, there are still questions to be answered. In the field of developmental disabilities, assessment of individuals with profound and severe intellectual disability has traditionally been difficult because these individuals lack functional language and may have many issues in their adaptive functioning. As Smith and Matson (2010) recognize, behavior problems commonly occur among individuals with ID, and so it would be extremely beneficial for clinicians to understand this population's specific needs. Even so, there is still a large disparity in the development of assessment techniques appropriate for this population (Smith & Matson, 2010). Additionally, many studies fail to report any follow-up measures and whether generalization of treatment gains occurred. When treatment effects are described, there is no consistent means of reporting them, and sometimes abstract terms, such as "low rates", are used. Addressing these limitations would add to the strengths of current treatments for children with developmental disabilities.

Also, though much research has been done on decreasing aggressive behavior over time, more studies must be done on effective trainings for managing severe aggressive behavior in the moment it is already happening, and how to best train parents and caregivers in managing them. For example, if the child pulls hair and bites to escape a situation, parents, caregivers, teachers, and other individuals who work with children with developmental disabilities need to know the safest and best approaches to de-escalating these highly stressful situations, such as proper blocking techniques, how to manage their own stress, etc. One study by Calabro, Mackey, and Williams (2002) looked at two programs – The Nonviolent Crisis Intervention® (CPI), (National Crisis Prevention Institute, Inc., Brookfield, WI) and Handle with Care (Handle with Care Behavioral Management System, Old Bridge, NJ). Both programs are designed to teach mental health facilities staff about how to prevent and control disruptive behavior of clients, including self-defense skills for staff to use when encountering an aggressive client. However, more information is needed on whether these programs can be also be taught and utilized by families of children with developmental disabilities and aggressive behavior at a low cost and in a timely manner. Though many clinicians who work with children with developmental disabilities can also have experience managing aggressive behavior, most parents or teachers do not. Even if a parent is implementing new behavioral treatments, the aggressive behavior could still occur. More research on effective behavior management programs is needed to ensure families are equipped to handle these aggressive behaviors as they occur.

As far as the limitations of many pharmacological studies already discussed, future research could also compare different types of treatment with how they relate to a child's gender, the socioeconomic status of their family, parental education, region where they currently receive services, and various other social markers that could inform other disparities that the field is only recently beginning to address.

Conclusion

Aggressive and tantrum behaviors are often the most challenging behaviors that clinicians working with children with developmental disabilities and their families face. These behaviors co-occur at high rates and tend to be chronic without intervention. The most effective approach to treatment for aggression and tantrums is a behavioral analysis approach. There are many procedures that can be implemented that will target the problem behavior and can also work to improve alternative and accepted behaviors. Clinicians must be careful in relying on anti-psychotic medication to treat certain symptoms of developmental disabilities as research has shown it to be increasingly problematic. Not only are these treatments often ineffective unless paired with a behavioral plan, but they may place the individual at greater risk for harm. Combining an effective behavioral plan with a well-trained staff is the best foundation for success in treatment of aggression and tantrum behaviors. Clinicians and researchers still have much to investigate and learn in this area of developmental disabilities, and there is still a need for more research on efficient, evidence-based, and dignified treatments.

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Self-Injurious Behavior in Children with Intellectual and Developmental Disabilities: Current Practices in Assessment and Treatment

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Contents

Introduction

One of the first studies on treating self-injury was conducted by Tate and Baroff (1966) with a 9-year-old boy. Tate and Baroff defined *self-injurious behavior* (SIB) as behavior which produces physical injury to the individual's own body. The young boy had a 6-year history of engaging in SIB, which consisted of face slapping and banging his head forcefully against doors. He had developed bilateral cataracts and a complete detachment of the left retina likely caused from his head-directed SIB. The researchers decreased the SIB of the young boy via contingent withdrawal of physical contact and later with response-contingent electric shock. Since the original Tate and Baroff study, multiple reviews (e.g., Carr, 1977; Iwata, Pace, Dorsey, et al., 1994; Johnson & Baumeister, 1978; Kahng, Iwata, & Lewin, 2002a, 2002b; Matson & LoVullo, 2008; Richman, 2008) on the causes and treatment of SIB in persons with intellectual and developmental disabilities (IDD) have highlighted the emergence of multiple, effective assessments and treatments for SIB.

The dangerous nature of SIB makes immediacy and effectiveness of the intervention critical. Additionally, intervening earlier is important as a longer history of SIB may result in greater tissue

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damage (Newell, Challis, Boros, & Bodfish, 2002). It is also important to identify and intervene in SIB to avoid worsening the problem behavior (e.g., greater intensity, additional topographies) and to minimize the possibility of treatment resistance (Schroeder et al., 2014). This chapter will describe effective assessment and treatment procedures in children with IDD.

Prevalence

The prevalence of SIB in individuals with IDD has been found to be higher in children than adults. Estimates from client databases receiving IDD services in California and New York ($N = 89, 415$) showed 15.5% of children under the age of 20 with IDD engaged in SIB compared to 9.05% of reported adults ages 20–45 (Rojahn, Borthwick-Duffy, & Jacobson, 1993). Oliver, Murphy, and Corbett (1987) examined the prevalence of SIB among 596 individuals with DD and found that the prevalence of SIB was higher in late childhood and adolescence (i.e., between 10 and 30 years old), and individuals who exhibited more severe SIB were more likely to be significantly younger. Data showing a higher prevalence of SIB in children is concerning and provides more evidence that effective interventions be implemented as soon as possible.

Topographies

Multiple reviews on SIB of persons with IDD have reported a range of ways SIB has been classified. Oliver et al. (1987) categorized SIB into 19 different topographies. Kahng et al. (2002a) identified 13 topographies reported in the treatment research literature. Although classification is relatively arbitrary, the most common topographies of SIB tend to be head-directed SIB (Hyman, Fisher, Mercugliano, & Cataldo, 1990; Kahng et al., 2002a; Kurtz et al., 2003) such as head banging. Some other topographies included self-biting, body hitting, pica, scratching, skin picking, hair pulling, pinching, bruxism, hand mouthing, eye gouging, and orifice digging (Griffin et al., 1987; Kahng et al.; Kurtz et al.; Matson & LoVullo, 2008). Multiple reviews have also reported that individuals typically engage in multiple forms of SIB at a time (Hyman et al., 1990; Kahng et al., 2002b; Kurtz et al.; Oliver et al., 1987). Categorization of SIB has also occurred by using severity as an indicator. Severity may be difficult to define; therefore specific measurement procedures are necessary (e.g., Iwata, Pace, Kissel, Nau, & Farber, 1990). These will be discussed in the following section.

Measurement

Identifying a method of measuring SIB must take place in order to begin treatment. The many dimensions (e.g., frequency, intensity, magnitude or force, size, location) of SIB have been measured multiple ways. Measurement of SIB is typically done through direct observation by counting and recording the number of times the behavior occurs (e.g., Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993) or through recording the duration of continuous SIB (e.g., Goh et al., 1995) and bouts of SIB (e.g., Kroeker, Touchette, Engleman, & Sandman, 2004). These types of measures are most commonly used during assessment and treatment. Other measures such as the severity of SIB provide descriptive information but are used less often.

Objective measures of SIB severity may be difficult to obtain due to the individualized nature of individuals who engage in SIB. For example, a scratch may be a relatively minor injury. However, for an individual with a blood clotting disorder, it may be life threatening. Severity could vary based on different topographies of SIB, which may cause different amounts of tissue damage. For example, head-directed SIB in which the individual targets hard, sharp corners versus head hitting with an open palm might lead to more severe tissue damage. Measures of SIB severity have been taken from medical literature that take into account the number of injuries, the location of the injuries, and the type of injury (Iwata, Pace, Kissel, et al., 1990; Wilson, Iwata, & Bloom, 2012). Other studies on prevalence of

SIB have classified severity based on frequency of the occurrence of SIB (e.g., Cooper, 1998; Smith, Branford, Collacott, Cooper, & McGrother, 1996). Generally, SIB that is head-directed, frequent, and creates larger amounts of tissue damage is classified as more severe.

Another possible measure of severity of SIB could be through identifying overt signs of pain. Work by McGrath, Rosmus, Canfield, Campbell, and Hennigar (1998) and Breau, McGrath, Camfield, Rosmus, and Finley (2000) has contributed to the Non-Communicating Children's Pain Checklist (NCCPC), which is a reliable and validated rating scale that covers the presence and intensity of observational pain across seven subscales including vocal, facial expression, eating/sleeping, social/personality, facial expression, activity, body/limbs, and physiological. This checklist involves retrospective report and direct observation to determine pain in children and adults with IDD typically following an injury (e.g., burns, falls, injury), but may also provide some indication of pain and severity of SIB. For example, Breau et al. (2003) were able to delineate different forms of SIB (e.g., targeting different locations on the body) based on results of the checklist.

Multiple procedures to measure SIB before, during, and after it has occurred have been developed. However, it is sometimes difficult, or impossible, to observe the behavior as it is occurring (e.g., environments with limited data recording availability or SIB that occurs when no one is present). When this is the case, measurement must take place after the behavior has occurred and has left some evidence of occurrence (e.g., wound). This is referred to as permanent product measurement. This measurement system is convenient for the data collector if the SIB occurs infrequently, or covertly, because the data collector does not have to continuously monitor the individual to record SIB. For example, the Self-Injury Trauma Scale (SIT; Iwata, Pace, Kissel, et al., 1990) provides information on number, type, location, and severity of visible tissue damage. The SIT scale is completed by caregivers who can conduct a visual check of the individual. However, it does not require caregivers to directly observe SIB. This information can quantify previous injuries, which may help to determine future risk. The SIB scale may also be a useful permanent product measure, which can be used to measure treatment effects.

Recently, Wilson et al. (2012) described a more objective measure of SIB injury. They used a computer-assisted measurement tool to measure wound surface area. This technique involved photographing the injured area and uploading the photograph into a computer program, which analyzed (measure) the surface area of the wound. Wilson et al. used wound surface area as their dependent variable to measure treatment effects on covert SIB of a woman with Prader-Willi syndrome. Computer programs have also been used to analyze videotapes depicting SIB and compute the force of impact of self-striking (Newell et al., 2002).

Assessment

Vollmer, Sloman, and Borrero (2009) separated SIB assessment methods into two main categories: indirect and direct. Indirect assessment does not require information recording to occur at the same time the SIB is occurring. For example, information gathered from caregivers before the SIB has occurred (e.g., interviews and questionnaires) provide the clinician with information on topography and severity they might expect to see when conducting direct assessment. Similarly, measurement of permanent products (e.g., wounds, abrasions, tissue damage) after the occurrence of SIB can lead to valuable information when examining the effect of the treatment, or to identify correlated variables in the environment to inform direct assessment procedures. Direct assessment occurs when SIB is being directly observed and typically involves data being recorded at the time the SIB is taking place. For example, experimenter observation of clients in their typical setting when SIB is occurring provides information on the variables surrounding how the SIB is occurring and a more precise description of topography. Clinical manipulation of the variables as part of assessment (e.g., functional analysis) is also part of direct assessment and can lead to more precise intervention protocols. In the following sections, indirect and direct assessment of SIB will be discussed in detail.

Indirect Assessment

Indirect assessments use methods that do not require the assessor to be present while SIB occurs. For this reason, indirect assessments frequently involve the use of rating scales (e.g., Durand & Crimmins, 1988; Iwata, Pace, Kissel, et al., 1990; Rojahn, Matson, Lott, Esbensen, & Smalls, 2001), interviews (e.g., O'Neill, Albin, Horner, Storey, & Sprague, 2015), checklists (e.g., Paclawskyj, Matson, Rush, Smalls, & Vollmer, 2000; Van Houten & Rolider, 1991), and questionnaires (e.g., Lewis, Scott, & Sugai, 1994). Some advantages include time efficiency as well as less training as compared to direct assessments, which allows for greater access for clinicians, teachers, and aides (Vollmer et al., 2009).

Another advantage of indirect assessment is that it provides preliminary information to be used in direct assessments. For example, the Functional Analysis Screening Tool (FAST; Iwata, DeLeon, & Roscoe, 2013) is an interview used to identify factors that may influence SIB and other problem behaviors. The FAST was created specifically for use only as a screening tool as part of a comprehensive functional analysis of behavior. The Behavior Problems Inventory (BPI-01; Rojahn et al., 2001) is another tool that has been used to indirectly assess SIB. This respondent-based behavior rating instrument can provide information on frequency, severity, and topography of SIB. This information could be useful for epidemiological reasons or for administrative decision-making in regard to persons with IDD that engage in SIB. Furthermore, measurement of SIB using this tool might allow for monitoring of changing behavior problems or the emergence of new SIB in longitudinal assessments (Rojahn et al.). Rating scales and questionnaires like the FAST and the BPI-01 are also useful because they provide a consistent format for conducting an interview; they might serve as the basis of future interviews that could provide more specific information (Iwata et al., 2013).

A major disadvantage of indirect assessments is that they do not specifically identify cause-and-effect variables through controlled manipulation (Hall, 2005; Iwata et al., 2013; Thompson & Borrero, 2011). This may create a problem leading to false-positive or false-negative findings from indirect assessments when trying to determine the function of SIB. To address false-positive results, researchers have compared results from indirect assessments to direct assessments, and the findings are mixed. Some studies have found higher correspondence (Arndorfer, Miltenberger, Woster, Rortvedt, & Gaffaney, 1994; Cunningham & O'Neill, 2000; Durand & Crimmins, 1988; Hall , 2005; Lewis, Mitchell, Harvey, Green, & McKenzie, 2015), whereas other studies have found low correspondence between indirect and direct assessments (Crawford, Brockel, Schauss, & Miltenberger, 1992; Lerman & Iwata, 1993; Paclawskyj et al., 2000).

Another limitation of indirect assessments is that they rely on human report, which can be subjective and prone to bias, and may take place long after the SIB has occurred. Additionally, teachers, staff, or caregivers reporting SIB may have limited experience with the child. For example, a teacher may only work with a child for few months and may have only had a few experiences observing the behavior and may not fully know what to report. Furthermore, bias may lead the teacher to report that the SIB occurred because the students did not want to do their work, as opposed to reporting the consequence (i.e., the student was given a break) that occurred; the teacher may also forget about instances of the behavior that have happened in the past. Due to the serious limitations of indirect assessments, multiple authors have recommended using direct assessments in conjunction with indirect assessments (Beavers, Iwata, & Lerman, 2013; Iwata et al., 2013; Smith, Smith, Dracobly, & Pace, 2012; Vollmer et al., 2009; Zarcone, Rodgers, Iwata, Rourke, & Dorsey, 1991).

Direct Assessment

Direct assessment approaches involve direct observations that provide information about a person's behavior as it occurs (Miltenberger, 2011). Direct assessment is commonly used to assess why a child is engaging in SIB by directly observing the child in their typical setting with naturally occurring interactions. Direct assessment is usually more accurate than indirect assessment because you do not have to rely on other caregiver's memories or subjective reports (Miltenberger, 2011).

Direct assessment can be carried out in the form of descriptive analyses in which environmental variables are recorded as they happen, or through experimental functional assessment (i.e., functional analysis—to be discussed later), in which variables in the environment are manipulated by the professional. Descriptive analyses typically include the observer taking data on antecedent-behavior-consequence interactions in the child's environment and then inferring function of the behavior based on correlations in the data. For example, Lerman and Iwata (1993) observed subjects during 15-min sessions once or twice a day for several weeks and recorded naturally occurring sequences of subject and staff behavior including SIB as the target behavior. They then calculated conditional probabilities to identify relevant antecedent and consequent events.

A common descriptive analysis tool is the Functional Assessment Observation Form (FA; O'Neill et al., 2015). When using the FAOF observers identify topography of target behaviors, predictors, and perceived functions and then record across the day the time and frequency of when all of these events occur. It is assumed that patterns that may appear in the recording will reveal what the antecedents and consequences of the problem behavior are, due to the frequency with which they show up on the form as correlating with the problem behavior. These data can then be used to inform planning for treatment based on the identified function of the behavior. The FAOF is considered a naturalistic observation tool because observers do not manipulate or program for antecedent or consequence changes to test for function; instead the recording is event driven, occurring whenever a problem behavior or episode of problem behavior occurs.

Descriptive analyses have limitations that might lead to false-positive conclusions. One way this could occur is if a particular consequence commonly followed SIB, but was not a reinforcer for SIB. For example, Thompson and Iwata (2001) found attention of caregivers commonly follows dangerous behavior even if the attention may not function as a reinforcer. St. Peter et al. (2005) demonstrated events that follow problem behavior (including SIB) do not necessarily maintain or cause the problem behavior. They found that attention was highly correlated with problem behavior, following observation and computing of matching relations for three participants, despite functional analyses ruling out attention as a reinforcer.

Functional analysis (FA) is a type of direct assessment, which involves directly manipulating the variables (i.e., antecedent and consequence events) to identify the variable(s) that may maintain SIB. This type of assessment is the most common form of assessment to identify the function of SIB (Kahng et al., 2002a). In a seminal article on assessment of SIB, Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1984) manipulated social (i.e., social disapproval, academic demand, unstructured play) and nonsocial variables (i.e., leaving participant alone) to assess environmental functional relationships with SIB. They found higher levels of SIB were associated with exposure to specific variables relative to others, suggesting they were able to identify the variables causing and maintaining the SIB. Since this study, over 200 studies have been published using functional analysis to assess SIB (Beavers et al., 2013).

Due to the nature of SIB, it is important to consider potential risk before conducting an FA and consult medical personnel (Iwata et al., 1982/1994; Vollmer et al., 2009). However, this should not limit whether or not an FA is conducted. Kahng et al. (2015) reviewed records of 99 inpatients who engaged in SIB and found that conducting FAs on SIB was relatively safe when appropriate precautions were taken. It has been suggested by multiple researchers and clinicians that conducting an FA is best practice when determining the function of problem behavior including SIB (Hanley, Iwata, & McCord, 2003; Kahng et al., 2015; Vollmer et al., 2009).

Causes (Why Does SIB Occur?)

There are multiple hypotheses about why SIB occurs. Symons and Thompson (1997) identified seven: psychodynamic hypothesis, biological or organically based hypotheses, developmental hypothesis, side effect of minor illness hypotheses, self-stimulation hypothesis, learned behavior hypothesis, and neurochemical hypothesis. Although many hypotheses exist, research suggests that the majority of SIB occurs due to environmental events that have produced a learning history (Hagopian, Rooker, & Zarcone, 2015; Iwata, Kahng, Wallace, & Lindberg, 2000; Iwata, Pace, Cowdery, & Miltenberger, 1994; Iwata et al., 2000; Kahng et al., 2002a; Matson & LoVullo, 2008; Vollmer et al., 2009). The idea that SIB is a learned behavior is supported by the number of effective treatments that are based on manipulating antecedents and consequences in the environment (see Kahng et al. for review). That is, environmental control of variables can reduce SIB, so it is likely that these same variables cause or maintain SIB.

Although specific environmental variables controlling SIB are sometimes idiosyncratic, in previous reviews the most common behavioral functions of SIB have been divided into four categories: social negative reinforcement, social positive reinforcement, automatic reinforcement, and multiple functions (Iwata, Pace, Dorsey, et al., 1994; Kahng et al., 2002a).

Social negative reinforcement involves a socially mediated stimulus being removed following an individual engaging in SIB leading to maintenance or increase of SIB by that individual. This is commonly referred to as escape from a demand. For example, a caregiver may ask a child with IDD to get dressed. The child then engages in SIB and delays or removes the instruction by the caregiver to get dressed.

Social positive reinforcement involves a socially mediated stimulus being presented following an individual engaging in SIB, leading to maintenance or increase of SIB by that individual. The delivery of attention following SIB is a common socially mediated event that occurs. For example, a teacher offers a statement of concern, “Don’t do that, you’ll hurt yourself,” following a student engaging in SIB. The attention delivered by the caregiver, although well-meaning, could inadvertently reinforce the SIB.

Automatic reinforcement is said to maintain SIB when SIB occurs independent of social consequences. That is, the behavior is a direct result of one’s own behavior and does not involve reinforcement mediated by another person (Vaughan & Michael, 1982). For example, relieving an itching sensation through scratching would be considered automatic reinforcement. Rincover (1978) proposed automatic reinforcement occurs through sensory stimulation and as such could be eliminated through blocking the cause of stimulation (i.e., extinction). Other theories for how automatic reinforcement maintains problem behavior such as SIB refer to covert physiological actions including pain attenuation (Cataldo & Harris, 1982) and the production of endogenous opioids (Sandman, 1990, 2009). Automatic reinforcement, through covert mechanisms, may be more difficult to treat because the reinforcers maintaining behavior are not within the control of the practitioner (Vollmer, 1994). However, treatments do exist for SIB maintained by automatic reinforcement, as will be discussed later.

It has recently been suggested that automatically maintained SIB is further subtyped due to distinct functional properties of SIB (Hagopian et al., 2015). Hagopian et al. (2015) identified three subtypes of automatically maintained SIB among 39 individuals based on patterns of responding during the FA (e.g., levels of responding were high in the alone condition and low in the play condition). They also implemented treatments for all of the individuals to identify relationships between treatment outcome and SIB subtypes. They found significant differences across subtypes of automatically maintained SIB on effectiveness of treatment outcome. That is, interventions failed, and more intensive interventions were required for Subtypes 2 and 3 (SIB that was high and undifferentiated across functional analysis conditions and SIB including self-restraint, respectively). This study offers a subtyping model that may be useful for practitioners trying to reduce automatically reinforced SIB based on patterns of responding in the FA.

It may also be the case that the function of the SIB is controlled by multiple sources, or a clear function is unable to be identified (e.g., Smith, Iwata, Vollmer, & Zarcone, 1993; Vollmer, Marcus, & LeBlanc, 1994). In these cases, further assessment may be necessary. For example, Smith et al. (1993) sequentially exposed participants to multiple treatments each tailored to address a different function of multiple controlled SIB. They found that multiple different treatments were required to reduce SIB for two of three subjects, thus confirming the results of the previous FA. However, a single treatment was able to reduce SIB for one of the participants, suggesting spurious results of the initial FA.

Reviews identifying the prevalence of different functions of SIB have found consistent and interesting results. Iwata, Pace, Dorsey, et al. (1994) summarized functional analysis data from 152 cases of individuals who engaged in SIB and found social negative reinforcement functioned as the reinforcer maintaining the majority of the cases (38.1%). This finding corresponded to Kahng et al. (2002b) in which they also found social negative reinforcement to be the function for the majority (31.3%) of the cases they reviewed. Furthermore, there was close correspondence among the percentage of cases across all of the functions of SIB for both studies. However, the disparity between the functions was small (i.e., 31.3%, 26.4%, and 27.5% for social negative reinforcement, social positive reinforcement, and automatic reinforcement, respectively). This suggests SIB is not overwhelmingly maintained by access to a specific consequence for individuals with IDD; however, maintaining variables were able to be identified for 92% of the individuals (Kahng et al., 2002b).

Identifying why SIB occurs is critical to inform the treatment process. Multiple authors have suggested the process of identifying the function of SIB and then applying a function-based intervention is necessary to effectively treat SIB (Carr, 1977; Hanley, 2012; Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990; Kahng et al., 2002b). Additionally, school districts in the United States are legally mandated to conduct functional behavior assessments for individuals with ongoing behavior problems that preclude them from school according to revisions to the Individuals with Disabilities Improvement Education Act of 2004 (IDEA, 2004). Once a clinician or researcher identifies the function, there is a range of behavioral treatment options available.

Treatment

This section describes examples of behavioral treatments that have successfully reduced SIB in individuals with IDD following a functional analysis. Although medical and pharmacological treatments (e.g., electroconvulsive therapy, typical and atypical antipsychotics, selective serotonin reuptake inhibitors, naltrexone, lithium, and antiepileptic drugs) have been used with various degrees of efficacy (for review, see Minshawi, Hurwitz, Morriss, & McDougle, 2014), discussing them in depth is beyond the scope of this chapter.

Current behavioral treatments tend to be function based, meaning they rely on the results of a functional analysis or functional assessment to determine the function of a behavior and develop a treatment that is designed to address it. As discussed previously, the results of a functional analysis determine what events maintain a behavior. The treatments are guided based on this information and may include access to tangible items, access to attention, and escape. Treatments for SIB found to be automatically maintained are also described. General suggestions, including considerations for ensuring the safety of individuals who engage in SIB throughout assessment and treatment, and a summary of some punishment-based treatments, are discussed at the end of the chapter.

Function-Based Treatment for Socially Mediated SIB

Differential reinforcement of alternative behavior (DRA) is a procedure that involves reinforcing behavior that is different from the behavior targeted for reduction (Vollmer & Iwata, 1992). One of the most common forms of DRA involves the teaching of a communication response or functional communication training (FCT; Carr & Durand, 1985). FCT involves teaching the individual to appropriately request the reinforcer found to be maintaining SIB (Tiger, Hanley, & Bruzek, 2008). For example, if a child engages in SIB maintained by access to tangible items, the child may be taught to exchange a picture card to receive an item instead of engaging in SIB. Kurtz et al. (2003) pointed out that FCT is often paired with other components. Of 24 total participants in their summary cases of SIB in children, 8 were successfully treated using FCT plus extinction. However, successful treatment for 9 of the 24 participants required a punishment component.

FCT is a good treatment choice when the behavior is socially mediated, and there are several ways individuals can be taught to request for the reinforcer maintaining their SIB. Danov, Hartman, McComas, and Symons (2010) compared FCT of different request topographies with a 3-year-old boy with autism whose SIB was maintained by access to tangible items. They first conducted a preference assessment to identify highly preferred items. Next, they compared FCT using a vocal request to FCT using a picture card. They found that both the vocal response and picture card reduced SIB; however, the child did not independently request items during the vocal request condition. This has an important implication—choosing a response modality that the participant can use independently is an essential consideration when choosing FCT as treatment.

SIB has also been treated through differential reinforcement of behavior that does not involve reinforcing a specific alternative response. Differential reinforcement of other behavior (DRO) involves reinforcing the absence of the target behavior (Pierce & Cheney, 2013). Reinforcement is provided after a predetermined interval if the individual has not engaged in the target behavior during that time, regardless of other behavior. Kahng et al. (2002a) found that DRO was the most commonly used intervention for behavioral treatment of SIB from 1964 to 2002. Kurtz et al. (2003) used DRO, which involved delivering the reinforcer maintaining SIB contingent on the absence of SIB, with 4 of their 24 participants. For example, case 13 in their study specifically required DRO for escape-maintained SIB. More recently researchers have used DRO procedures to treat automatically maintained SIB in children with a nonfunction-based treatment (e.g., Cowdery, Iwata, & Pace, 1990; Paisey, Whitney, & Wainczak, 1993; Tiger, Fisher, & Bouxsein, 2009; Toussaint & Tiger, 2012). More will be discussed on SIB maintained by automatic reinforcement in the next section.

Differential reinforcement has been found to be more effective when SIB can be placed on extinction (Fisher et al., 1993; Volkert, Lerman, Call, & Trosclair-Lasserre, 2009). However, implementing extinction is not always possible (Athens & Vollmer, 2010; Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998). For example, implementing escape extinction (i.e., not allowing an individual to access a break or have demands briefly removed) may not be feasible because the caregiver has to block the SIB, thus producing a brief access to escape from demands.

An alternative intervention for decreasing SIB without extinction is noncontingent reinforcement (NCR; Vollmer & Iwata, 1992). This procedure involves providing access to a reinforcer continuously or on a predetermined schedule, regardless of other behavior (Pierce & Cheney, 2013). One benefit of NCR is that it does not require constant monitoring of the individual. Wilder, Normand, and Atwell (2005) used NCR to treat the SIB of a 3-year-old female with autism, gastroesophageal reflux, and food allergies who engaged in pinching, scraping, and scratching her own skin and hitting her head against the ground and other objects. The results of a functional analysis showed that the child engaged in SIB maintained by escape from demands, specifically the presentation of food. Treatment included NCR in the form of continuous access to a highly preferred video during sessions, and SIB resulted in a 15-s break during treatment sessions. This treatment resulted in a decrease of SIB from 44% of intervals in the initial baseline phase to 6% of intervals during treatment.

Vollmer, Marcus, and Ringdahl (1995) treated SIB in two male children with developmental disabilities using NCR during demand situations, which they termed noncontingent escape (NCE). Vollmer et al. provided escape (a break from demands) on a fixed-time schedule. There were no programmed consequences for SIB, and the frequency of SIB did not affect the frequency of breaks. NCE was successful in reducing SIB for both children from median rates of 1.6 and 3.2 during baseline to zero for both participants during NCE treatment. The researchers were also able to systematically increase the intervals between breaks. This intervention was successful not only in decreasing SIB but also in increasing the amount of work the participants completed. NCE might be a good choice in environments where frequent demands are presented (e.g., classrooms).

Another way to avoid the use of extinction is to combine reinforcement contingencies. In one study, researchers compared the efficacy of three treatment conditions for an 11-year-old female who was diagnosed with autism and engaged in hand biting maintained by escape from demands (Hoch, McComas, Thompson, & Paone, 2002). SIB resulted in a 30-s break from demands in all three conditions. In one condition, there was no programmed consequence for task completion. In another condition, task completion resulted in escape from demands. In the final condition, task completion resulted in escape from demands and access to a preferred activity. The researchers were comparing the efficacy of a treatment involving no contingency for task completion, negative reinforcement only for task completion, and negative reinforcement plus positive reinforcement for task completion. They found that SIB occurred at high rates and fewer tasks were completed during the condition in which there was no reinforcement for task completion. More tasks were completed, and problem behavior was reduced in the negative reinforcement plus positive reinforcement condition. This study suggests that combining positive reinforcement and negative reinforcement contingencies may be most effective for decreasing problem behaviors while increasing desired behaviors. This study is also different from many others because the treatment did not place problem behavior on extinction. Problem behavior was reinforced with a 30-s break. Even without using extinction, positive results of the treatment were maintained as the number of tasks to be completed increased and schedule of reinforcement was thinned. This is promising for implementation of treatment outside of clinical settings, where placing a behavior on extinction may not be possible.

Antecedent manipulations (i.e., altering what happens in the environment before the behavior occurs) have also been used to reduce SIB. O'Reilly, Sigafoos, Lancioni, Edrisinha, and Andrews (2005) rearranged a schedule of activities to address the SIB of a 12-year-old boy with autism and intellectual disabilities. Their functional analysis showed that the SIB occurred in the demand condition and seemed to carry over into other conditions that followed. During treatment analysis in a classroom, O'Reilly et al. (2005) compared a schedule that included 5 min of work, followed by 5 min of no interaction and then 5 min of play to the normal classroom schedule. Results showed that the antecedent manipulation of altering the activity schedule of the child decreased SIB and increased his engagement in classroom activities.

In addition to determining the function of SIB, researchers have addressed behaviors that consistently occur before the SIB. This is known as targeting the precursor behavior. This is particularly relevant when addressing attention-maintained problem behavior because it may be the case that delivering attention following SIB is unavoidable. This might occur in cases of severe SIB where the behavior must be blocked, for example, head banging on sharp corners or glass surfaces. In these cases, researchers have conducted functional analyses of precursor behavior and designed treatment based on those results. This was done with an older individual (a 29-year-old man) with an IDD who engaged in face slapping, face punching, and head banging (Dracobly & Smith, 2012). An unstructured observation was conducted to identify precursor behaviors, which were used as the target behavior within a functional analysis. The functional analysis determined access to attention to be maintaining the precursor behavior. Treatment consisted of providing attention for the precursor behavior and withholding attention for the SIB. The participant's SIB was successfully reduced and eventually eliminated through the assessment and treatment of precursor behavior. An advantage of this type of assessment and treatment is that it allows for addressing a target behavior while reducing the risk of harm for the participant (Dracobly & Smith).

To summarize, we have identified examples of effective interventions to reduce SIB that is socially mediated. It is important to point out that although one intervention (e.g., FCT) might have been used to reduce one type of socially mediated SIB (e.g., SIB maintained by access to attention), the same intervention has been successful at reducing other types of socially mediated problem behavior (e.g., access to escape).

Treatment for SIB That Is Maintained by Automatic Reinforcement

Researchers have identified and discussed the difficulties in treating automatically maintained problem behavior (e.g., LeBlanc, Patel, & Carr, 2000; Vollmer, 1994). One of the main difficulties lies in not being able to manipulate the functional reinforcer because it is not a socially mediated reinforcer. That is, reinforcement generated by the behavior itself cannot be accessed by the clinician or researcher. Delivery of stimuli that function as reinforcers for behavior that competes with SIB has been used in these situations.

Noncontingent reinforcement has also been used to treat SIB that is automatically maintained. Researchers conducted modified FAs with 64 individuals, including adolescents and adults, who engaged in chronic hand mouthing, and found that this behavior was automatically maintained for all but one participant (Roscoe, Iwata, & Zhou, 2013). Treatment evaluation was conducted for 14 individuals and showed that NCR alone (e.g., delivery of a leisure item) was successful in reducing SIB for 6 individuals. Other components, including response blocking, DRA, and brief manual restraint, were necessary for successful treatment for the other eight individuals. The use of these other components may not be feasible or practical in all cases. For example, response blocking would not be possible when the person implementing the intervention cannot stay close enough to the individual to block all SIB attempts, as would likely be the case in classrooms and other group settings. Additionally, manual restraint may not be allowed in all settings.

In another example of the application of NCR, researchers compared the efficacy of NCR alone, response blocking alone, and NCR plus response blocking for reducing the SIB of a 4-year-old male with autism (Saini et al., 2016). This child engaged in automatically maintained SIB in the form of self-biting. Blocking alone resulted in reductions of the SIB, but the reductions were not clinically significant. Treatment significantly reduced the occurrences of SIB only when NCR and response blocking were combined. Saini et al. (2016) noted that a modified blocking procedure was put in place in the NCR plus response blocking condition due to the high rate of SIB and the therapist's inability to block all attempts using the original blocking procedure. However, this modified blocking procedure was never tested alone.

To increase the efficacy of NCR, some researchers have employed the use of a competing stimulus assessment (CSA). A typical competing stimulus assessment (CSA) involves the comparison of 15 stimuli and a control condition across 2-min sessions (Piazza et al., 1998). The therapist gives the participant one stimulus to be evaluated at the beginning of each session. The therapist ensures that the item is still within reach if the participant sets it down and rates of target behavior and duration of stimulus contact are recorded.

Jennett, Jann, and Hagopian (2011) compared a typical CSA with two other CSAs: one in which the item was re-presented to the participant if she set it down and one in which the item was re-presented and response blocking was in place for SIB. The participant in this study was a 3-year-old female diagnosed with cerebral palsy, IDD, and shunted hydrocephalus. She engaged in SIB in the form of head hitting, finger and hand biting, and head banging. Results of a functional analysis suggested that this behavior was maintained by automatic reinforcement. This participant engaged in lower levels of SIB and higher levels of stimulus contact in the CSA, which included re-presentation of the item and response blocking for SIB. No stimuli reduced levels of SIB to a clinically acceptable level during the typical CSA. A treatment evaluation showed that the CSA plus re-presentation and response blocking was the most effective treatment. Although providing a competing stimulus is a practical treatment choice for a group setting, results of this study show that additional treatment components may be necessary for significant reductions of SIB. Conducting a brief comparison of CSAs with other components may help to predict the success of these treatments.

Treatment of automatically maintained SIB has also involved addressing precursor behavior. Hagopian, Paclawskyj, and Kuhn (2005) conducted a functional analysis of SIB (eye poking) exhibited by a 16-year-old male diagnosed with stereotypical movement disorder, IDD, and Down syndrome. The functional analysis showed that the behavior was maintained by automatic reinforcement. Previous treatments included response blocking, protective eye goggles, and noncontingent access to toys, which were unsuccessful in reducing SIB. Hagopian et al. modified their intervention to include response blocking for precursor behavior. Although there was no functional analysis of the precursor behavior itself, the addition of response blocking of the precursor behavior reduced eye poking from occurring in 38% of intervals on average in the original treatment to only 7.7% of intervals in the modified treatment. Not only did SIB decrease, but it also decreased the number of times the therapist was required to response block by 80%, which made the intervention easier and more practical to implement.

Protective equipment can be used to decrease SIB maintained by automatic reinforcement. One way the application of protective equipment might reduce SIB is through increasing the response effort of the SIB. Zhou, Goff, and Iwata (2000) increased the response effort of SIB by having participants (four women with IDD) wear flexible arm splints. Results showed that providing access to a reinforcer can reduce SIB, even if the reinforcer is less preferred than SIB, when response effort for SIB is increased.

Protective equipment has also been used to terminate the behavior-consequence relation in SIB through sensory extinction to decrease automatically maintained SIB. Moore, Fisher, and Pennington (2004) applied protective equipment to relative body parts of a 12-year-old female who engaged in over 18 topographies of automatically maintained SIB. These topographies were grouped into three categories: shoulder-directed, hand-directed, and leg-directed. Results showed that applying the protective equipment to relevant body parts decreased SIB to near-zero rates. These decreases occurred for each of the three groups of topographies only when the protective equipment was placed on areas of the participant's body where that topography of SIB was directed. Researchers identified sensory extinction (e.g., the protective equipment decreased or removed the sensory stimulation gained from SIB) as the most likely explanation for the effectiveness of this treatment.

Once behavior has been reduced or eliminated, fading protective equipment or restraints out of the treatment may be considered. As an example, restraint fading has been implemented to decrease the automatically maintained hand-to-head SIB of a 16-year-old female with IDD (Kahng, Abt, & Wilder, 2001). In this study, the participant wore mechanical arm splints throughout the day. The splints were systematically faded contingent on low rates of SIB by reducing the amount they restricted movement. Although the splints decreased her hand-to-head SIB, rates of other topographies of SIB (e.g., arm- or shoulder-to-head, head-to-surface) increased. Kahng et al. (2001) then implemented environmental enrichment by providing access to highly preferred items during the sessions, but this had little impact on SIB. Finally, they added a punishment component, contingent exercise, in which the therapist guided the child to touch her toes repeatedly for 30 s following all instances of SIB. This resulted in immediate suppression of the SIB. It is important to note that researchers were able to fade the mechanical restraints to flexible sleeves in 175 sessions over 1.5 months. This was done while maintaining low to zero levels of SIB during the combined intervention of restraints, contingent exercise, and environmental enrichment.

Removal of protective equipment has also been incorporated into a contingency as a treatment to reduce SIB. This was done with an 8-year-old boy who engaged in SIB in the form of closed-fist punches directed toward his head (Magnusson & Gould, 2007). Results of a functional analysis showed this behavior was maintained by automatic reinforcement. Magnusson and Gould (2007) compared a condition in which the child had continuous access to a soft foam karate helmet to a condition in which the helmet was removed contingent on each instance of SIB. When the helmet was removed, the child was prompted to fold his hands and count out loud to ten. Access to the helmet was given again once the child counted to ten without engaging in SIB. Results showed that the child's SIB remained high in the continuous access condition. SIB was reduced to near-zero levels immediately in the contingent removal condition.

The Role of Punishment in Treatment of SIB

As reported in the review of behavioral treatments of SIB from 1964 to 2000 (Kahng et al., 2002a), there was an increase in the number of studies using reinforcement-based interventions beginning in the early 1990s. As such, there were few recent studies that exclusively used punishment to decrease SIB. It is important to note that in this chapter, punishment refers to the addition or removal of a stimulus that results in a decrease of behavior. Although the studies included in this chapter primarily involve reinforcement-based procedures, it is worth noting that many included response blocking, which could be seen as a punishing component (e.g., Hagopian et al., 2005; Jennett et al., 2011; Roscoe et al., 2013) and, similarly, brief manual restraint (e.g., Kurtz et al., 2003; Roscoe et al.).

A common punishment treatment is response interruption. Response interruption has been successfully used to suppress problem behaviors such as pica (e.g., Hagopian & Toole, 2009; Hagopian, Gonzàlez, Rivet, Triggs, & Clark, 2011) and stereotypy (e.g., Ahrens, Lerman, Kodak, Worsdell, & Keegan, 2011; Brusa & Richman, 2008; Giles, St. Peter, Pence, & Gibson, 2012). However, Lydon, Healy, O'Reilly, and McCoy (2013) reviewed research on response interruption for treating challenging behaviors in individuals with IDD and cautioned that response interruption is unlikely to completely eliminate the targeted behavior. Given the harmful nature of SIB, this might not be a suitable intervention for addressing this behavior.

One recent study that used punishment alone used response interruption to treat SIB in a 14-year-old female diagnosed with Rett syndrome (Roane, Piazza, Sgro, Volkert, & Anderson, 2001). This child's exhibited hand mouthing and a functional analysis showed that it was maintained by automatic reinforcement. The researchers implemented a 5-s hands down procedure in which the child's hands were held down for 5 s contingent on hand mouthing attempts. Although treatment reduced SIB, it still occurred up to 1.1 responses per min during treatment.

Safety and Treatment of SIB

Many studies we reviewed commented on client safety during assessments and interventions. Prioritizing client safety is always important. This is especially true when assessing and treating SIB. We suggest having predetermined session termination criteria in place throughout assessments and treatments. Kahng et al. (2015) conducted a review to examine injuries related to functional analysis of SIB as compared to other settings. They found that injuries were relatively infrequent and rarely severe. Overall, this review stresses the relative safety of functional analyses of SIB as long as appropriate precautions are taken. In their seminal work on conducting a functional analysis of SIB, Iwata et al. (1982/1994) laid out the following safeguards: (1) each participant's current physical health was assessed by a physician; (2) the physician for each participant recommended termination criteria based on risk of physical injury; (3) if termination criteria were met at any time for a participant, the session was terminated, SIB was blocked using restraint, and the participant was assessed by a nurse or physician; (4) after four sessions, each participant was examined by a nurse; and (5) each participant's case was reviewed at least once a week by several members of a multidisciplinary team.

Conclusion

The behavioral treatment of SIB in children with disabilities has been extensively researched since the early 1960s. Effective procedures have evolved and developed since that time. Arguably, the inclusion of functional behavior assessment has likely had the biggest impact in changing and improving intervention in SIB. This stems from the data that SIB is largely a learned behavior and can be intervened upon by manipulating antecedents and consequences in the environment.

Advances in assessment and intervention procedures have led to the reduction in the usage of punishment procedures as well as more systematic, socially acceptable, and accurate identification of functions and treatment for SIB.

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Pica in Individuals with Developmental Disabilities

Esther Hong and Dennis R. Dixon

Contents

Pica in Individuals with Developmental Disabilities

Pica is the consumption of nonfood, nonnutritive substances (American Psychological Association [APA], 2013) and is the most commonly observed feeding disorder among children and adolescents with developmental disabilities (Barrett, 2008). Pica has historically been treated as a feeding and eating disorder specific to infancy or early childhood (APA, 2000). More recently though, pica was reclassified under the "Feeding and Eating Disorders" category in the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5; APA, 2013), which broadened the onset criteria to individuals of all ages. Pica is a significant challenging behavior in that it can lead to serious medical problems and, in some cases, even death. Due to the severe medical consequences of pica, some researchers have classified pica as self-injurious behavior (SIB; Call, Simmons, Lomas Mevers, & Alvarez, 2015; Williams & McAdam, 2016).

According to the DSM-5, symptoms must persist for over a period of at least 1 month, be inappropriate to the developmental level of the individual, and not part of a culturally supported or socially normative practice (APA, 2013). Commonly reported types of pica include geophagy (consumption of earth; Johnson, 1990), chthonophagy (consumption of dirt; Johnson, 1990), lithophagy (consumption of stone or gravel; Johnson, 1990), coprophagy (consumption of feces; Foxx & Martin, 1975), and other nonfood items (e.g., chalk, paper, paint chips, cigarette butts). Although the DSM-5 states that pica is of "nonfood" items, some researchers have broadened pica topography to include nonnutritive food consumption, such as amylophagy (consumption of raw starches; Johnson, 1990) and pagophagy (consumption of ice; Miao, Young, & Golden, 2015), or to include food items

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that are retrieved from inappropriate places (e.g., floor, trash; Hirsch & Smith-Myles, 1996).

Pica is common among certain cultures. An individual does not meet the DSM-5 criteria for pica if feeding behaviors are supported by cultural practices (APA, 2013). For example, children in sub-Saharan Africa (Nchito, Geissler, Mubila, Friis, & Olsen, 2004) and pregnant women across Africa commonly engage in geophagy (28–100%; Young et al., 2010). In areas where geophagy was less common, amylophagy was much more frequently reported (Young et al. 2010). In the United States, pica is more common in rural (Johnson, 1990) and underdeveloped areas, with reports of pagophagy among pregnant, African-American women (Edwards et al., 1994) and geophagy among pregnant women in the rural South (Johnson, 1990).

Pica is sometimes considered not to be a major behavioral or medical problem (McAlpine & Singh, 1986; Williams & McAdam, 2012). Consequently, this behavior is commonly missed, and individuals with this disorder engage in this potentially dangerous behavior for several years before it is detected (McAlpine & Singh, 1986). Pica has many medical consequences including intestinal obstruction or puncture, acute weight loss, poisoning, dental health problems, infection, and gastrointestinal parasites (Call et al., 2015; Foxx & Martin, 1975). These complications may result in emergency surgery and even death (APA, 2013; Bell & Stein, 1992; McAdam, Sherman, Sheldon, & Napolitano, 2004). In addition, ingestion of certain nonfood items (e.g., paint chips, soil) can impair intellectual and physical development. Thus, detection of pica and subsequent treatment should be a high priority.

Pica affects people across ages, gender, geographic location, and socioeconomic status (Sayetta, 1986; Young et al., 2010). Pica is frequently reported among pregnant women and less frequently among young, typically developing children. In very young children, the behavior is not considered true pica but rather a habitual mouthing behavior, which diminishes with age and is virtually nonexistent by age 2 (Barrett, 2008; Johnson, 1990). Pica is commonly comorbid with autism spectrum disorder (ASD) and ID and less commonly comorbid with schizophrenia and obsessive-compulsive disorder (OCD; APA, 2013). Kinnell (1985) found that 60% of the ASD group engaged in pica, while only 4% of the Down's syndrome group engaged in pica. Individuals with profound ID are most likely to be affected by pica (Ali, 2001; APA, 2013), and prevalence among individuals with ID appears to increase with severity of ID. Although pica is not commonly reported among individuals with ID in the community, high rates of pica are found in clinics and institutions (5.7–25.8%; Ashworth, Hirdes, & Martin, 2009), with one report finding the prevalence of pica to be as high as 25.8% in institutionalized people with ID (Danford & Huber, 1982). It should be noted that pica is commonly missed and underreported (Rose, Porcelli, & Neale, 2000), thus, the prevalence is difficult to ascertain (APA, 2013). Underreporting is a problem and difficult to control. Fear of chastisement may contribute to this underreporting (Young et al., 2010). When pica occurs in the context of other mental disorders, particularly ASD, it is imperative to seek clinical and/or behavioral treatment (APA, 2013).

Several theories regarding the etiology of pica, including behavioral or nutritional causes (Bugle & Rubin, 1993; Chisholm & Martin, 1981; Lofts, Schroeder, & Maier, 1990), have been evaluated. Some research has indicated that pica may be caused due to micronutrient deficiencies (e.g., iron, zinc), hunger, gastrointestinal distress, and protection from pathogens and toxins (e.g., Rose et al., 2000; Young et al., 2010). One meta-analysis found that compared to individuals without pica, those with pica were more likely to have anemia, low hemoglobin concentration, low hematocrit concentration, and low plasma zinc concentration (Miao et al., 2015). Researchers have hypothesized that these factors result in nutritional deficiencies. Further, they theorize that individuals experience cravings and engage in inappropriate feeding behavior in order to satisfy the cravings and eliminate the nutritional deficiencies (reviewed by Barrett, 2008). However, it is unclear if the nutritional deficiencies were the cause or the result of the pica. Nonetheless, among young children without intellectual impairments, a nutritional-deficiency approach was found to be the most common treatment applied (McAdam et al., 2004). However, Rose and colleagues (2000) found no significant differences in nutritional deficiencies between children and adolescents with pica and those without. Overall, there is some evidence to support this theory; however, data are limited and much more research needs to be conducted.

While the direct causes of pica remain unclear, there has been significant support for a behavioral etiology (Favell, McGimsey, & Schell, 1982; Smith, 1987). Pica is found to be most commonly maintained by automatic reinforcement (Hanley, Iwata, & McCord, 2003; Williams & McAdam, 2012). Further, there is support for pica to be maintained by social variables. In a study of institutionalized adults with ID (*N* = 1008*)*, Ashworth and colleagues (2009) found that pica was significantly associated with the absence of a strong and supportive relationship with family and reduced social contact with family and/or friends (i.e., visit, overnight stay, or other types of interaction within the last 30 days). These participants had spent an average of 41.6 years in an institutional setting, and 71.7% of participants had left their family home before the age of 10. The inverse relationship between pica and social interaction suggests that decreased levels of social interaction were associated with increased rates of pica (Ashworth et al., 2009). These findings warrant further investigation of the behavioral and social variables that maintain pica.

Assessment

Professionals who treat individuals with developmental disabilities are recommended to screen for pica by reviewing medical history, interviewing caregivers, observing behavior, and/or implementing challenging behavior screening scales (Williams & McAdam, 2012). However, well-developed assessment scales designed to detect pica are limited but include the Screening Tool of Feeding Problems (STEP; Matson & Kuhn, 2001), the Autism Spectrum Disorders-Comorbidity for Children (ASD-CC; Matson & Gonzalez, 2007), and the Behavior Problems Inventory (BPI; Rojahn, Matson, Esbensen, & Smalls, 2001).

The STEP (2001) is a 23-item questionnaire that screens for feeding problems presented by persons with ID. The questions are designed using a Likert-type format and assess for the frequency and severity of feeding problems. This screening tool represents five categories of feeding problems. These categories include aspiration risk, selectivity, skills, food refusal-related behavior problems, and nutrition-related behavior problems. Items that may be associated with pica such as “he/she eats or attempts to eat items that are not food” are included in the nutrition-related behavior problems category.

The ASD-CC (2007) is an 84-item questionnaire that screens for comorbid conditions with ASD, including depression, conduct disorder, attention-deficit hyperactivity disorder (ADHD), tic disorder, OCD, specific phobia, and eating difficulties. In regard to pica, informants are instructed to rate the feeding item (i.e., eats things that are not meant to be eaten [e.g., eats paint chips, dirt, hair, cloth, etc.]) for the extent that it is a recent problem. While this tool is not a screening tool specific to the assessment of pica, it may be an important first step in assessing pica in individuals with ASD.

The BPI (2001) is 52-item questionnaire that screens for problem behaviors (i.e., SIB items, stereotypic behavior items, and aggressive/destructive behavior items) in individuals with ID. Pica is included within the SIB section and is defined as the “mouthing or swallowing of objects which should not be mouthed or swallowed for health or hygiene reasons (non-food items such as feces, grass, paper, garbage, hair).” The BPI is one of the few instruments that specifically assesses for the frequency and severity of pica.

The STEP, ASD-CC, and BPI are efficient tools for assessing pica in individuals with ID or ASD. All of these scales have demonstrated good reliability and validity (Gonzalez et al., 2009;

Kuhn & Matson, 2002; Matson, LoVullo, Rivet, & Boisjoli, 2009). These indirect methods of assessment can be useful in identifying the presence of pica.

Treatment of Pica

The treatment of pica has received significant attention over the years and has been the subject of a number of reviews (Hagopian, Rooker, & Rolider, 2011; Matson, Hattier, Belva, & Matson, 2013; McAdam et al., 2004). Overall, most studies have focused on behavioral treatments; however, some few researchers have address biological treatments such as nutritional supplements. These treatments are discussed in turn.

Biological Interventions

A number of researchers have discussed biological variables in regard to the etiology of pica (Barrett, 2008; McAdam, Briedbord, Levine, & Williams, 2012). However, studies that have evaluated biological treatment based upon these etiological explanations have been scarce. In general, biological treatments have exclusively focused on the use of nutritional supplements to treat the hypothesized cause of the challenging behavior (Matson et al., 2013; McAdam et al., 2012).

Biological interventions such as providing nutritional supplements (e.g., iron supplement, multivitamins) have received some attention from researchers (e.g., Bugle & Rubin, 1993; Gutelius, Millican, Layman, Cohen, & Dublin, 1962; Pace & Toyer, 2000); however, empirical evaluations of these treatments have not found evidence to support their use. For example, in a controlled trial, Gutelius and colleagues (1962) found that iron supplementation did not yield any clinically significant differences between groups. More recent studies have had significant limitations such as an uncontrolled research design (Bugle & Rubin, 1993), small sample size (Pace & Toyer, 2000), and variable results (Pace & Toyer, 2000). Due to these issues, biological interventions have insufficient evidence to support their use as treatments for pica (reviewed by Matson et al., 2013).

Behavioral Interventions

A key aspect of most behavioral interventions is to first identify the operant function of the challenging behavior. Functional analysis procedures are typically categorized as either direct or indirect (Dixon, Vogel, & Tarbox, 2012). Once the function of the behavior is identified, the clinician is able to choose the most appropriate intervention to address the variables that maintain the behavior.

Indirect functional analysis methods consist of gathering information about the person and potential environmental factors that may be serving to reinforce the behavior. Typically, a clinician may distribute a questionnaire or interview the caretaker of the individual with pica regarding the frequency, severity, and contexts of behavior. An indirect functional analysis can help identify the topography and function of behavior, but some researchers have argued that they may not always be sufficient for determining the operant function of a challenging behavior (Williams & McAdam, 2016). It should also be noted though that indirect functional analyses may be more effective at identifying the function of behavior when the behavior is of a low frequency and unlikely to be observed within typical observation periods.

Direct methods of functional assessment include experimental approaches to identifying the variables that maintain the SIB (i.e., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). During a direct functional analysis, a clinician will take an experimental approach to identify the variables that maintain the behavior. By using safe, baiting methods (i.e., presentation of food and nonfood items) to manipulate the antecedents and consequences of behavior, researchers can identify under which contingencies the behaviors are maintained. A direct functional analysis may provide more detailed information regarding the function of a behavior. However, an experimental functional analysis may require several hours per day, over a period of 2–3 weeks, across clinicians (Matson, Bamburg, Cherry, & Paclawskyj, 1999). Therefore, conducting an experimental functional analysis can be very time and resource intensive and also may yield results lacking in reliability and validity (Matson et al., 1999; Sturmey, 1995). Instead, practitioners may utilize reliable, indirect functional analyses such as the Questions About Behavioral Function (QABF; Matson & Vollmer, 1995), which was found to predict the function of behavior in 75% of cases (Hall, 2005). Following the functional analysis, the contributing variables are altered during treatment to reduce the challenging behavior (Hanley et al., 2003).

The application of functional analyses has led to significant advancements in the assessment and treatment of pica in individuals with developmental disabilities. Studies have found that pica is most commonly maintained by sensory or automatic reinforcement (e.g., oral stimulation; Delaney et al., 2015; McAdam et al., 2004) and less commonly maintained by social variables, such as access to tangible items and/or attention, or physiological variables, such as the addictive effect of nicotine in cigarettes (Piazza et al., 1998).

Once the function of the behavior is identified, treatment may be implemented to reduce pica and generalize results across settings. Meta-analyses have found that comprehensive behavioral interventions are well-established and have been highly effective in treating pica (Call et al., 2015), with several studies reporting more than a 90% reduction of pica (Hagopian et al., 2011). Behavioral treatments that have been effective in reducing or eliminating pica will be described in turn. Interventions have been categorized under (a) antecedent modification interventions, (b) response-contingent interventions, and (c) punishment-based interventions.

Antecedent Modification Interventions

Noncontingent reinforcement (NCR) is the most commonly used intervention for pica (McAdam et al., 2004). NCR is a well-established treatment that can be useful for interrupting or preventing automatically maintained behavior by providing alternative sources of reinforcement (Favell et al., 1982). During NCR procedures, a reinforcer (e.g., toy, food, attention) is presented independent of a response (Cooper, Heron, & Heyward, 2007). Reinforcement can be delivered on a fixed-time schedule (e.g., reinforcement provided every 5 min) or variable-time schedule (e.g., reinforcement provided on average of every 5 min; Huete, Schmidt, & Lopez-Arvizu, 2014). In addition, the reinforcer does not need to be functionally related to the challenging behavior. NCR has been effective in reducing challenging behaviors maintained by automatic reinforcement (e.g., oral self-stimulation) because alternative sources of reinforcement are provided (Favell et al., 1982).

Several studies have found that NCR was successful in reducing pica. The noncontingent presentation of food or toys that can be safely mouthed have been effective in reducing pica because the alternative objects provides access to the same source of stimulation and thus provides the same, or similar, reinforcement (McAdam et al., 2004). Favell and colleagues (1982) provided popcorn and toys to three adolescent participants with profound ID, whose behavior was hypothesized to be maintained by gustatory reinforcement. Pica was reduced to 0% in two study participants and to 5% in one study participant. In another study, the cigarette pica of a 17-year-old male with severe ID and ASD was hypothesized to be maintained by physiological variables (i.e., nicotine). Piazza, Hanley, and Fisher (1996) found that the participant's pica was maintained when the environment was baited with cigarettes that contained tobacco with nicotine but was not maintained when baited with cigarettes that contained herbs without nicotine. Treatment consisted of the noncontingent presentation of preferred foods and a contingent verbal interruption, "no butts." Following treatment, the participant's pica was reduced to 0 responses per min (Piazza et al., 1996). In a separate study by Piazza and colleagues (1998), a functional analysis of pica was conducted for three participants with intellectual disabilities. For two of the three study participants, a 5-year-old male with moderate ID and a 4-year-old female with profound ID, pica was found to be maintained by social and automatic reinforcement. The noncontingent presentation of attention and continuous access to tangible reinforcement led to significant reduction of pica.

Environmental enrichment procedures utilize the participant's environment to reduce pica by ensuring the environment includes items hypothesized to compete with pica (e.g., preferred food, toys, and activities; Call et al., 2015). By increasing the available preferred items in the environment, the potential for reinforcement is maximized (Williams & McAdam, 2016). In a participant group of young children, the addition of play and other recreational activities resulted in decreased levels of pica (Madden, Russo, & Cataldo, 1980). Similar results were found when leisure activities were provided for an adult male participant with developmental disabilities (Burke & Smith, 1999). Enrichment of foods (e.g., using highly spiced, flavored foods with meals/snacks, teaching participants to exchange nonfood items for preferred food items) was also found to reduce pica (Baker, Valenzuela, & Wieseler, 2005).

Discrimination training procedures aim to prevent pica by teaching individuals to correctly discriminate edible versus nonedible food items. However, discrimination training alone cannot eliminate pica and thus are applied in conjunction with a response-contingent intervention following pica attempts. Johnson, Hunt, and Siebert (1994) taught two male teens with profound ID to only eat food placed on a specific placement. When pica occurred, the participants were required to spit out the nonfood item and wash their faces for 15 s. Pica was reduced across settings (e.g., dining room, alone, group activity room) in both participants. In another study, a 21-year-old female with profound ID and epilepsy was taught to discriminate between food and nonfood items and subsequently place the nonedible items in the trash (Bogart, Piersel, & Gross, 1995).

Response effort manipulations have been found to be effective in reducing pica. Piazza, Roane, Keeney, Boney, and Abt (2002) manipulated response effort among three participants whose pica was maintained by automatic reinforcement. When response effort to engage in pica was low or medium, with no access to alternative items, pica level was the highest. When response effort to engage in pica was high, with no access to alternative items, pica was still reduced. When response effort for alternative items was increased, pica increased and effort to engage with alternative items decreased. Lowest levels of pica were found when response effort to engage in pica was high and alternative, preferred items were available. These findings indicate that increasing the effort required to engage in pica, in addition to NCR, may reduce the behavior.

Response-Contingent Interventions

Differential reinforcement (DR) is used to increase desired behaviors through reinforcement and to decrease challenging behaviors through extinction (Cooper et al., 2007). In differential reinforcement of incompatible behavior (DRI), behaviors that are incompatible with, or cannot occur at the same time as, the problem behavior are reinforced. In differential reinforcement of alternative behavior (DRA), alternative, appropriate behaviors are reinforced (Huete et al., 2014). Typically, during DRI and DRA procedures, the challenging behavior is placed on extinction. In some cases, extinction may not be possible depending on the severity of the challenging behavior and may require additional manipulation of the environment to increase opportunities for appropriate behavior (Athens & Vollmer, 2010).

Studies have found that DRI and DRA procedures led to a reduction of pica (Call et al., 2015; Donnelly & Olczak, 1990; Goh, Iwata, & Kahng, 1999; Smith, 1987). Contingent on an attempt of pica, Smith (1987) provided a verbal prompt not to ingest the inedible object (e.g., paper clip, paper, bottle caps) and instructed the participant to remain on task. Verbal praise and tokens were provided when the participant performed the incompatible behavior (i.e., keeping hands on work materials). Following DRI intervention, pica occurrence decreased from 21.3 occurrences of pica per day to 3.7 occurrences per day. In DRA procedures to treat pica, alternative behaviors (e.g., handing pica item to a clinician, discarding pica item in the trash, engaging in a leisure activity) were reinforced (Call et al., 2015). DRA was found to be effective in reducing cigarette pica in 38-year-old and 44-year-old males with profound ID. Attempts of pica were interrupted, and a reinforcer was provided contingent upon alternative behavior (i.e., chewing sugarless mint gum).

Response-blocking procedures are time and staff intensive in that they require a caregiver to provide constant supervision and remain in close proximity to the participant in order to physically block access to pica items. Response blocking can only reduce pica if each attempt of pica is consistently interrupted (McCord, Grosser, Iwata, & Powers, 2005). Consequently, response-blocking procedures are rarely used as a sole intervention and instead are included as part of an intervention package (Williams & McAdam, 2016). Mechanical restraint (i.e., face mask, helmet, and arm restraints) and response blocking (i.e., pica item pushed down before entry into the mouth) were both found to be effective in reducing pica in a 4-year-old girl with profound ID (LeBlanc, Piazza, & Krug, 1997). LeBlanc and colleagues (1997) concluded that response blocking was the preferable intervention since it was less restrictive, resulted in fewer negative vocalizations, and increased opportunities for social interaction. In a study evaluating the effectiveness of a protective equipment (i.e., helmet) as a response-blocking tool, Mace and Knight (1986) found that the helmet alone did not prevent or reduce pica. Rather, lower levels of interaction (i.e., staff-participant interaction) with no helmet resulted in the lowest levels of pica. These findings suggest that both social interaction and response-blocking equipment may influence the reduction of pica (Mace & Knight, 1986).

During visual screening procedures, a type of blindfold is placed over the participant's eyes immediately following the pica attempt. Singh and Winston (1984) found that visual screening for 1 min resulted in significant reduction of pica in a 24-year-old female with profound ID. In another study of three toddlers with profound ID and pervasive developmental disorders, pretreatment assessments suggested that facial screening would be an effective intervention (Fisher et al., 1994). Participants were verbally reprimanded following each occurrence of pica and his/her eyes covered for 30 s. Pica was reduced and, further, remained at low levels at a 9-month follow-up. Contingent upon pica, visual screening (i.e., covered face with bib) and physical restraint (i.e., held hands to side for 15 s) were implemented. Pica decreased from 25 occurrences per month to 12 occurrences per month (Bogart et al., 1995).

Punishment-Based Interventions

In punishment-based procedures, an environmental stimulus is either provided following a behavior (i.e., positive punishment) or removed following a behavior (i.e., negative punishment; Lerman & Vorndran, 2002). Positive punishment procedures include overcorrection, aversive stimuli, and physical restraint. Negative punishment procedures include response cost and time-out. A limitation of punishment-based procedures is that they do not teach appropriate or replacement behaviors (Huete et al., 2014). As a result, punishment-based interventions should be implemented in conjunction with an antecedent-based intervention, which reinforces and teaches appropriate behavior.

In a review by McAdam and colleagues (2004), overcorrection was the most commonly used punishment-based intervention. However, a study using overcorrection treatment methods has not been published in almost 30 years. Overcorrection, a type of "work and effort" procedure, is considered a mild punishment procedure that once was favored because it required the participant to make restitution for the challenging behavior and to exhibit more appropriate behaviors (Matson et al., 2013). Overcorrection procedures vary across studies and range from simple overcorrection procedures (e.g., spit object out and wash the mouth with washcloth for 15 s; Kalfus, Fisher-Gross, Marvullo, & Nau, 1987) to multistep, complex procedures. In an overcorrection procedure created by Foxx and Martin (1975) to eliminate coprophagy, contingent on a pica attempt, the trainer manually guided the participant toilet bowl and verbally instructed the client to spit the feces into the toilet. Next, the participant was required to brush their mouth, teeth, and gums with a toothbrush soaked in oral antiseptic. The participant was then required to wash their hands and scrub fingernails for 10 min. In addition, the participant was required to clean their anal area with a cloth and then briefly wash their hands. Lastly, the participant was guided back to the area where they were discovered engaging in pica and required to either mop up the area with a disinfectant. If the participant had obtained feces from an unflushed toilet, the participant was required to flush all unflushed toilets. This overcorrection procedure created by Foxx and Martin (1975) took approximately 30 min to complete. After just 2 weeks of this overcorrection intervention, the target behaviors had decreased to 0%. In addition, the elimination of pica was maintained at the 7-week follow-up. Although overcorrection methods are effective, they are time and staff-intensive and thus limited to institution or hospital settings.

The presentation of aversive stimuli has also been used as a punishment-based intervention to limit and reduce pica. Aversive stimuli are provided contingent upon the occurrence of problem behavior. Commonly reported aversive stimuli included a squirt of water mist on face or a squirt of lemon juice in mouth (Paisey & Whitney, 1989; Rojahn, McGonigle, Curcio, & Dixon, 1987). These methods have been viewed as controversial but were effective in the reduction of pica. Following aversive stimuli treatment of squirting lemon juice in his mouth, a 16-year-old male with profound ID no longer engaged in the ingestion of nonedible objects (e.g., broken glass, pins, cigarette butts; Paisey & Whitney, 1989). In a 16-year-old female with multiple disabilities, the presentation of water mist in the face or sniff of aromatic ammonia resulted in a significant reduction in pica occurrence. In spite of these successes, treatment of pica has moved away from aversive stimuli to more socially accepted interventions (Matson et al., 2013).

Physical and mechanical restraints are also controversial methods of treatment but are still implemented given the high potential for serious medical complications following each instance of pica (Matson et al., 2013). Physical restraint procedures (e.g., holding down arms to side) had high rates of success (up to 97.3% reduction of pica; Call et al., 2015) when applied in conjunction with other reinforcement-based interventions. In a comparison study between physical restraint and overcorrection interventions, physical restraint was found to be more effective in reducing pica than overcorrection (Singh & Bakker, 1984). Several studies found that implementing physical restraint procedures for various time intervals (e.g., 10 s, 15 s, 30 s; 1 min; Williams & McAdam, 2016) reduced pica. However, it is unclear whether brief intervals or longer intervals of physical restraint are most effective in reducing pica or if treatment outcomes maintain over time.

Time-out procedures have not been commonly implemented to treat pica. Therefore, there is insufficient evidence for the efficacy of this intervention to reduce pica. However, a study by Ausman, Ball, and Alexander (1974) found that pica was reduced to 0% following a time-out procedure. Contingent on the behavior, the study participant, a 14-year-old male with severe ID, was told “don’t eat that” and required to wear a time-out helmet for 15 min.

A number of behavioral interventions are effective to reduce pica. These interventions have been grouped as (a) antecedent modification interventions, (b) response-contingent interventions, and (c) punishment-based interventions. Well-established interventions include NCR (Favell et al., 1982; Mace & Knight, 1986), environmental enrichment (Madden et al., 1980), and overcorrection (Foxx & Martin, 1975).

Interventions such as response effort manipulations (Piazza et al., 2002) and response blocking (McCord et al., 2005) have limited evidence but warrant additional research.

Discussion

As previously noted, pica is a challenging behavior that can lead to severe medical complications, including death. There are many different types and forms of pica, including geophagy, amylophagy, chthonophagy, lithophagy, pagophagy, and coprophagy. Some types of pica, including geophagy and amylophagy, are culturally accepted practices and as such, do not meet the criteria for the diagnosis of pica. However, the ingestion of a nonfood or inappropriate food items should be considered a major medical and behavioral problem because it can lead to medical complications and impair intellectual and physical development.

A continued issue is that the prevalence of pica is difficult to ascertain because pica is commonly undetected and underreported. Pica is commonly comorbid with ID and ASD, with prevalence of pica increasing with severity of ID. The majority of the study participants in the existing literature included individuals with ID. For example, Kinnell (1985) found that as many as 60% of individuals with ASD engaged in pica. However, McAdam and colleagues (2004) found that only 4 of the 44 participants included in their review had ASD, while 32 participants had profound ID. Additional research is needed to evaluate the effects on behavioral treatments of pica in individuals with ASD and other comorbid disorders. In addition, the sample size of study participants should be increased. In a review of treatments for pica, Hagopian and colleagues (2011) found that the average number of participants per study was 1.92 (range 1–4). Due to the underreporting of pica, it may be challenging for researchers to increase the number of study participants per study. Consistent use of screening tools such as the STEP, ASD-CC, and BPI should improve the accuracy of these prevalence estimates.

Some researchers have hypothesized that the etiology of pica is due to nutritional deficiencies, such as anemia or low iron and zinc levels, and that individuals engage in pica to eliminate the nutritional deficiencies. However, there is insufficient evidence to support a nutritional explanation. From a behavioral perspective, pica is most commonly maintained by automatic reinforcement, followed by social variables (Matson et al., 2013). Several behavioral interventions are well-established and have been found to reduce pica in individuals with ID and ASD.

Another limitation of current research is that there are few standardized assessments available to screen and detect pica. While there are a limited number of assessments available, the STEP, ASD-CC, and BPI are well-established tools for the detection of pica. Given that pica is commonly comorbid with ID and ASD, all clinicians treating individuals with ID and ASD should routinely screen for pica. The existing screening assessments for pica can be conducted relatively quickly; screening should not be overly burdensome.

Given the lack of empirical support for the biological causes of inappropriate feeding behavior, researchers have focused on developing function-based treatments for pica (Piazza et al., 1998). As noted, it is essential to identify the variables that maintain the challenging behavior (Iwata et al., 1982). Direct and indirect functional analyses have both strengths and weaknesses, and no one approach is recommended over the other (Tarbox et al., 2009). Following the assessment, the clinician should determine the appropriate behavioral intervention based upon the nature and function of behavior. There is no single method of treatment that most effectively eliminates pica. Rather, an individualized, comprehensive treatment plan which includes multiple elements of behavioral procedures (i.e., antecedent modification, reinforcement, consequence) may optimize treatment outcomes.

Antecedent modification interventions for the treatment of pica include NCR, environmental enrichment, discrimination training, and response effort procedures. NCR and environmental enrichment interventions appear to be the most effective in reducing pica maintained by automatic reinforcement or social attention because they provide alternative sources of reinforcement. In order for NCR and environmental enrichment to be effective, clinicians need to identify preferable items (e.g., toys, food, activities) that provide the same or similar type of reinforcement. In addition, opportunities for reinforcement should be maximized. As such, antecedent modification interventions may be time and staff intensive. Discrimination training and response effort procedures should not be used as the sole intervention for treating pica. Rather, they should be applied as a component of treatment in an intervention package, in conjunction with a reinforcement system such as DR.

Within the category of response-contingent interventions, DR, response blocking, and visual screening procedures have been found to reduce pica. Response-contingent interventions provide individuals with a clear consequence of behavior, and inappropriate behaviors are reduced. Response-contingent interventions are successful in reducing pica only if the strict schedule of reinforcement is implemented (i.e., during DRA) or each pica attempt is consistently interrupted (i.e., during response blocking). As a result, response-contingent procedures are time and staff intensive and are rarely used as the sole intervention.

Punishment-based interventions include overcorrection, aversive stimuli, physical and mechanical restraint, and time-out procedures. Punishment procedures are among the oldest methods of treatment and have been found to reduce or eliminate pica. However, punishment-based interventions do not teach appropriate, alternative behaviors and thus should be implemented in conjunction with antecedent modification interventions. Following the development of more socially acceptable interventions, punishment-based interventions are less frequently evaluated in research studies. While punishment-based interventions have a long history of use, these methods should be carefully considered before implementing and only be used once other non-aversive methods have been shown as ineffective. However, these extreme procedures may be warranted given the life-threatening nature of pica.

Overall, behavioral interventions have resulted in a 70–90% reduction in pica. In an analysis of the treatment of pica in an intensive day-treatment clinical setting, Call and colleagues (2015) found that only 25% of participants had a 100% reduction of pica. Given that just one instance of pica can lead to a serious health complications, the ultimate goal of treatment interventions should be to completely eliminate pica, not just to reduce it. A number of study limitations may affect the variation in pica reduction levels across studies.

A general limitation to behavioral intervention research was pointed out by McAdam and colleagues (2004), who noted that only 11 of the 26 studies evaluated generalization of behavior. Of the 11 studies, 10 studies reported successful generalization across behaviors ($n = 2$), behavior-change agents ($n = 4$), settings ($n = 2$), and behavior-change agents and settings ($n = 1$). Despite reports of generalization, none of the studies included measures of long-term maintenance or generalization that are required to meet the criteria for most evidence-based practice standards. This is not surprising given that most of the study settings were limited to institutional settings or clinical settings (e.g., inpatient clinic at a medical school; McAdam et al., 2004). Thus, it is unclear if individuals living in the community would demonstrate treatment outcomes as study participants in the existing research. Only 3 of the 26 studies were conducted in a community setting (e.g., classroom). Institutional and hospital settings typically have constant, individualized staff supervision and are not representative of the environments of many individuals with pica. Thus, study settings should be expanded to community-based and/or home settings in order to increase generalization of learned behavior.

Overall, behavioral treatments are effective at significantly reducing pica. Given this, it is essential to routinely screen for pica in order to assess and treat pica as soon as it detected. Using reliable methods to detect pica and implementing effective function-based treatments, the serious medical consequences of this challenging behavior should be reduced.

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Social Competence: Consideration of Behavioral, Cognitive, and Emotional Factors

Karen Milligan, Annabel Sibalis, Ashley Morgan,
and Marjory Phillips

Contents

Social Competence

Social competence is considered an important resilience factor that increases positive developmental outcomes, even in the face of risk (Reich, 2016). Friendships are thought to enhance knowledge about social situations, as well as provide emotional support, instrumental aid, affection, self-validation, companionship, and opportunities to learn conflict resolution skills in a supportive environment (Rose-Krasner, 1997).

The ability to form and maintain friendships and social relationships is associated with long-term positive outcomes (Rose & Asher, 2017). For example, a positive relationship has been found between social competence and academic achievement in school-age children (Del Prette, Del Prette, de Oliviera, Gresham, & Vance, 2012; Elias & Haynes, 2008; Shek & Leung, 2016). Del Prette et al. (2012) suggested that this relation may reflect a stronger sense of belonging in students who are more academically engaged and motivated, and positive relationships with peers may promote better problem-solving and peer collaboration which may positively influence academic outcomes. Along the same line of reasoning, higher levels of social competence have also been associated with better career success in the long term (Amdurer, Boyatzis, Saatcioglu, Smith, & Taylor, 2014).

Social competence is also identified as a protective factor for good mental health (Alduncin, Huffman, Feldman, & Loe, 2014). It helps us to develop strong social supports and to work effectively with others. More and more, we live in a complex and connected world, and the ways in which we connect are increasingly fast paced and fragmented. The challenges of social media, living away from extended relatives and familiar communities, having to form new social supports, and having to work with groups of people, all add to the need for high levels of social competence. Social competence mitigates the impact of adverse events, such as maltreatment

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(Schultz et al., 2009). Conversely, low social competence is associated with negative outcomes, including school failure and dropout, alcohol and substance use, social rejection, and delinquency (Parker & Asher, 1987). Social competence deficits are associated with lower social supports and higher risk factor for physical disease (Repetti, Taylor, & Seeman, 2002).

What Is Social Competence?

While there is agreement about the importance of social competence, what constitutes social competence is less clear, with an abundant array of operational definitions used in the extant literature (Rantanen, Eriksson & Neimenen, 2012; Rose-Krasner, 1997). For example, in her review of the use of term social competence, Rose-Krasner (1997) concluded that the key emphasis is on positive social outcomes and effectiveness. Social competence is defined as “the ability to achieve personal goals in social interaction while simultaneously maintaining positive relationships over time and across situations” (Rubin & Rose-Krasner, 1992, p. 4). Arthur, Bochner, and Butterfield (1999), in contrast, took a developmental approach to the construct and defined social competence as reflecting the evolving understanding of self and others and the ability to form meaningful relationships with peers. Gresham (2001) defined social competence as the degree to which children and youth are able to establish and maintain satisfactory interpersonal relationships, gain peer acceptance, make friendships, and terminate negative or pernicious interpersonal relationships. The importance of perceiving and responding appropriately to the emotional components of social interactions was highlighted by Halberstadt, Denham, and Dunsmore (2001) in their understanding of social competence. More recently, the ability to regulate emotions is considered to be an important component of social competence (Blair & Raver, 2015).

Examining all of these definitions suggests that there is general agreement that social competence reflects more than just learning and carrying out social skills. Rather, the emphasis is on the performance of complex and interconnected skills within interpersonal environments (Lillvist, Sandberg, Bjorck-Akesson, & Granlund, 2009). Attempts have been made to disentangle and identify the complex and interconnected set of skills that enables us to navigate social interactions and initiate and maintain relationships with others (Stichter, O’Connor, Herzog, Lierheimer, & McGhee, 2012). These skills are thought to include communication (making eye contact, taking turns, appropriate tone of voice), cooperation (helping others, sharing materials, following directions), assertion (requesting information from others, introducing oneself, responding to the actions of others), empathy (showing concern for another, taking the perspective of another), engagement (joining ongoing activities, making friends, interacting with others), and self-control (taking turns, compromising, responding appropriately to conflict; Lyons, Huber, Carter, Chen, & Asmus, 2016). To be considered socially competent, one needs to use social skills in a way that adheres to social conventions and that responds appropriately to others’ emotions and thoughts (Stichter et al., 2012).

Each of these social skills can be seen at a behavioral level. Social interactions, however, are complex and rarely is one enacting a single social behavior in isolation. One must attend to and process context cues, as well as verbal and nonverbal cues from social partners. This information must then be integrated and compared with previous experiences and knowledge. The child must decide what information is key to responding, make a plan, draw on their verbal and behavioral skill repertoire, and implement. This complex cognitive and behavioral process is further complicated in the context of strong emotion (e.g., fear, anger, excitement), which is often present in human interactions. Emotions can hijack cognitive processes, making it harder to perspective-take, problem-solve, and behave in a manner that takes into account all the complex cues of social situations (Zelazo & Lyons, 2012).

As such, there has been movement within the social competence field away from a social skills perspective that focuses on behavior to

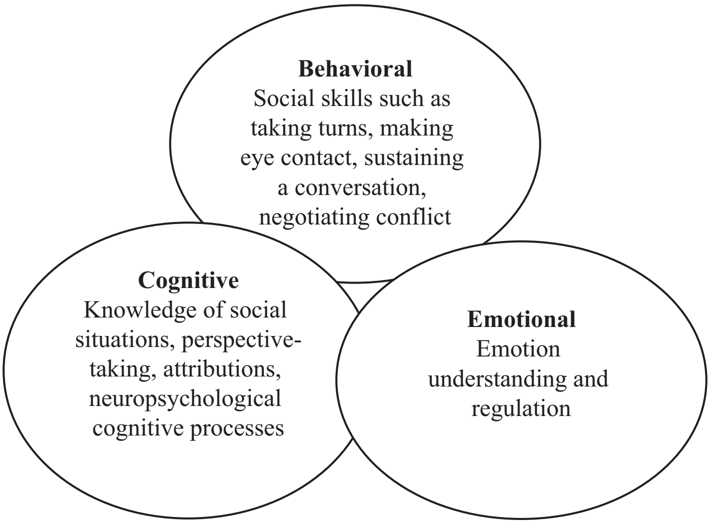

Fig. 1 Behavioral, cognitive, and emotional factors interact to support development and enactment of social competence

an integrative perspective that accounts for the complex interaction of cognitive and emotional processes that support social competence at a behavioral level (Beauchamp & Anderson, 2010; Milligan, Phillips, & Morgan, 2016). See Fig. 1.

Cognitive Factors and Social Competence

Cognitive factors involved in social competence can be viewed from two interrelated perspectives. At one level, cognition reflects thoughts, including one's knowledge of social situations (e.g., what is expected in terms of behavior, content, and different roles) and one's interpretation of situations (e.g., perspective-taking and attributions about the cause of events or behaviors). At a more basic level, cognition also embodies neuropsychological cognitive abilities, including but not limited to attention, executive functions, processing speed, and visual-spatial processing. Importantly, these two levels of cognition are not independent, but rather, they interact in a transactional manner to support social competence (Crick & Dodge, 1994; Dodge, 1986; Galway & Metsala, 2011; Gifford-Smith & Rabiner, 2004; Lemerise & Arsenio, 2000).

Cognition: Thought Processes Related to Social Competence

Schemas reflect knowledge about the rules/expectations of social situations. They may be developed based on a child or adolescent's personal experience or the observation or experiences of others and essentially help children (and adults) in predicting what will occur in a given social situation so that they don't have to experience a situation as novel every time it is encountered. An example of this would include a child knowing broadly what is expected when they play a board game (e.g., sit down, take turns, follow rules, etc.).

Related to schemas are attributions, cognitive processes that reflect a child's perception of the cause or intent of another's behavior (Weiner, 1985). Most of the research on attributions and social behavior has focused on hostile attributions (i.e., the tendency to attribute negative intent in a benign situation). Hostile attributions are explained within the context of the social information processing model (SIP; Crick & Dodge, 1994). SIP breaks social problem-solving down into a series of steps which include interpreting cues, clarifying goals, generating alternative responses, selecting and implementing a specific response, and evaluating the outcome. These steps are executed rapidly and the process is far from linear, with steps overlapping and numerous feedback loops as information is processed within the child's knowledge and beliefs about social situations (e.g., Crick & Dodge, 1994; Dodge, 1986; Gifford-Smith & Rabiner, 2004; Lemerise & Arsenio, 2000). Research has consistently shown that children who are socially rejected and/or engage in heightened levels of aggression are more likely to attribute hostile or negative intent in benign social situations. Further, they are more likely to experience challenge in understanding and/or performing the SIP steps (Dodge & Coie, 1987; Dodge & Feldman, 1990; Dodge, Murphy, & Buchsbaum, 1984; Dodge & Newman, 1981; Dodge & Tomlin, 1987).

Theory of mind (ToM) is another area of cognitive understanding that has been linked with social competence. ToM reflects the ability to infer beliefs, thoughts, and desires (i.e., mental states) to another person and to be able to see that these may differ from one's own mental states (Milligan, Astington, & Dack, 2007). The relation between ToM and social competence is well established (for a review, see Astington, 2003). The false-belief task is the gold standard task for assessing ToM in the preschool period. This task, passed by most children by age 5, assesses a child's ability to reason about the behavioral consequences of holding a mistaken belief. Thus, by age 5 most children can act in a way that acknowledges that mental representations impact on what a person says or does, even in cases where they are mistaken about the situation in reality (Milligan et al., 2007). To become socially skilled, children must understand that desires and beliefs held by peers influence their behavioral and emotional responses (Slomkowski & Dunn, 1996). This knowledge assists children in understanding the social behavior and verbal communications of their peers and guides their behavior in social interactions, thereby enabling them to regulate and coordinate their interactions (Astington & Gopnik, 1991; Baron-Cohen, 1994; Lalonde & Chandler, 1995). One of the first studies to examine this relation, completed by Astington and Jenkins (1995), found that children who passed false-belief tasks were more likely to make joint proposals and to assign roles for themselves and their playmates when engaged in pretend play. These results suggest that children with superior perspective-taking skills are more aware that their partners' beliefs about the pretend situation may differ from their own and accordingly make their beliefs and intentions more explicit to their partner. Understanding of others' beliefs has also been related to connectedness of communications between friends (Slomkowski & Dunn, 1996) and successful communication bids and cooperative play (Dunn & Cutting, 1999).

The studies reviewed examine the relation between ToM and social competence in the preschool period. Most typically developing children have developed false-belief understanding by middle childhood, and as such there is less variation found in social competence by false-belief understanding. However, it is possible that individual differences in the flexible and appropriate implementation of ToM may play a role in social competence during this period as well. While less commonly examined, advanced ToM tasks that are passed later in childhood (e.g., Little & Nettle, 2006) have been associated with social competence outcomes, including the number of friends in a child's social network (Stiller & Dunbar, 2007) and teacher-rated social competence (e.g., Little & Nettle, 2006). This suggests a continued role of ToM for school-age social competence. This is an area in need of further exploration, particularly with neurodevelopmental samples who may present with more challenges with ToM.

Neuropsychological Processing Abilities

Disorders associated with neuropsychological or cognitive-executive weaknesses, such as schizophrenia, specific and nonverbal learning disabilities (LD, Galway & Metsala, 2011; Milligan et al., 2016), autism spectrum disorders (Gates, Kang, & Lerner, 2017), and traumatic brain injury (Tlustos et al., 2016), have been associated with greater social competence challenge. Within these disorders, research has highlighted the key role of processing deficits in social competence challenge. While an exhaustive review of all neuropsychological cognitive processes involved in social competence is beyond the scope of this chapter, we will explore the impact of attention control and executive functions, processing speed, and visual-spatial processing to exemplify the impact of processing on social competence.

Attentional Control

Attentional control reflects the ability to orient and sustain attention while filtering out irrelevant stimuli (Derakshan & Eysenck, 2009). Challenges with attention have been associated with behavioral challenges in social interactions (Andrade, Brodeur, Waschbusch, Stewart, & McGee, 2009). Challenges with attentional control can impact on learning social skills and developing one's knowledge of social situations and situational norms. Attentional deficits are also intricately involved in the relation between attributions and social competence. For example, research suggests that children who exhibit aggressive behavior demonstrate biased attention toward threat cues. For example, aggressive children have difficulty attending to and remembering all important aspects of a social interaction and encode fewer social cues (with preference for those that may be most recent) before making causal attributions about the hostile intent of another person (Milich & Dodge, 1984).

Research examining social competence in ADHD populations (where deficits in attentional control are considered central) exemplifies the role of attention in social competence. Children and adolescents with ADHD experience higher rates of rejection, fewer friends, and lower levels of social support compared to non-ADHD peers (Humphreys, Galán, Tottenham, & Lee, 2016).

In addition to improving indices of attentional control, stimulant medication has been associated with improvements in social functioning at home and school, with notable medium to large effect sizes (van der Oord, Prins, Oosterlaan, & Emmelkamp, 2008). Importantly, challenges with social competence are seen in both those with ADHD-inattentive and ADHD-combined (inattentive and hyperactive-impulsive) subtypes, suggesting that the variance in social competence is likely related to inattention and not solely due to challenges with hyperactivity/impulsivity. In fact, research suggests that children with ADHD-inattentive subtype are more likely to show deficits in the performance of socially competent behavior (similar to combined type) but experience even more challenge in the acquisition of social skills, possibly due to the critical role attention plays in learning (Wheeler & Carlson, 1994).

Executive Functions

Closely associated with attentional control are executive functions (EF), which are the higher-order cognitive processes that support purposeful and effortful goal-directed behaviors (Pennington & Ozonoff, 1996). The model of EF proposed by Miyake, Friedman, Emerson, Witzki, and Howerter (2000) suggests that the ability to control impulses, respond flexibly (or adjust one's approach, behavior, attention, or thinking based on feedback from the environment), and keep information in mind while working with that information (i.e., working memory) are the primary processes within the broad EF construct. These EF assist with problem-solving in everyday life and, as such, are considered pivotal to successful social interaction. Children and adolescents with weaknesses in EF experience challenge with knowing what social information to focus on, developing plans for social interactions, executing their plans, controlling their behavior in keeping with the social/situational demands, monitoring the success of their behavior, and flexibly shifting their behavioral approach based on feedback from peers and the broader environment (Clark, Prior, & Kinsella, 2002; Nigg, Quamma, Greenberg, & Kusche, 1999; Dennis, Brotman, Huang, & Gouley, 2007; Riggs, Greenberg, Kusché, & Pentz, 2006).

Similar to attention, EF is related to thought processes, such as ToM and hostile attributions. There is a small to moderate association between

ToM and EF ($d = 0.38$, Devine & Hughes, 2014). It is possible that EF enables children to attend to and reflect upon the mental states of others, thereby improving social competence.

Within typically developing samples, the association between EF and social competence appears to decrease as children age (small effect size, Devine, White, Ensor, & Hughes, 2016). For example, Harms, Zayas, Meltzoff, and Carlson (2014) found that EF at 8 and 12 years was not significantly related to social competence as rated by teachers at age 12. However, within populations of children with significant EF deficits (e.g., traumatic brain injury, disruptive behavior disorder), the association appears to be maintained across developmental periods. For example, in adolescents who have experienced a traumatic brain injury, parent ratings of EF were significantly negatively associated with social competence (Tlustos et al., 2016). Further, ratings of EF were found to moderate the impact of a social competence intervention, suggesting that EF may be a resilience factor that supports learning and performance of socially competent behaviors (Tlustos et al. 2016).

EF deficits also appear to moderate the impact of hostile attributions. For example, in their study of 83 boys, Ellis, Weiss, and Lochman (2009) found that boys who presented with both hostile attributions and EF challenges in planning and inhibition exhibited higher rates of reactive aggression but that EF challenges alone did not lead to increased rates of reactive aggression. This underscores the importance of examining the interaction of thought processes and neuropsychological cognitive factors on social competence, rather than each in isolation.

Processing Speed

The speed at which children and adolescents process visual and verbal information also has important implications for social competence (Anderson, 2008). If it takes a child longer to take in, process, and respond in a social context, this may impact on their ability to follow conversations, to formulate responses, and to deliver responses in a timely manner. Further, slowed processing may ultimately result in children having to narrow their field of perception in order to successfully process information, resulting in information loss and heightened possibility of social errors.

Certainly, research with clinical populations with marked processing speed challenges highlights the relation between processing speed and social competence (e.g., schizophrenia; Bowie et al., 2008; traumatic brain injury, Rassovsky et al., 2006). Backenson et al. (2015) have highlighted that learning disabilities marked by significant processing speed challenges have a greater impact on adaptive functioning (including social) than learning disabilities associated with working memory or executive functions. Similarly, adolescents with ADHD marked by sluggish cognitive tempo, which reflects symptoms such as drowsiness, daydreaming, lethargy, and slowed processing speed (e.g., Barkley, 2011; Becker & Langberg, 2014), also have been shown to have lower levels of social competence challenge than those without these symptoms (Becker & Langberg, 2014). Research suggests the sluggish cognitive tempo accounts for challenges in initiation and working memory (EF), and this may be one pathway by which processing speed influences social competence.

Visual-Spatial Processing

Children and adolescents with visual-spatial processing deficits may also be more likely to experience challenges with social competence (Galway & Metsala, 2011; Petti, Voelker, Shore, & Hayman-Abello, 2003). Effective social interactions depend upon the ability to attend to and rapidly process and integrate multiple, often subtle, nonverbal social cues, as well as determine their relative salience. This information assists individuals in understanding emotional states and intentions of others (Nowicki & Duke, 1992). Research examining children with nonverbal learning disabilities (NLD) who present with core weaknesses in visual-spatial processing has highlighted that, in comparison to a typically developing control group, children with NLD encode fewer social cues and have more difficulty detecting and inferring emotion based on nonverbal social cues. As such, it is possible that children and adolescents with visual processing challenges may become overwhelmed by the amount/type of social information to encode, leading to a narrowed focus that may distort understanding of a social situation. This may result in challenges in understanding the emotional aspects of a situation that require more inference and integration of information. Research suggests that children with NLD are able to generate competent/assertive responses to social challenges at levels that are commensurate with typically developing peers; however, they are less likely to believe that enactment of these responses will lead to positive outcomes (Galway & Metsala, 2011). It is possible that the generation responses, while potentially accurate or competent, may be associated with a sense of overload or anxiety. This, in turn, may impact on performance of the response and/or attributions of success. Further research is needed into what specific aspects of visual-spatial processing (vs. a broad diagnosis such as NLD) impact on the different components of the social interaction process and how these challenges combine with other neuropsychological cognitive processes to impact social behavior.

Emotion Regulation

Social competence is not just a cognitive and behavioral process. Social interactions are emotional by nature, and emotion has the potential to impact on learning social skills, perspective-taking and problem-solving, and performance of behaviors. Children who are better able to regulate their emotions are more likely to experience positive social outcomes, including positive engagement with peers, greater acceptance by peers, and a higher quality of friendships (Eisenberg et al. 2000). As such, a comprehensive understanding of social competence must include factors relating to emotion understanding and emotion regulation, given the central role of emotion in social interaction.

Emotion understanding is a broad multidimensional construct that reflects emotion recognition and emotional knowledge (i.e., the ability to attribute emotions to oneself and others based on knowledge about emotion-eliciting situations), as well as the integration across the skill areas (Castro, Halberstadt, & Garrett-Peters, 2016). Emotion understanding develops across childhood with emotion recognition skills developing in the preschool years and emotion knowledge developing in the school-age years. More complex emotion understanding (e.g., mixed emotions) also develops during the school-age years as developing cognitive abilities facilitate the ability to analyze, interpret, and integrate emotional information (see Castro et al., 2016 for review). A well-established base of research support exists for the relation between emotion understanding and social competence (e.g., Heinze, Miller, Seifer, Dickstein, & Locke, 2015; Miller et al., 2005; Ornaghi, Grazzani, Cherubin, Conte, & Piralli, 2015). For example, Castro et al. (2016) found that emotional knowledge about the experience of emotion across situations supported positive social competence outcomes in grade 3 students.

While understanding emotions in self and others provides essential information for social problem-solving, enacting behaviors and thought processes associated with social competence is dependent, in part, on emotion regulation. Emotion regulation is defined as the "extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially in their intensive and temporal features, to accomplish one's goals" (Thompson, 1994, pp. 27–28). Emotion regulation is associated with both cognitive processes related to attributions and perspective-taking and neuropsychological cognitive factors.

Emotion regulation is a significant contributor to effective social information processing. In a study of 100 grade 4–6 boys, Bauminger and Kimhi-Kind (2008) found that children with LD experienced significant challenge with social information processing, including hostile attributions. Moreover, emotion regulation was found to moderate the strength of this relation, with those with emotion regulation challenges experiencing more social information processing deficits.

Emotional regulation is also significantly associated with neuropsychological cognitive processes (e.g., attention, language, flexibility, processing speed, inhibition; see Diamond, 2013 for review). Certainly, children and adolescents with neurodevelopmental disorders, such as LDs, are at increased risk for emotion regulation deficits (Bauminger & Kimhi-Kind, 2008) and associated co-occurring mental disorders (Milligan, Badali, & Spiroiu, 2015). From a neurobiological perspective, the presence of a strong emotional response limits a child's ability to fully engage their cognitive processes and behavioral skills (e.g., impulse control, cognitive flexibility, social knowledge, perspective-taking abilities, social skills; Zelazo & Lyons, 2012). For children and adolescents who already present with challenges in these areas, emotion may serve to magnify these challenges. As such, many children and adolescents may cope with social challenge by engaging in fight (e.g., aggression) or flight (e.g., avoidance) behaviors to regulate strong emotions (Milligan et al., 2015). Further research is needed to better understand the interaction between cognitive, behavioral, and emotional factors and the manner in which they impact on the trajectory of the social interaction process.

Social Competence Interventions

Given that social competence develops and is further refined over the course of childhood and adolescence, and its well-documented contribution to resilience, a number of universal social competence programs have been developed, schools being the primary setting in which these interventions have been implemented and evaluated.

In this next section of the chapter, we take a critical look at the extent to which the social competence programs in the extant literature tailor their content or delivery of the program to behavioral, cognitive, and emotional processes. First, we examine interventions for typically developing children and adolescents, followed by an examination of programs for clinical populations with specific challenges in behavioral, cognitive, and emotional processes.

Social Competence Interventions for Typically Developing Populations

Numerous universal social competence interventions have been developed for children and adolescents without specific cognitive, emotional, or behavioral challenges. The content and delivery characteristic of programs in the extant literature appear to be moderated by age. Social competence interventions designed for children ages 10 and under (including those for preschool-age and kindergarten-age children) nearly exclusively focus on the content at a behavioral level, highlighting simple, physical social actions such as sharing toys, initiating conversations, listening quietly when others speak, and promoting helping behavior (e.g., Battistich, Solomon, Watson, Solomon, & Schaps, 1989; Boyle et al., 1999; Ialongo, Poduska, Werthamer, & Kellam, 2001; Stanton-Chapman, Walker, & Jamison, 2014; Stevahn, Johnson, Johnson, Oberle, & Wahl, 2000). As children age, the content of social competence programs mirrors the advances they are making in terms of cognitive and emotional processes (Beelmann, Pfingsten, & Loesel, 1994), as well as the growing complexity and prominent importance of social interactions (Brown & Larson, 2009). More specifically, interventions designed for youth in grades 5 and higher begin to incorporate emotional facets of social competence. The focus appears to shift from behavioral aspects of social skills to understanding the feelings experienced by oneself as well as others. In fact, the majority of interventions targeting middle- and high school-age youth in the extant literature contain some component reflecting socio-emotional understanding and self-presentation, for example, emotion regulation (stress management; calming down when frustrated; expressing anger appropriately), communicating feelings and desires to others, social assertiveness and resisting peer pressure, and empathy and perspective-taking (e.g., Caplan et al., 1992; Holsen, Smith, & Frey, 2008; Kimber, Sandell, & Bremberg, 2008; O'Hearn & Gatz, 1999; Sarason & Sarason, 1981; Taylor, Liang, Tracy, Williams, & Seigle, 2002).

One example of a social competence program for typically developing children is the Second Step program (Committee for Children, 1997). An in-class, manualized program presented by classroom teachers, the program is adjustable for three different age groups: early learning (preschool), elementary (kindergarten to grade 5), and middle school (grades 6–8). Depending on participant age, the program is 22–28 weeks in length, with 20–40-min lessons. Across all age groups, participants are presented with four core units: skills for learning (listening, focusing attention, self-talk, being assertive), empathy (identifying feelings, showing care and compassion, helping others), emotion management (managing anxiety, disappointment, and anger), and problem-solving (playing fairly, thinking of solutions, taking responsibility). Specific content is adjusted for age and level of cognitive ability of participants, with attention to what would be developmentally appropriate or salient at a given age. For example, in the emotion management unit, preschoolers discuss managing waiting, while grade 5 students address avoiding making assumptions. Additional units addressing bullying prevention, substance abuse prevention, and goal setting are added to the program beginning in grade 6.

There is support for the broad benefit of social competence interventions for typically developing youth, across age groups. In a meta-analysis of 213 studies examining social competence interventions for typically developing children completed between 1955 and 2007, Durlak, Weissberg, Dymnicki, Taylor, and Schellinger (2011) found that participation in interventions led to moderate improvement in social and emotional skills ($d = 0.57$), as rated by participants themselves, their parents, or their teachers, as well as small improvements in self-esteem and self-efficacy ($d = 0.23$) and a small improvements in the level of positive social behaviors such as cooperation with peers ($d = 0.24$; Durlak et al., 2011). In addition, participants showed a small reduction in conduct problems ($d = 0.22$) and reduced emotional distress ($d = 0.24$; Durlak et al. 2011). Intervention participation was also predictive of small improvements in academic performance ($d = 0.27$; Durlak et al. 2011). More recent studies replicate these results. Training in social competence has led to more positive social interactions with peers, as rated by children and their teachers, as well as improvements in self-esteem, decreases in internalizing and externalizing problems, and, for younger intervention participants, increases in social initiations and cooperative play (Holsen et al., 2008; Kimber et al., 2008; Stanton-Chapman et al., 2014).

While research supports the benefit of social competence programs, effect sizes are small. While social skills are a focus across childhood and adolescence, and emotion understanding and regulation, as well as cognitive-perspective,appear to be more of a focus after age 10, there is little emphasis on neuropsychological cognitive processes. These processes are important to consider given their role in learning (Milligan et al., 2015). In particular, executive functions are still under development throughout the childhood and adolescent periods, and social competence groups that tailor content and delivery to the specific level of EF within a class may be more successful in enhancing social competence. It is also important to recognize that universal programs may be associated with smaller effect sizes because many of the students may already possess appropriate levels of competence, leaving little room for improvement on outcome measures. Regardless, it may be beneficial to explore if pre-intervention EF (e.g., working memory, impulse control, flexibility) moderates the impact of social competence programs. If differences do exist, future research that informs tailoring of social competence program curriculum to support the development of these executive functions or accommodate for weaknesses in executive functions may improve the strength of the observed effect.

Social Competence Interventions for Neurodevelopmental Disorders

The most common neurodevelopmental disorders for which social competence interventions have been developed are autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and learning disability (LD). Review of this literature suggests that both content and program delivery attend more explicitly to behavioral, cognitive, and emotional factors associated with social competence, with the specific focus depending on the central deficits associated with each disorder. For example, social deficits are central to the diagnosis of ASD. Children with ASD have difficulties experiencing and displaying empathy and engaging in reciprocal social interactions (APA, 2013). Often, these difficulties lead to a lack of behaviors necessary to build and maintain social interactions, such as maintaining eye contact, displaying engaged or welcoming body language, responding to direct or indirect social advances, and engaging in cooperative play and activities. Additionally, children with ASD can display restrictive and repetitive behaviors and interests – for example, repetitive motor movements such as hand flapping or obsession with cars – and tend to be inflexible regarding changes to established routines (APA, 2013). Such behaviors or obsessive interests can be seen as confusing, frightening, or off-putting by peers (Swaim & Morgan, 2001). Further, comorbid social anxiety is highly prevalent, affecting up to 84% of children with ASD (White et al., 2009) and further impairing children from engaging in social situations.

Review of the social competence programs designed for ASD suggests that both the content and the method of delivery take into account behavioral, cognitive, and emotional processes involved in learning and performing socially competent behavior. One exemplar intervention is the *Social Competence Enhancement Program* (SCEP; Cotugno, 2009) for elementary school-age children with ASD. This 30-week (1 h/week) program focuses on eye contact and gaze sharing with others (behavioral), social initiations and social responding (behavioral), joint attention with others (cognitive-attention), and flexibility and transitioning between thoughts and activities (cognitive-executive functioning). Anxiety and stress management strategies, such as visualization and breathing (emotion regulation), are also integrated. Similar to other social competence programs, program delivery capitalizes on multiple instruction methods, including didactic instruction, discussion, modeling, and peer-based practice. However, it is adapted to the neuropsychological processing profiles of children with ASD, with particular attention to challenges with the executive function of cognitive flexibility. For example, (1) all sessions follow a strictly consistent outline in order to accommodate the need for inflexible routines; (2) acknowledge and anticipate transitional difficulty when changing from one activity to the next, setting aside time between tasks and providing transitional support; and (3) predictability is increased by pre-teaching activities and breaking them down into simpler steps.

A similar program, *Social Competence Intervention* (SCI; Stichter et al., 2010), was developed for children and adolescents with ASD and includes three separate curricula specified for children (ages 6–10), adolescents (ages 11–14), and high school students (ages 14–18). All programs are 10 weeks (1 h/week) in length and school-based. The adolescent curriculum focuses on recognizing facial expressions, communication skills such as eye contact, and nonverbal cues, turn-taking in conversation, recognizing emotions in oneself and others, stress and anxiety management, and problem-solving. As in *SCEP*, *SCI* is adapted to suit the needs of ASD participants, using small group sizes (maximum six participants/group) to avoid overstimulation and minimize social anxiety and adhering to a strictly structured lesson format that always begins with the practice of acknowledging, greeting, and making eye contact with all participants. A study of 27 *SCI* participants showed that participation was associated with improvements in parent-rated social skills and executive functioning and improved performance on measures of facial expression recognition and theory of mind (Stichter et al. 2010).

ADHD is associated with a different profile of neuropsychological cognitive challenge. Children often have difficulty remaining focused on the task at hand or understanding and sticking with difficult tasks or problems (e.g., playing a complex game, engaging in school group projects), which often impairs cooperative work and play with peers (Wehmeier, Schacht, & Barkley, 2010). Due to distractibility and/or hyperactivity, children with ADHD often have difficulty waiting their turn in conversation or acknowledging a peer's thoughts and ideas, which can hinder conversations or budding friendships (Wehmeier et al., 2010). Finally, children with ADHD may be prone to outbursts of frustration (APA, 2013), which may alienate peers.

Similar to ASD, the social competence interventions for ADHD for children 6–12 tailor the content and the delivery of the program to the behavioral, cognitive, and emotional processes of social competence. For example, the *Therapeutic Summer Day Camp for Children with ADHD* (Hantson et al., 2012) is a 2-week social skills training program offered in the milieu of a summer day camp that aims to increase understanding and labeling feelings, emotional self-control, and positive approaches to deal with anger and frustration (e.g., response to teasing and avoidance of verbal and physical confrontations). Specific skills addressed include introducing oneself (behavioral), joining social situations (behavioral), anger management (emotional), and using self-control (emotional/cognitive-executive functioning). Program delivery is tailored to provide a mix of active and calm activities in order to keep children engaged and introduce and practice skills across domains. Concurrent parent training is provided to support generalization to home (e.g., effective praise and rewards, providing a structured day schedule, building a positive parent-child relationship). Participation in the program has been shown to be associated with parent-rated improvements in peer relations, as well as behavioral and emotional problems (Hantson et al. 2012).

Meta-analyses examining the impact of social competence interventions for neurodevelopmental disorders suggest that the strength of the observed effect is small ($d = 0.199$, Quinn, Kavale, Mathur, Rutherford, & Forness, 1999; PND = 69%, low or questionable effectiveness, Bellini, Peters, Benner, & Hopf, 2007). Despite multiple researchers noting the need for intervention programs to specifically cater to the neuropsychological deficits of a disorder (Cragar & Horvath, 2003; Rao, Beidel, & Murray, 2008), this appears to be inconsistently put into practice. While certain interventions may address the global deficits of the population they seek to serve (e.g., eye contact in children with ASD), most interventions do not take into account the specific needs of the subgroup attending the intervention, and how this subgroup's abilities and deficits may vary slightly from the disorder as a whole (Cragar & Horvath, 2003; Rao et al., 2008). Researchers propose that by tailoring interventions more specifically to the participants attending them, interventions may have a greater positive impact (Attwood, 2000; Rao et al. 2008).

The Integra Social ACES (Awareness, Competence, Engagement, Skills) program is a program that aims to advance social competence in learning-disordered children by introducing social abilities in light of differing ability levels of participants and deficits in underlying cognitive abilities. The program will be outlined here as a model for social competence programming that successfully integrates emotional, cognitive, and processing facets of social competence.

Integra Social ACES Program: A Social Competence Intervention for LD

While we often think of LDs in the context of academic achievement, challenges experienced by children and adolescents extend beyond the classroom, with approximately 75% of students with LDs having lower levels of social competence than typically developing children, as assessed by teachers, peers, and children themselves (Forness & Kavale, 1996). Further, approximately 50% of children with LDs are rejected, neglected, or victimized by peers (Baumeister, Storch, & Geffken, 2008; Mishna, 2003), and many have impoverished and unstable friendships (Wiener & Schneider, 2002; Wiener & Sunohara, 1998).

While there is considerable current debate how LDs should be defined, we will use the consensus definition of the LDAO (2001), which defines LDs as a disorder that (1) affects how individuals acquire, understand, retain, or organize information, (2) results in specific rather than global deficits in individuals with average to above average intelligence, and (3) results from impairments in one or more psychological processes related to learning (e.g., language processing, visual-spatial skills, processing speed, memory, and attention).

Overview of the Program

The Integra Social ACES (Awareness, Competence, Engagement, and Skills) program is a strength-based, client-centered, and experiential program intended to provide children and youth with LDs with a positive social experience and increase their social competence. Unlike many manualized social skills treatment programs, the Integra Social ACES program tailors the curriculum to the child's and group's treatment goals and takes an individualized approach in terms of flexibility of content, therapeutic stance, and group matching (Integra Program, 2016). A key component of the Integra Social ACES program is the tailoring of group activities to accommodate group participants' neuropsychological processing deficits. This is accomplished through careful group matching and informed by a review of each participant's learning profile (based on a comprehensive psychoeducational assessment).

Group Matching

Through a multisource assessment informed by the child's psychological assessment report, clinical observations of the child in an assessment group, as well as clinician and parent report, a child's learning profile, self-regulation, and emotion regulation skills, in addition to their baseline level of social competence, are taken into account. Children are categorized into group profiles on the basis of clinician ratings of social competence and emotion regulation, further delineated by age and gender, to ensure that children with compatible goals are placed together and to provide a framework for tailoring group activities and lessons. See Table 1.

Children are then matched carefully according to their individual treatment goals with consideration of each child's self-regulation and emotion regulation abilities and how these abilities may positively or negatively affect the group process and opportunities for learning for the children in the group. For example, a child who needs to work on basic social competence, such as turn-taking, eye contact, and basic conversational skills, may be placed with other children with similar social competence treatment goals. The level of self-regulation may help to determine the pacing and nature of the activities. For instance, children with low levels of regulation may need a faster pace of activities and less talking and processing of the activities in order to sustain their attention and focus. Groups vary in size from three to eight children or youth and are matched according to age, developmental stage, and gender.

Group Content

One of the key features of the Integra Social ACES program is that there is less of an emphasis on teaching social skills in a didactic manner. Rather, the program content largely consists of games and activities (e.g., tabletop games, drama activities, teamwork-based activities)

Table 1 Group matching by social competence and emotion regulation

		Social competence		
		Low	Medium	High
Regulation	Low	Low social competence/low regulation	Medium social competence/low regulation	High social competence/low regulation
	High	Low social competence/high regulation	Medium social competence/high regulation	High social competence/high regulation

that provide naturalistic and engaging opportunities for participants to practice their skills. Children learn from each other and are directly coached by adult facilitators. This encourages children to approach social situations that they may normally avoid and to learn to manage the associated emotion. In addition, the games and activities allow for "in-the-moment" teaching opportunities, group discussion of the skills learned to "real-world" situations, and direct modeling and coaching by the group facilitators.

Sample Group Session: Skills, Information Processing Deficits, and Accommodations

Given that each child brings to the group a unique set of social competence strengths and needs across behavioral, cognitive, and emotional areas, treatment goals differ by group and no two groups are structured in the same exact manner. However, the groups follow a general structure with the common elements of a form of check-in and a time for "snack and chat" at the end of the group. The specific group activities that make up the content of the group are based on several factors including, but not limited to, individual participant treatment goals, group treatment goals, stage of treatment, and progression toward goals. Decisions regarding the specific content of each group session also account for the participants' specific information processing deficits. For example, all group sessions begin with an overview of the group agenda, as well as a visual schedule to accommodate participants with memory difficulties, such that they know the plan for the group and can refer back to the schedule to know what is coming next. Providing a visual schedule also helps to support group members who struggle with transitions as they know what to expect and what is expected of them.

Group Check-In Most group sessions begin with an active check-in or a feelings check-in as a way to ground and reconnect the participants since their last group session together. An active check-in involves having the group participants demonstrate a particular movement with their bodies while the other group members mirror the movement. This type of check-in works best for children with self-regulation difficulties who would benefit from having an opportunity to release excess energy from their bodies, allowing them to experience improved self-regulation during the rest of the group. An active check-in also encourages the group to tune in to the participant leading the movement, which involves visual tracking and shifting one's attention to the participant, important skills in social interactions. For children with slower processing speed, group leaders will ensure that each child has an opportunity to engage in the movement by adjusting the pace of the check-in. A feelings check-in often involves having the participants discuss their current feeling state and briefly explain their choice to the group. Feelings check-ins are often adapted by having a visual component that includes a card with a picture of an animal and an associated feeling label (e.g., a bear is associated with irritable). This accommodation supports participants who may learn and express themselves best with visual rather than verbal information. Feelings check-ins promote emotional awareness and conversation skills, including visual tracking, sharing about oneself, the opportunity for group participants to ask follow-up questions, and opportunities to demonstrate empathy. Throughout a verbally based check-in, group leaders will scaffold for group members how to show good listening skills, how to ask follow-up questions to demonstrate appropriate listening skills, and may provide direct feedback regarding making eye contact for participants who struggle with eye contact, for example.

The following content activities are examples of activities that could be used to target skills such as taking turns, compromising, and cooperation.

Squiggle Game The squiggle game involves having the group members draw a simple squiggle on a piece of paper and passing the paper to someone else. The next group member will turn the squiggle into a drawing, while the original participant who drew the squiggle has to watch their squiggle transform into something new. The children who are not involved in drawing are encouraged to ask questions and show an interest in the drawing. For the child who is drawing, visual-motor integration difficulties may make this activity particularly challenging. To accommodate for visual-motor integration difficulties, group leaders may provide suggestions for how to turn the squiggle into a drawing or may subtly provide a concrete example to assist the child in visualizing a potential drawing. For the group member who originally drew the squiggle, executive functioning difficulties may impact on their ability to regulate their reaction and shift their expectations. Group leaders may provide verbal feedback to the group member who is having a hard time seeing their squiggle turned into something unexpected by labeling their feelings and praising them for regulating their emotional response.

Change the Room In this activity, one group member will leave the room while the remaining group members change three things about the room. The group member who left the room has a few guesses to figure out what is different upon reentering the room. This game fosters compromise, negotiation skills, and cooperation and involves visual attention to detail. A common accommodation for the participant who is guessing which changes have been made is that the rest of the group members will indicate "hot" or "cold" if they are getting closer to the vicinity of the change. This accommodation is only provided with the permission of the guessing participant. Group members are instructed to discuss each change with one another and to ensure that all group members contribute and approve each change, thereby promoting the skills of negotiation, cooperation, and compromise. Children with executive functioning difficulties may struggle with the emphasis on compromise involved in this activity as a result of their difficulty shifting. To accommodate for this executive functioning difficulty, group leaders will have introduced the skill of compromising prior to this activity and provided them with opportunities to practice this skill. Group leaders will provide immediate and direct feedback during the negotiation part of this activity to support children who have executive functioning difficulties.

Snack and Chat Each group session ends with "snack and chat," a structured time during which the group members are supported to practice their conversational skills while having a snack. Specific skills targeted during the snack and chat include asking on-topic questions, sharing about oneself, making on-topic comments to build on the conversation, and complimenting. Depending on the level of social competence of the group members, more or less scaffolding is provided by the group leaders during snack and chat. For example, a group with overall low levels of social competence may require more explicit direction, modeling, and coaching to practice asking questions of one another to keep the conversation going. Over time, group participants build their skills in this area with the highest level of social competence being a conversation that begins and is maintained with minimal facilitation on the part of the group leaders. In addition to explicit instruction on how to maintain conversation, as well as opportunities to role-play these skills and practice them in a naturalistic context, group leaders will accommodate for memory difficulties, slow processing speed, and executive function difficulties by moderating the pace of the conversation, providing scaffolding to group members, and adjusting their tailored feedback according to the group member's level of difficulty with the skill. See Table 2 for a summary of the skills targeted related to the activity, the information processing deficits that may interfere with the activity, and the accommodations that are often provided in the Social ACES program.

Another key component of the Social ACES program is its focus on self-regulation and emotion regulation and how these affect the acquisition and development of social skills. Children with self-regulation difficulties may struggle with monitoring and controlling their energy level, maintaining focused attention during social interactions, or providing conversational space for others to participate, for

Table 2 Sample activity and associated skills and neuropsychological cognitive processes and accommodations

Activity	Skills targeted	Neuropsychological cognitive processes involved	Accommodations
Feelings check-in	Emotional awareness Conversation skills	Language processing Visual-spatial processing Processing speed	Modeling from group leaders (sharing their internal feeling state as well as asking follow-up questions to engage others in conversation) Visual images to represent and match feelings listed on cards Allowing enough time for group members to respond (i.e., group leaders moderate pace of turn-taking)
Squiggle game	Communication Creativity Expression through art Adapting to change and compromising	Language processing Executive functioning (e.g., shifting) Visual-motor integration skills	Visual activity for children who may have difficulty with language-based activities Scaffolding by group leaders to support group members to "let it go"/adapt to unexpected changes Repetition of instructions related to activity provided to group members Check-in with group members to ensure their understanding Extra time (related to visual-motor integration difficulties)
Change the room	Negotiation Compromise Cooperation	Language processing Processing speed Executive functioning Memory ToM	Scaffolding by group leader to support group members to ask each other questions and tune in to others Ensuring that each group has a chance to contribute their ideas Group leaders ensuring enough time for group member who is guessing the changes Repetition of rules to reduce memory demands Didactic lesson on what it means to compromise
Snack and chat	Conversation skills, including asking on-topic questions Sharing about oneself Making on-topic comments to build on the conversation Complimenting	Language processing Processing speed Memory Attention Executive functioning skills	Didactic lesson related to how to keep a conversation going Role-plays to allow group participants to practice the skills Modeling from group leaders Scaffolding (i.e., group leader asks, "does anyone have any questions about that?")

example. A child's regulation may significantly impact their ability to actively participate in group process and may impact their social interactions. Due to difficulties with self-regulation, a child's ability to attend to and follow conversation may be affected. For children who have some social competence yet who struggle with self-regulation, their difficulties may impede performance of their social skills. Often, a focus of intervention for these children is on improved awareness of self and others, as well as monitoring their self-regulation.

Similarly, for children with higher levels of social competence and low levels of self-regulation, a focus of intervention is on improving their awareness of the impact of their actions on others and reducing silliness. To address difficulties with self-regulation, the Social ACES program uses a tool called the silly-serious scale. The goal of introducing the silly-serious scale is such that group members will learn that different activities and situations require different levels of silliness or seriousness and develop the skills to self-monitor and adjust their behavioral output accordingly. In introducing the silly-serious scale, group leaders will elicit from the group participants what are acceptable energy levels for particular activities (e.g., watching television requires a relatively calm energy level, while playing outside at recess can involve more silliness and less regulation). Once this tool has been introduced in the context of a group, it is referred to throughout the group so that the group participants gradually build their awareness related to their energy level and its impact on others.

In addition to difficulties with behavioral self-regulation, children with LDs often have difficulty managing and regulating emotional reactivity due to their executive functioning deficits. Their difficulties with emotion regulation may impact them socially as they are more likely to struggle with managing their reactions to others and perspective-taking, for example. The Social ACES program pays particular attention to children who demonstrate rigidity and low frustration tolerance as these characteristics can significantly impact on a child's ability to engage in and benefit from the intervention. For example, children who exhibit extreme rigidity regarding rules of a game or the concept of fairness will benefit most from opportunities to interact with peers who model flexibility and who will be tolerant of the group member's rigidity.

Evaluation research of the Integra Social ACES programs attests to its promise in enhancing the social skills of children with learning disabilities and co-occurring mental health issues (Milligan et al., 2016). The program was associated with significant gains in initiation and engagement in positive social interactions, foundational skills that support improvement in social competence. Effect sizes ranged from $d = 0.40$–0.59, which reflects larger effects than seen in previous research (Quinn et al., 1999) and effects that approach or are medium in strength. Qualitative interviews with parents, children, and teachers suggested improvements in social self-concept, initiation, and emotion regulation. Tailoring treatment to the child's information processing and emotion regulation abilities, as well as "in-the-moment" feedback, was reported to support gains made and contributed to participants having a positive social experience.

Conclusion

This chapter highlights the complexity of social competence, both in terms of its development and its enactment. We have provided a possible framework for understanding the interaction of behavioral, cognitive, and emotional factors in social competence. Review of the extant literature suggests that cognitive and emotional factors are not consistently attended to in the curriculum or delivery of social competence interventions and that differences in targeting these factors may depend, at least in part, on the age and clinical characteristics of the group the intervention is designed for. Effect sizes for social competence interventions are small. It is possible that attending to behavioral, cognitive, and emotional factors in our interventions, with flexibility to individualize to participants in groups (as is done in the Integra Social ACES program), may enhance the effectiveness of our social competence interventions.

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Headache and Migraine

Tiah Dowell, Paul R. Martin, and Allison M. Waters

Contents

Prevalence, Burden, and Costs of Headaches in Children

Headache represents the most common manifestation of pain in childhood and adolescence, with estimates indicating that as many as 75% of young people will have experienced a significant headache by the age of 15 years (Bille, 1962; Kabbouche & Gilman, 2008). Whilst it is commonly accepted that the majority of the population will experience infrequent headaches from time to time, a significant proportion of youth experience recurrent and disabling headaches, impacting on many aspects of their lives. Prevalence rates for headache vary considerably according to research methodology and diagnostic criteria used. It is estimated that between 3.2% and 14.5% of children and adolescents suffer from recurrent migraines (Özge et al., 2011) and between 10% and 25% suffer from frequent tension-type headaches (Anttila, 2006), with research indicating a concerning trend towards an increase in incidence (Albers, von Kries, Heinen, & Straube, 2015). Research consistently indicates that the prevalence of headaches increases with age and is slightly more common in males in prepubertal years, transitioning to a clear predominance in females during adolescence (Hershey, 2010).

The impact of headaches on sufferers varies greatly due to the heterogeneity of headache con-

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ditions, whereby significant variations may occur within individual attacks in terms of headache frequency, duration, and severity. Headache disorders have the potential to have a negative impact on the lives of young people, spanning across their physical, academic, and social functioning and at times causing severe disability (Holden, Levy, Deichmann, & Gladstein, 1998). Research indicates that many young people experience difficulties in coping with their headaches (Wöber-Bingöl et al., 2014), and the quality of life in those affected is found to be lower than that of healthy counterparts across all domains (Powers, Patton, Hommel, & Hershey, 2003). Furthermore, the negative personal impact of recurrent headaches has been found to be comparable with serious health conditions afflicting children, including cancer, sickle cell disease, and rheumatoid arthritis (Peterson & Palermo, 2004; Powers et al., 2003). The societal costs of headaches in children are poorly understood, though research indicates that headaches account for a significant number of days missed at school (Connelly & Rapoff, 2006; Kernick & Campbell, 2009) and a significant number of parents missing days at work (Wöber-Bingöl et al., 2014). The high prevalence rates and burden of headache in children indicate a serious need for effective diagnosis and treatment.

The Headache Classification System

The current headache classification system is the International Classification of Headache Disorders, 3rd Edition Beta version (ICHD-3 beta; Headache Classification Committee, 2013), which is used as the basis for clinical diagnosis and research in both adults and children. The ICHD-3 beta is comprised of three parts: primary headaches, secondary headaches, and painful cranial neuropathies, other facial pains, and other headaches. Primary headaches are thought to be intrinsic to the nervous system, whilst secondary headaches are those which are attributable to a separate cause, such as a tumour, infection, or medication overuse. Primary headaches are divided into four categories: migraine, tension-type headache, trigeminal autonomic cephalalgias, and other primary headache disorders. Migraine and tension-type headache are the most commonly occurring headache disorders in children and adolescents and have received the largest proportion of empirical research. They are also the headache types for which patients are most likely to seek psychological treatment, and as such will be the focus of the current chapter.

Migraine is subdivided into six sections in the ICHD-3 beta, of which the two major sub-conditions are migraine without aura and migraine with aura. Migraine without aura is defined as a recurrent headache disorder manifesting in attacks lasting from 4 to 72 h, with at least two of the following: unilateral location, pulsating quality, moderate or severe pain intensity, or aggravation by, or causing avoidance of, routine physical activity. Additionally, the patient must present with at least one of the following: nausea and/or vomiting or photophobia and/or phonophobia. Aura is defined as recurrent attacks of unilateral, fully reversible symptoms characterised by visual, sensory, or other central nervous system disturbances that develop gradually and are usually followed by a headache and associated migraine symptoms. Other subtypes of migraine include chronic migraine, complications of migraine, probable migraine, and episodic syndromes that may be associated with migraine. Episodic syndromes that may be associated with migraine occur exclusively in children and are usually considered a precursor to the development of a migraine disorder. These conditions are understudied and poorly understood, though research indicates that up to half of children who experience migraines may also meet criteria for an associated episodic syndrome (Rothner & Parikh, 2016). The ICHD-3 beta identifies three episodic syndromes: recurrent gastrointestinal disturbance (cyclical vomiting syndrome or abdominal migraine), benign paroxysmal vertigo, and benign paroxysmal torticollis.

There has been considerable debate surrounding the applicability of the ICHD criteria in diagnosing primary headache disorders in children and adolescents, particularly in regard to migraine disorders. The issues of unilaterality and duration of headaches are thought to predominantly account for a general lack of sensitivity, specificity, and predictive value of the criteria in children (McAbee, Morse, & Assadi, 2016). The ICHD-3 beta recognises that characteristics of migraine may manifest differently in children, conceding that pain may occur bilaterally in children, and headache duration may occur for a minimum of two, rather than 4 h. However, research has indicated that as many as 11–81% of children with a diagnosis of migraine may experience headache durations of less than 2 h, with a further 8–25% reporting headache durations of less than 1 h (Maytal, Young, Shechter, & Lipton, 1997; Mortimer, Kay, & Jaron, 1992; Winner & Hershey, 2006). Furthermore, research conducted by Lima and colleagues (2015) indicated a 58% sensitivity of the criteria to accurately diagnose migraine headaches in children, which rose to 94% when attacks lasting for less than 2 h were included.

The ICHD-3 beta defines a tension-type headache as having two of the following qualities: bilateral location, pressing or tightening (non-pulsating) quality, mild or moderate intensity, and not aggravated by routine physical activity. Nausea and/or vomiting does not accompany the headache, and only one of photophobia or phonophobia may be present. The duration of the headache may occur from 30 min to 7 days. Tension-type headache is divided into four categories, of which the three main subtypes are infrequent tension-type headache (occurring less than once per month), frequent tension-type headache (occurring between 1 and 14 days per month), and chronic tension-type headache (occurring on, or more than, 15 days per month). To date, only one study has examined the applicability of ICHD-3 beta criteria to children with tension-type headache and found a 69.7% predictive value (Albers, Straube, Landgraf, Heinen, & von Kries, 2014).

Course of Headache Disorders in Children

The course of a headache disorder may vary considerably between individuals, though common trends have been observed in the literature. Research indicates that more than half of children diagnosed with a headache disorder will show significant improvement or even be headache-free at long-term follow-up. However, 20–40% of children remain unchanged or experience a worsening of their symptoms, carrying the disorder into adulthood (Antonaci et al., 2014; Brna, Dooley, Gordon, & Dewan, 2005; Guidetti et al., 1998; Hernandez-Latorre & Roig, 2000). A review of headache trajectories in children concluded that transformations of headaches (migraine becoming tension-type headache and vice versa) are common, occurring in approximately one third of children, which is further likely to complicate diagnostic issues (Antonaci et al., 2014). Research consistently indicates that remission rates of headache disorders are more favourable for boys compared to girls and for tension-type headache compared to migraine (Brna et al., 2005; Guidetti et al., 1998; Kienbacher et al., 2006). Other potential risk factors for poor outcomes that have been identified include having a higher headache severity at diagnosis (Brna et al., 2005) and a longer time period between headache onset and seeking professional help (Kienbacher et al., 2006).

Mechanisms of Migraine and Tension-Type Headache

The mechanisms involved in primary headache disorders are not well understood and have been the subject of much debate within the literature. Furthermore, little research has examined the mechanisms of headache in children and adolescents, though it is presumed that the mechanisms that underlie headaches in adults are similar to that of youth (Hershey, 2010). Traditionally, migraine has been considered a disorder of the vascular system. This predominant theory was proposed by Harold Wolff, who argued that a two-stage model of vasoconstriction caused by cortical spreading depression (a wave of electrophysiological hyperactivity followed by inhibition), followed by extracranial vasodilation, formed the underlying physiology of pain in migraine (Shevel, 2011). However, recent years have seen a transition of focus from peripheral mechanisms to central mechanisms, which has been largely facilitated by advances in neuroimaging (Tedeschi, Russo, & Tessitore, 2013).

Migraine Mechanisms of migraine are now thought to be based on an interaction between neural and vascular systems and include cortical spreading depression and trigeminal vascular activation with transmission through the thalamus to higher cortical structures (Hershey, 2010). Cortical spreading depression is considered to be the likely cause of migraine aura, with neuroimaging techniques indicating a slowly spreading area of abnormal blood flow in the occipital lobe during migraine aura, likely caused by heightened neuronal excitability (Hadjikhani et al., 2001). Central neuronal hyperexcitability has also been proposed as a key mechanism, with evidence indicating that neuronal excitability in the occipital cortex is elevated in individuals who suffer from migraine, and furthermore, this excitability determines the threshold for triggering attacks (Bussone, 2004). This same hyperexcitability has been demonstrated in a study with children and adolescents suffering from migraine, which indicated that sensitivity levels changed during the migraine cycle, supporting the notion that altered sensitivity in the brain of migraine sufferers may be involved in the initiation and propagation of migraine in this age group (Siniatchkin et al., 2009).

Tension-type Less research has been conducted in the area of mechanisms responsible for tension-type headache, and underlying pathophysiology is considered to be complex and poorly understood (Bendtsen, Ashina, Moore, & Steiner, 2016). Evidence suggests that sufferers of tension-type headache experience more pericranial myofascial tenderness, which is positively correlated with intensity and frequency of attacks (Lipchik et al., 2000). It is hypothesised that peripheral activation or sensitisation of myofascial nociceptors is involved in the development of this muscle pain and acute episodes of tension-type headaches (Bendtsen et al., 2016). Furthermore, it is thought that prolonged nociceptive stimuli from pericranial tissues lead to sensitisation of pain pathways in the central nervous system, which is hypothesised to be responsible for the conversion from episodic to chronic tension-type headache in sufferers (Bendtsen et al., 2016; Bendtsen & Jensen, 2006).

Genetic and Environmental Factors

When considering the relative influence of genetic and environmental factors in predisposing individuals to headaches, much of the research has been conducted in adult populations and is extrapolated to children. Several population and twin-based studies have indicated that the risk of developing a migraine disorder is dependent on a combination of genetic influence and environmental effects contributing to phenotypic expression. Research has indicated major genetic components in both migraine with aura (Ulrich, Gervil, Kyvik, Olesen, & Russell, 1999) and migraine without aura (Gervil, Ulrich, Kyvik, Olesen, & Russell, 1999), though a lack of co-occurrence observed in twin studies indicates that the two disorders are genetically distinct (Russell, Ulrich, Gervil, & Olesen, 2002). In addition to genetic influences, individual environmental factors are indicated to account for at least 50% of an individual's susceptibility (Ulrich et al., 1999).

Research investigating the genetic component of susceptibility to developing frequent tension-type headache has indicated an evident, though smaller, genetic component, with individual environmental factors deemed to play a larger role, accounting for approximately 81% of individual's susceptibility (Ulrich, Gervil, & Olesen, 2004). Research has indicated that genetic factors may play a larger role in chronic tension-type headache, with a threefold risk of developing the disorder observed between first-degree relatives

(Ostergaard, Russell, Bendtsen, & Olesen, 1997; Russell, Østergaard, Bendtsen, & Olesen, 1999).

The Functional Model of Primary Headaches

A psychological approach to the assessment and treatment of a primary headache disorder should entail an investigation of the unique factors contributing to each individual's case. This involves attempting to answer a number of questions which may include the following: Why the headaches began when they did, why the individual experiences headaches at certain times and not others, and what made the individual susceptible to developing headaches in the first place? These questions are not easily answered and in many cases have no definitive answers. However, attempting to understand such questions allows for a specialised mapping of factors contributing to the individual's headache disorder, which is integral in informing treatment. This approach should involve conducting a functional analysis, whereby the antecedents and consequences of headaches are explored. Martin has developed a functional model of primary headaches in adults (Martin, 1993, 2013; Martin, Milech, & Nathan, 1993), which is depicted in Fig. 1. Whilst no such model has yet been developed for children and adolescents, the adult model is likely applicable to the younger population and provides a useful framework for understanding individual factors contributing to headaches.

Immediate factors Central to the model are headache events and their associated symptoms, as well as the underlying central and peripheral mechanisms. The immediate antecedents of headaches are commonly referred to as triggers, which are factors that precipitate or aggravate headache attacks. It is thought that at up to 91% of children suffering from recurrent headaches report having at least one identifiable trigger, with an average of approximately seven triggers reported in some studies (Fraga et al., 2013; Neut, Fily, Cuvellier, & Vallée, 2012). Triggers most commonly reported by children include stress, negative affect (the tendency to experience high negative emotional reactivity), problems related to sleep (too little, poor quality), weather (humidity, temperature, precipitation), light, odours, noise, hunger, and playing video games (Fraga et al., 2013; Neut et al., 2012). These triggers are similar to those that are reported in the adult literature (Kelman, 2007).

Currently, there is a paucity of research surrounding triggers in the paediatric population, with much data relying on retrospective, self-report methodology. This hinders the ability to establish clear temporal relationships between triggers and headaches, and the data is vulnerable to recall bias (Connelly & Bickel, 2011). Despite these limitations, a small number of studies have been conducted which have utilised a prospective headache diary design to investigate triggers in the paediatric population. This research has indicated associations between headaches and factors including increased stress levels, too little sleep, negative mood, and changes in weather (Connelly & Bickel, 2011; Connelly, Miller, Gerry, & Bickel, 2010; Karlson et al., 2013).

Setting antecedents Setting antecedents acknowledge that headaches occur within and are affected by a broader psychosocial context. Individual setting antecedents are largely dependent on the triggers that precipitate their headaches. For example, if stress is identified as a headache trigger, it is important to ascertain the main sources of stress in the individual's life, as well as their coping style and social support. Whilst research has been somewhat inconsistent within this area, associations have been reported between setting factors, such as negative family environments, difficulties at school, and peer relational problems, and a higher rate of headache occurrence in children (Anttila, Metsähonkala, Helenius, & Sillanpää, 2000; Aromaa, Rautava, Helenius, & Sillanpää, 1998).

Setting antecedents may also incorporate comorbid conditions that have the potential to mediate or moderate an individual's exposure to certain triggers. For example, a comorbid mood or anxiety disorder may result in an individual

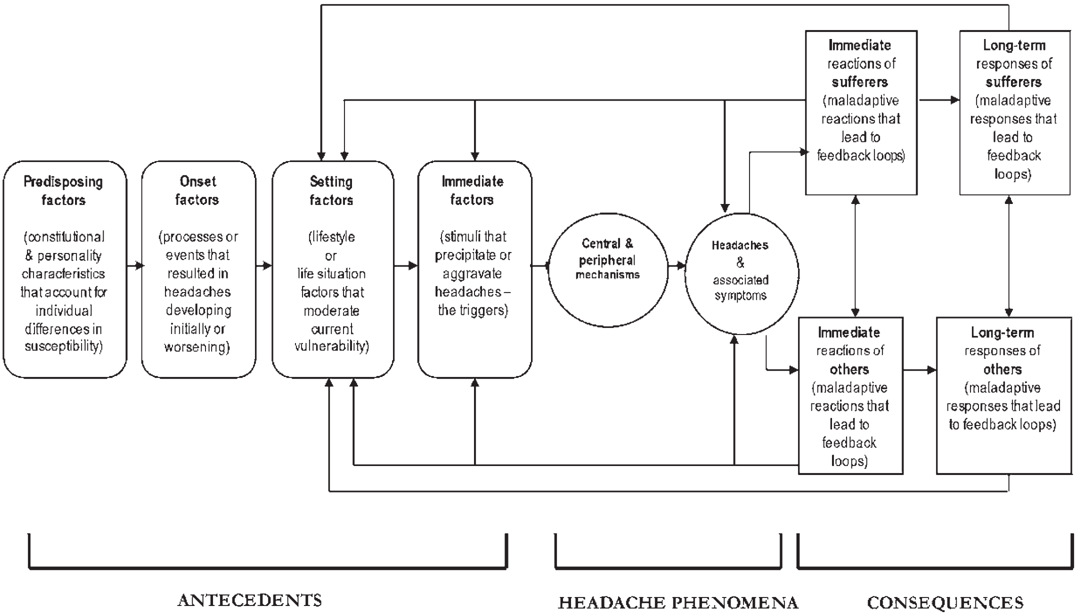

Fig. 1 Functional model of primary headaches (Martin, 1993, 2013; Martin et al., 1993)

experiencing more frequent episodes of negative affect or stress, which may act as a trigger for their headaches. Research has consistently indicated that children who suffer from headaches are also more likely to suffer from a variety of psychological and emotional problems, particularly difficulties related to anxiety and depression (Fielding, Young, Martin, & Waters, 2016; Mazzone, et al., 2006; Milde-Busch et al., 2010; Powers, Gilman, & Hershey, 2006). Despite their common prevalence, these relationships are poorly understood and are thought to be complex and bidirectional. Sleeping difficulties represent another important comorbid condition that should be considered, given that sleep is commonly cited as a trigger. Children suffering from migraine disorders have been found to be at higher risk of suffering from a range of sleeping disturbances including bruxism, co-sleeping, and snoring (Miller, Palermo, Powers, Scher, & Hershey, 2003).

Onset factors Any event or situation occurring at the time when the individual first began to experience headaches and that is thought to have played a role in the initial development of the disorder is considered as onset factors. Whilst there is little research into onset factors within the paediatric population, one study examining headache histories in adolescents suffering from chronic headaches indicated that personal loss, such as the death of a family member, separation or divorce in the family, or change of residence from a familiar area, had occurred within 12 months of headache onset in many cases (Kaiser & Primavera, 1993). Childhood maltreatment has also been associated with an earlier age of migraine onset and is considered a risk factor for the chronification of migraines (Tietjen et al., 2010). Hormonal factors may play a role in the onset of the disorder in females and are thought to play a role in the increase in prevalence of headaches in girls following the onset of puberty. A population-based longitudinal study found that the onset of menarche was associated with an increased risk of recurrent headaches (Kröner-Herwig & Vath, 2009). Furthermore, headache has been found to be more prevalent amongst adolescents and adult females with early menarche, though it remains unclear if early menarche increases headache susceptibility or is a consequence of a common pathogenic factor (Aegidius et al., 2011).

Predisposing factors These factors contribute to an individual's vulnerability to developing a headache disorder. The aforementioned genetic component of headaches plays an important role in an individual's susceptibility, particularly in the case of migraine headaches. It is speculated that certain temperamental traits may also predispose individuals to developing headache disorders. In children, traits such as anxiety sensitivity and hypersensitivity to somatosensory stimuli have been consistently linked with the development of headache disorders later in life (Kröner-Herwig & Gassmann, 2012). However, research in this area remains limited and is hindered by its reliance on cross-sectional and retrospective methodology. A number of health variables including asthma, allergies, obesity, and epilepsy have also been associated with an increased risk of developing a headache disorder, though the relationships between these disorders remain unclear (Hershey, 2010).

Immediate- and long-term responses of sufferers The model recognises that the experience of headache is complex and subjective and is influenced not only by its antecedents but also its consequences. These consequences pertain to the short- and long-term reactions and responses of both the headache sufferer and those around them. It is important to consider the individual's appraisals of their headaches and associated pain, as these are likely to play an important role within the model. Negative appraisals of pain that are characterised by anxiety and catastrophic thinking are associated with an exacerbation of pain severity and higher levels of disability (Vervoort, Goubert, Eccleston, Bijttebier, & Crombez, 2006). These responses also have the potential to create negative feedback loops within the model. For example, if the child's headaches are triggered by stress, a reaction to headaches characterised by stress is likely to play a role in triggering future attacks. In the long term, this response may also influence setting factors such as comorbid disorders, creating a vicious cycle that maintains the headache disorder.

Immediate- and long-term responses of others It is important to recognise the complexity inherent in the relationship between the child's pain experience and the reactions and responses of those around them, particularly their caregivers. Caregivers are likely to be personally affected by their children's headaches, and their response to their child's expression of pain is likely to be part of a complex and bidirectional relationship whereby the parent and child appraisals influence each other (Asmundson, Noel, Petter, & Parkerson, 2012). Research indicates that children with pain conditions experience greater levels of functional disability when their parents consistently respond to their pain in maladaptive ways (Claar, Simons, & Logan, 2008). Maladaptive responses include responding with criticism or discounting of pain but also include paying increased attention to the child's pain or granting special privileges. Whilst these latter responses may be perceived as positive, they have the potential to act as positive reinforcement for sick role behaviours, resulting in an ongoing cycle.

Psychological Assessment of Primary Headaches

It is recommended that the starting point in headache assessment involves consultation with a medical practitioner, ideally a paediatric neurologist, in order to obtain an accurate diagnosis, particularly with a view to ruling out secondary headaches. Within the realm of psychological treatment for headaches, it is argued that functional analysis, regardless of the specific diagnostic type of primary headache, will provide more useful information pertaining to a treatment plan, as this takes into account the individual factors maintaining the headache disorder. Interviewing, self-monitoring, and standardised measures and questionnaires should be utilised within this assessment, in order to obtain a clear picture of the individual's difficulties.

Interviewing

Gathering information pertaining to the personal and social history of the child forms an essential part of the assessment process, in order to elucidate the context in which the headache problem occurs. It is then necessary to gather information relating to the headache problem itself, as well as the antecedents and consequences of headache attacks. Parents play an integral role in the provision of this information. It is widely recognised that young children may have difficulties in articulating the symptoms of their headaches to practitioners and their parents, and it is recommended that parents are asked about behaviours that their children demonstrate, for example, a child requesting to lie in a dark room may be indicative of experiencing photophobia. A small but increasing body of research has investigated the utility in asking children to visually depict their headaches via drawings, which have been found to have a high specificity, sensitivity, and predictive value in differential headache diagnoses and may also allow for a deeper understanding of the child's pain experience (Mazzotta et al., 2015; Stafstrom, Rostasy, & Minster, 2002). Furthermore, these drawings have been found to be useful in depicting the clinical course of a headache condition when used longitudinally (Stafstrom, Goldenholz, & Dulli, 2005). It is worth noting that research has indicated that relying solely on parental reports of children's headaches may not provide an accurate depiction of the problem, as parents have been found to consistently underestimate the extent of their children's headaches (Lundqvist, Clench-Aas, Hofoss, & Bartonova, 2006; Sasmaz et al., 2004), which highlights the importance of utilising additional assessment methods.

Self-monitoring

Self-monitoring of headaches provides important information contributing to the assessment of the individual and is also integral in the measurement of treatment outcomes. This usually occurs in the form of a headache diary, which collects information regarding the frequency, duration, and intensity of headaches, usually completed at multiple time points on a daily basis. Headache diaries also have the potential to collect additional information including medication consumption and exposure to suspected triggers of headaches. A 3–4-week period has been suggested as the optimal length to accurately assess headache patterns (Heyer, Perkins, Rose, Aylward, & Lee, 2014; Osterhaus & Passchier, 1992). Traditionally, paper diaries have been used; however the recent burgeoning of technology use has seen a movement towards electronic diaries, which are completed via computers, specialised handheld devices, or via specific applications on mobile phones. A growing body of evidence suggests the electronic diaries are favourable in terms of accuracy and credibility and are suitable for usage in children as young as 8 years old (Krogh, Larsson, Salvesen, & Linde, 2015; Palermo, Valenzuela, & Stork, 2004). However, the psychometric properties of electronic headache diaries are yet to be rigorously assessed and therefore should be interpreted cautiously (Larsson & Stinson, 2011).

Questionnaires and Inventories

Measurement of the experience of headaches themselves forms an important part of the assessment process. This entails measuring the intensity of headaches, as well as their frequency and duration. It is recognised that young children may not have the verbal capabilities necessary to describe the intensity of their headaches accurately. The usage of visual measures in this area has been recommended, with devices such as visual analogue scales, which allow children to rate their pain on a visual line, anchored at variations of 'no pain' and 'most possible pain' (Stinson, Kavanagh, Yamada, Gill, & Stevens, 2006). The Facial Affect Scale has also been used to measure the level of discomfort associated with recurrent headaches in children as young as 5 years old (McGrath et al., 1996).

Measurement of disability and quality of life associated with headaches allows for an understanding of the impact of headaches on the individual and also provides useful information in terms of outcome measures. An emerging consensus exists that it is necessary to utilise both generic and disease-specific quality of life measures for chronic health conditions (Varni, Burwinkle, & Lane, 2005). The pedMIDAS (Hershey et al., 2001) is a migraine-specific measurement of disability across different domains of children's lives, which has been widely used in the literature and has sound psychometric properties. Additionally, the Quality of Life Scale (Langeveld, Koot, Loonen, Hazebroek-Kampschreur, & Passchier, 1996) has been developed specifically to measure quality of life in adolescents suffering from chronic headaches. Generic measures of quality of life and disability include the Paediatric Quality of Life Inventory (Peds QL 4.0; Varni, Seid, & Kurtin, 2001) and the Functional Disability Inventory (Walker & Greene, 1991), both of which are commonly used.

Comorbid conditions, particularly anxiety and mood disorders, are highly prevalent in children with headaches and are likely to play an important role in the maintenance of headaches, as well as the child's life more broadly. As such, it may be useful to routinely assess for these using psychometrically sound measures, such as the Spence Children's Anxiety Scale (SCAS; Spence, 1998) and the Multidimensional Anxiety Scale for Children (March, Parker, Sullivan, Stallings, & Conners, 1997) for anxiety and the Children's Depression Inventory (Kovacs & Beck, 1977) for mood disorders, which have frequently been utilised within the headache literature.

Psychological Treatment of Headaches in Children

Treatment of headaches at an early age is important, as it may allow for the prevention of the condition's evolution into a chronic adulthood disorder. Additionally, longer periods of untreated headaches have been linked with poorer outcomes (Osterhaus, Lange, Linssen, & Passchier, 1997). Current treatment methods for headaches in children are varied and may include pharmacological treatment, biofeedback therapy, relaxation training, and cognitive behavioural therapy (CBT). These treatments may be administered as stand-alone interventions or in combination with one another. It is worth noting that research in this area has predominantly focused on adult populations, and empirical evidence for the efficacy of these treatments in paediatric populations is very much in its infancy.

Pharmacological

Pharmacological treatment has traditionally been the cornerstone of treatment for headaches and remains a common treatment option for both adults and children. Despite this treatment falling within the medical realm, it is nonetheless an important area for other professionals to have at least a modest understanding of, given that many headache patients will receive pharmacological treatment concurrently with psychological treatment. The pharmacological treatment of headaches can be separated into two broad categories, acute and preventive.

Acute pharmacological treatment aims to treat headache attacks rapidly, with the intention to restore the individual's ability to function. Analgesics and nonsteroidal anti-inflammatory drugs are commonly used in this endeavour (Bonfert et al., 2013). The efficacy of acute medications has predominantly been evaluated in adults thus far, though they are considered to have putative benefits for paediatric populations for both migraines and infrequent tension-type headaches. Ibuprofen is considered the first-line treatment, followed by acetaminophen, due to their favourable side effect profiles (Bonfert et al., 2013). However, 'over-the-counter' medications are thought to be of minor value in at least 30–60% of paediatric migraineurs (Ho et al., 2012), and triptan agents are recommended when children suffer severe episodes that remain unresponsive to analgesics. Currently triptan agents have been approved for use in paediatric migraine sufferers only. Whilst acute therapies may shorten the duration or lessen the intensity of attacks, they are unlikely to affect the frequency of attacks. Furthermore, the use of acute medication becomes problematic when children suffer from frequent headaches, as consumption on more than three occasions per week poses a risk of headache transformation to analgesic overuse headaches (Hershey, Kabbouche, & Powers, 2010).

Preventive pharmacological treatment is considered when headaches begin to seriously interfere with the individual's life, either through their frequency or the level of disability caused. Preventive medication may also be beneficial when acute options are found to be ineffective, not tolerated, contraindicated, or regularly overused, in children suffering from migraines or frequent episodic tension-type headache. Prophylaxis including antidepressants, antihypertensives, antihistamines, and antiepileptics is regularly prescribed for children, though evidence of efficacy is limited and effective dose levels are rarely established (Bonfert et al., 2013); additionally, evidence in this area tends to focus on children suffering from migraine, with little research addressing the efficacy of these treatments in cases of tension-type headache. Due to the frequency of side effects, contraindications, and a general lack of consensus on pharmacological strategies in the paediatric population, it is frequently recommended that preventive pharmacological treatment is indicated only when non-pharmacological and lifestyle modification strategies have been found to be ineffective (Bonfert et al., 2013; Termine et al., 2011).

Biofeedback Training

Biofeedback training aims to assist individuals to exert control over biological processes that are usually involuntary or modulated outside of conscious awareness. Such processes may include muscle tension, pulse rate, and peripheral blood flow. Feedback concerning these processes is provided by audio or visual feedback devices, which are driven by electrodes or transducers, which detect the signals and pass them onto amplifiers, which results in an amplification of these processes. The most common forms of biofeedback training in treating headaches are based on understandings of underlying mechanisms developed in the 1960s and 1970s, whereby thermal biofeedback has been used for migraines and electromyographic biofeedback has commonly been used in the treatment of tension-type headaches. Whilst physiological control is the focus of biofeedback training, research indicates that other therapeutic processes such as cognitive changes (such as increased self-efficacy and internal locus of control) account for a significant portion of changes in headaches (Holroyd et al., 1984).

Biofeedback may be administered as a standalone therapy or form a component of treatments that also incorporate cognitive strategies. Usually several treatment sessions are required, with daily home practice involved. It is often facilitated by teaching relaxation or autogenic exercises. Biofeedback training is comprised of multiple phases, including a baseline phase, a feedback phase, and a self-control phase where feedback is not provided. Over time, reliance on the feedback is gradually eliminated as the individual's skills in self-regulation become consolidated.

Whilst there are a limited number of high quality studies investigating the efficacy of biofeedback training as a solitary treatment for headaches in children, current evidence is indicative of positive effects. Bussone and colleagues (1998) compared EMG biofeedback training with a placebo relaxation condition in children aged 11–15 suffering from episodic tension-type headache. Whilst initially both conditions were associated with sizeable headache reductions, after 12 months, children in the biofeedback condition were found to show continuous improvements superior to the control condition. Biofeedback training for skin temperature control in children and adolescents aged 7–18 diagnosed with migraine has also been associated with significant improvements in headache activity, which appear to be maintained over time (Labbé, 1995; Labbé & Williamson, 1984). Interestingly, research conducted by Labbé and Williamson (1984) indicated that the treatment condition achieved significant results compared to a control condition, despite evidence that children in the treatment condition did not successfully learn to regulate hand temperature. Scharff and colleague (2002) attempted to explore this placebo effect in children, by comparing hand-warming biofeedback with a control condition involving hand-cooling biofeedback. They found that children in the treatment condition were more likely to achieve clinical improvement, though a decrease in headache activity in both groups also indicates that there are likely to be nonspecific treatment effects. It is noted that the treatment group in this study also included additional components such as relaxation techniques, stress management, and education surrounding stress as a trigger for headaches, which were not included in the control condition and may have confounded the results. Whilst biofeedback appears to be efficacious in the treatment of headaches, the mechanisms of change remain poorly understood, and further research in the area is required.

Relaxation Training

Relaxation training in the treatment of headaches embodies a number of techniques, aiming to allow the individual to modify headache-related physiological responses, decreasing their levels of sympathetic arousal. Techniques that are commonly implemented in headache treatment include progressive muscle relaxation, diaphragmatic breathing, autogenic training, and meditative or passive relaxation. Relaxation training may be utilised as a stand-alone treatment or as part of a multi-faceted treatment plan and usually entails six or more hourly sessions. There is usually a daily home practice component, facilitated using an audio guide or script.

The efficacy of using relaxation training alone to treat headaches in children has been empirically supported, with research indicating that children are able to achieve clinically significant change following treatment (Larsson & Carlsson, 1996; McGrath et al., 1988; Passchier et al., 1990; Richter et al., 1986). Fichtel and Larsson (2001) explored the effects of relaxation treatment in adolescents suffering from migraine and/or tension-type headache and found that 50% of adolescents achieved clinically significant improvement, though results appeared to be more favourable for migraine sufferers, compared to those with tension-type headache. Larsson and colleagues (1987b) also found support for the efficacy of a relaxation programme which was taught during school hours and was found to be effective in reducing headache activity for adolescents with recurrent headaches (mostly tension-type).

Cognitive Behavioural Therapy

The earliest forms of psychological treatment for headaches in children were primarily behavioural in nature and included contingency management-based interventions. These interventions acknowledged that headache reports in some patients may be conceptualised as operant behaviour that is controlled by the consequences of headache behaviour. This treatment was explored in multiple case studies. Yen and McIntire (1971) successfully reduced headaches in a 14-year-old girls suffering from constant headache complaints using a response-cost contingency plan. Other case studies have indicated substantial decreases in the reporting of headaches in a 6-year-old girl (Ramsden, Friedman, & Williamson, 1983) and 11-year-old male (Lake, 1981) following contingency plans whereby healthy behaviours were consistently positively reinforced. Results of these case studies suggest that headache reporting in some children may be strongly influenced by the environmental consequences of reporting pain. However, despite these initial results, contingency management as a stand-alone treatment did not progress beyond these limited case studies.

CBT is becoming increasingly utilised in the treatment of headache disorders in children. This treatment combines behavioural and cognitive elements of therapy, aiming to modify unhelpful thoughts, assumptions, and behavioural patterns that are considered to be influencing the headache disorder. Usually in headache treatment, CBT focuses on aiding the individual to gain awareness of the role of their thought processes in the headache cycle and to gain insight into the relationships between stress, coping, and headaches.

CBT usually occurs over 8–12 sessions and may occur in individual, group, or minimal therapist contact formats, typically involving daily home practice. Initial sessions focus on providing psycho-education surrounding the role of CBT in treating headaches, followed by behavioural techniques, which may include relaxation techniques, biofeedback, pleasant activity scheduling, and activity pacing. Cognitive components are likely to include problem-solving strategies, exploration of the impact of thoughts and feelings on headache occurrence and pain, strategies to challenge and modify unhelpful thought processes, and the development of appropriate coping strategies. The development of a maintenance plan at the conclusion of treatment is considered integral to lessen the likelihood of future relapses.

Current empirical evidence indicates that CBT produces favourable outcomes for children suffering from recurrent headaches, and clinically significant changes appear to be durable throughout follow-up periods (Griffiths & Martin, 1996; Kröener-Herwig & Denecke, 2002; McGrath et al., 1992; Osterhaus et al., 1997). Cognitive therapy as a stand-alone treatment has been compared to relaxation training by Richter and colleagues (1986) to treat children suffering from migraine. Both treatments were found to be equally efficacious and superior to a placebo condition.

Research by Powers and colleagues (2013) explored the value of CBT when administered concurrently with pharmacological treatment in children aged 10–17 suffering from migraine. A treatment group receiving CBT and amitriptyline was compared with a control group who received amitriptyline and headache education. The study revealed a greater reduction in headache days and disability in children who received CBT in conjunction with amitriptyline, indicating that psychological intervention has important value as an adjunct to pharmacological treatment. Furthermore, the addition of headache education in the control group indicates that the effect found was not solely due to therapist support, education, or nonspecific intervention effects. Sartory and colleagues (1998) compared children aged 8–16 with recurrent headaches who received either pharmacological treatment, stress management combined with progressive muscle relaxation, or vasomotor feedback. Results indicated that relaxation and stress management were favourable in reducing headache activity, with 80% of children experiencing clinical improvement in this condition, compared to 53.3% in the vasomotor feedback group and 41.7% in the group receiving pharmacological treatment.

A study conducted by Wicksell and colleagues (2009) was the first to utilise acceptance and commitment therapy in the treatment of chronic pain conditions in children, which included recurrent headaches. This intervention was based on behavioural and cognitive strategies, although it emphasised exposure and acceptance strategies. The study compared this treatment to a standard multidisciplinary approach combined with amitriptyline use. Results indicated that the treatment showed substantial and significant improvements across all measures, indicating that it may be an efficacious treatment option for headaches in children, though additional research is required in this area.

Overall Efficacy of Psychological Treatments

The aforementioned psychological treatments for headaches in children are gaining a base of empirical evidence that supports their efficacy. However, it remains evident that whilst some children do benefit from these treatments, many do not. Osterhaus and colleagues (1997) indicated that only half of the children in their treatment group achieved clinical improvement in terms of reductions in headache frequency. Similarly, Larsson and Carlsson (1996) found that a 34% improvement from baseline could be seen in children who benefited from treatment, indicating that headaches still remained a problem for this group. Research consistently indicates that whilst headache frequency is improved by psychological treatment, intensity and duration tend to remain unchanged (Osterhaus et al., 1997; Richter et al., 1986), suggesting that whilst these treatments appear to have value in terms of headache prevention, they are not overly effective when headaches do occur.

A Cochrane review conducted by Eccleston and colleagues (2014) evaluated currently available evidence pertaining to the efficacy of psychological treatments in treating children with recurrent headaches. Overall, current research is indicative of a beneficial effect of psychological treatment on the reduction of headache pain, which is maintained over time. Whilst improvements are seen in terms of disability, effect sizes are generally small (Eccleston et al., 2014). Additionally, the effects of treatment on comorbid anxiety and depression were evaluated when available. In summary, no beneficial effects were found for comorbid depression, and whilst some small effects were found for anxiety reduction, these effects were not found to be maintained at follow-up (Eccleston et al., 2014). It is noted that evidence in this area is currently limited by a paucity of research; however it does appear that current treatments do little to alleviate common comorbid conditions in children with recurrent headache.

Variations in the Psychological Treatment of Headaches

Time Period

Whilst evidence indicates that psychological treatment is efficacious in the treatment of recurrent headaches in children, it is recognised that treatment is often resource intensive and may be costly for families in terms of both finances and time. For these reasons, research has begun to explore the utility of brief interventions in the treatment of headaches, compared to standard treatment timeframes that may span over a number of months.

The possibility of a 1-h education session was explored by Abram and colleagues (2007), which incorporated information about headaches, the role of stress and other triggers, and lifestyle changes and also included a brief guided practice in relaxation techniques. The education session was followed by an immediate consultation with a neurologist. This was compared to a standard neurologist consultation. Both conditions were found to be equally effective in terms of information received by patients, and the authors concluded that the intervention was likely too brief for a significant difference to emerge. Barry and von Baeyer (1997) explored the efficacy of abbreviated cognitive therapy for children with headaches. This included two 90-min sessions focusing on relaxation, distraction, visualisation, and stress management skills. Results did not support this treatment method as efficacious. Passchier and colleagues (1990) evaluated a relaxation training programme which consisted of four 20 min sessions conducted over 2 weeks and found efficacy in terms of reduction in tension-type headaches but limited efficacy for reduction in migraines. Whilst evidence is limited in this area, preliminary studies suggest that interventions of standard length are necessary to achieve clinically significant improvements.

Modality

A rise in minimal therapist contact and self-help treatments also acknowledges the potential barriers that families may face in receiving treatment for headaches. These interventions may utilise manuals provided to patients or, increasingly, are delivered using technology, which includes computer-based programmes, internet-based programmes, smartphone apps, audiotapes, and therapist contact via telephone. These alternative formats of treatment may be beneficial in terms of being widely accessible and self-paced. Whilst research investigating the efficacy of these treatment formats is growing, the empirical database remains small.

Self-administered manuals have been utilised to administer CBT for a number of years. These are usually supplemented by auditory stimuli for relaxation components and often include weekly therapist check-ins via phone. When compared to identical interventions delivered by a therapist in face-to-face formats, the self-administered programmes have been found to be equally efficacious in producing clinically significant improvements in children with recurrent headaches (Griffiths & Martin, 1996; Kröener-Herwig & Denecke, 2002; McGrath et al., 1992). Relaxation training has also been administered in self-administered formats, with results indicating that it is beneficial (Larsson et al., 1987a).

Connelly, Rapoff, Thompson, and Connelly (2006) conducted the first known study investigating the use of a CD-ROM as a medium for paediatric headache treatment delivery (cognitive behavioural strategies). They found that the treatment produced clinically significant improvements compared to a control group, which were maintained at follow-up, though no differences in disability scores were found. Rapoff and colleagues (2014) also examined a cognitive behavioural self-management CD-ROM intervention and found that whilst the intervention resulted in lower headache intensity and disability scores, headache frequency and quality of life did not differ from an educational control group. Cottrell, Drew, Gibson, Holroyd, and O'Donnell (2007) examined the utility of a telephone-delivered behavioural management programme for adolescents with migraine. Treatment effects were large in terms of reductions in the number of migraines and disability equivalent hours, indicating that this is likely to be an efficacious format of treatment for adolescents. Web-based manuals and interventions have been examined in treating children with a multitude of pain problems, including headache, and have been shown to be significantly superior to waitlist control groups (Hicks, Von Baeyer, & McGrath, 2006; Palermo, Wilson, Peters, Lewandowski, & Somhegyi, 2009; Trautmann & Kröner-Herwig, 2010). A Cochrane review conducted by Fisher, Law, Palermo, and Eccleston (2015) concluded that remotely delivered treatment for headaches is a promising area, though additional empirical evidence is necessary in order to be confident of its efficacy.

Parental Involvement

The impact of parents and caregivers in the maintenance of headaches in children is emphasised in the aforementioned functional model of headaches, whereby parental responses to their children's headaches play an important role in determining outcomes. As such, it follows naturally that parents and caregivers are likely to play an important role in the intervention process, the extent of which is likely to vary depending on the developmental stage and needs of the child. There are two ways in which parents may be involved in the treatment of childhood headaches. One is to assist and support the child in working through the treatment programme. The other recognises that the parent may be playing a role in the perpetuation of headaches, and hence treatment may include modifying parental behaviours and responses considered to be dysfunctional. The latter form of involvement necessitates an assessment of parental responses to headaches and has the possibility of being threatening to parents. Many existing psychological interventions have acknowledged the necessity of parental involvement in treatment, with varying degrees of parental incorporation noted within the current literature.

At the most basic level, parental involvement may be limited to assisting the child to complete tasks associated with the intervention. This was utilised in research by Rapoff and colleagues (2014), where parental involvement had the primary goal of assisting the child to complete a self-help manual and to aid with any difficulties encountered. Whilst parents play a passive role in this form of treatment, there exists an opportunity to become educated about the child's programme, which is likely to be beneficial. Parents may also be involved on a partial level, where they are required to attend a number of the child's treatment sessions, in order to become informed about the material and skills being taught and to facilitate the practice of these skills in the home environment (Powers et al., 2003). Additionally, parents may be assigned entire sections of the child's manual to complete (Cottrell et al., 2007; Hicks et al., 2006).

Perhaps the most extensive incorporation of caregivers in treatment to date has occurred in research conducted by Palermo and colleagues (2009), which utilised a family CBT model, acknowledging the key role that parents may play in maintaining children's pain conditions. Treatment involved eight modules to be completed by parents, which covered topics such as adaptive communication and interaction patterns, education surrounding operant procedures and appropriate reinforcement, modelling appropriate behaviours, and supporting the child's independence. Despite the inclusion of caregivers in interventions, there is currently no literature comparing these varying levels of involvement, and as such it is difficult to empirically comment on the effect that this has on treatment outcomes.

Future Directions for the Psychological Treatment of Headaches in Children

Whilst the assessment and treatment of headaches in children are gaining traction, research in the area remains limited, with many areas warranting further attention. In terms of the classification system, there is a need for additional research to ascertain how the current diagnostic system, which has been developed for adults, applies to children and adolescents. There is also an ongoing need for additional research to better understand the mechanisms that underlie headaches, as well as the influences from a broader psychosocial context. Additionally, assessment of headaches in children warrants further research, particularly in order to ensure that electronic measurement methods that are commonly used are psychometrically sound.

The treatment of headaches in children is perhaps the realm warranting the most empirical attention, due to a general lack of research conducted in this area. Pharmacologically, there is a need for trials to establish the efficacy of current treatments in the paediatric population. Psychological treatments including relaxation, biofeedback, and CBT appear to be efficacious within this population, though additional large-scale studies are warranted. Furthermore, much research to date has focused on the outcomes of headache frequency, duration, and intensity; however, comorbid conditions such as anxiety and depression are common in this population, and the research available indicates that current treatments do little to address these conditions. It would likely be beneficial for future research to focus on developing interventions that successfully treat such comorbid conditions concurrently. There are also many possible variations to treatment that are worthy of exploration, particularly in terms of minimal therapist contact methods, for which there is a need for additional quality research.

When considering the function model of headaches in children, it is evident that precipitating factors, or triggers, are rarely addressed in current psychological treatments. Medical advice has traditionally counselled an avoidance of triggers in order to reduce headache frequency (Friedman & De Ver Dye, 2009). However, an emerging trigger avoidance model of headaches has indicated that avoidance of triggers could result in a sensitising effect, whereby the trigger's capacity to elicit a headache in an individual becomes stronger (Martin, 2000, 2001). Laboratory studies have investigated the relationship between exposure to triggers and headaches and have provided confirmatory evidence for this theory for stress (Martin, Lae, & Reece, 2007), visual disturbance (Martin, 2000, 2001), and noise (Martin, Reece, & Forsyth, 2006). In response to this research, a novel approach to treating headache called learning to cope with triggers has been developed. This approach utilises graduated exposure techniques to promote individual desensitisation to triggers when deemed appropriate. A randomised control trial conducted by Martin and colleagues (2014) found this approach to be superior to the avoidance of triggers. Despite promising gains in this area, research is yet to evaluate the efficacy of this approach in the paediatric population.

Despite growing research interest in the treatment of headaches in children, relatively little is known about why treatments work for some children and not others. Research by Osterhaus and colleagues (1997) indicated that the most important predictor of treatment success was length of headache history, whereby those with shorter periods of time spent experiencing headaches were more likely to benefit from treatment. Additionally, maternal rewarding of illness behaviours and positive mother-child relationships were indicated as risk factors for poorer outcomes following treatment. These findings highlight the importance of early intervention, assessing the possible role of parent behaviours in a child's headache cycle, as well as including parents in treatment plans as necessary. Considering the huge cost and increasing incidence of childhood headache disorders, it is thought that ongoing research and the development of effective treatment interventions are of critical importance to headache sufferers, their families, and the wider society.

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Eating Disorders

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Contents

Introduction

Eating problems or irregularities are common among children and adolescents. When the problems reach the point of being gross disturbances in eating behavior and when accompanied by some form of body image disturbance, we enter the realm of the eating disorders (EDs). The current *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; American Psychiatric Association [APA], 2013) includes a chapter called "Feeding and Eating Disorders," which comprises eight disorders: pica, rumination disorder, avoidant/restrictive food intake disorder, anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), and two residual diagnoses. In this chapter, we review AN, BN, BED, and their variants (which may fall into the two residual categories). See Hong and Dixon (this volume) for a discussion of pica and Penrod and Fryling (this volume) or Bryant-Waugh (2013) for a discussion of other feeding disorders. Another eating-related problem among children is obesity, but a discussion of obesity and related problems is beyond the scope of the current chapter. See Altman and Wilfley (2015) for a review of the literature on treatment of childhood obesity.

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Anorexia Nervosa (AN)

The central feature of AN is a persistent "restriction of energy intake relative to requirements, leading to a significantly low body weight" (APA, 2013, p. 338). The full *DSM-5* diagnostic criteria are listed in Table 1. Significantly low body weight is defined as "less than minimally expected" (p. 338) for children and adolescents. Past versions of the *DSM* have used specific, and somewhat arbitrary, weight criteria (e.g., body mass index <=17.5; BMI; weight in kilograms/height in meters^2); however, with the *DSM-5*, there is no minimum. Severity of the disorder can be specified based on current BMI (see Table 1). For this chapter, it is critical to note that absolute BMIs may not be suitable to use with children and younger adolescents given that they are still growing, and BMI does not account for sex and age expected norms. Assessing deviation from expected body weight, through looking at age- and gender-adjusted BMI percentiles, may be more appropriate for this age group (Le Grange et al., 2012). A young person may be at a minimal body size through having lost weight or through never having gained the weight that would be expected with normal development. The latter may be more common among children and young adolescents, although it would not be uncommon for older adolescents to lose a significant amount of weight. Persons diagnosed as having AN may use a variety of weight control mechanisms including intentional starvation, excessive exercising, or purgative behaviors (self-induced vomiting and misuse of laxatives, diuretics, or enemas).

Table 1 DSM-5 diagnostic criteria for anorexia nervosa

A. Restriction of energy intake relative to requirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. Significantly low weight is defined as a weight that is less than minimally normal or, for children and adolescents, less than that minimally expected
B. Intense fear of gaining weight or of becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight
C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight
Restricting type: during the last 3 months, the individual has not engaged in recurrent episodes of binge eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas). This subtype describes presentations in which weight loss is accomplished primarily through dieting, fasting, and/or excessive exercise
Binge eating/purging type: during the last 3 months, the individual has engaged in recurrent episodes of binge eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas)
Specify current severity: The minimum level of severity is based, for adults, on current body mass index (BMI) (see below) or, for children and adolescents, on BMI percentile. The ranges below are derived from World Health Organization categories for thinness in adults; for children and adolescents, corresponding BMI percentiles should be used. The level of severity may be increased to reflect clinical symptoms, the degree of functional disability, and the need for supervision
Mild: BMI > 17 kg/m^2
Moderate: BMI = 16–16.99 kg/m^2
Severe: BMI = 15–15.99 kg/m^2
Extreme: BMI < 15 kg/m^2

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In addition to the persistent restriction of energy intake, individuals with AN also experience an intense fear of becoming fat or sometimes of gaining any weight (APA, 2013). This fear does not seem to diminish, and may even worsen, as the individual loses weight. Individuals with AN may experience their bodies in a distorted way, may feel fat or extremely dissatisfied with their body shape/weight, and may base their total self-worth on their body size. Such individuals may closely monitor their body weight and shape and experience strong negative emotional reactions if they gain weight. Another common feature of AN (in postmenarchal girls), although no longer a diagnostic criterion, is the presence of amenorrhea. In young girls with AN, the onset of menstruation may be delayed.

Two subtypes of AN are described in the current *DSM-5* (APA, 2013), and the typology is based on the presence or absence of binge eating as well as on the principal method of weight control. Individuals with restricting anorexia restrict only, whereas those with binge eating/purging anorexia engage in purging which may or may not be associated with binge eating. However, excessive dieting and exercising may occur with either type of AN.

Recognizing AN in children and adolescents presents many challenges. First, in a prepubescent girl, amenorrhea may not be present. Second, there may not be a noticeable weight loss but rather a failure to achieve normal weight or to gain weight at a normal rate. As noted above, normal weight is also sometimes a challenge to determine and quantify. A related concern is that severe anorexia may inhibit normal skeletal development; thus, height may be affected. Finally, a young person may be less likely to willingly seek help or discuss their symptoms (Lask and Bryant-Waugh (2013), placing the responsibility on the parents/caregivers.

Bulimia Nervosa (BN)

According to the current *DSM-5* (APA, 2013), BN is characterized by repeated episodes of binge eating followed by an inappropriate compensatory response to prevent weight gain, with binge episodes and compensatory behaviors occurring on average at least once a week for 3 months (APA). Full criteria are listed in Table 2. As with AN, there is some sort of body image disturbance. Although the *DSM-5* defines a binge as "Eating, in a discrete period of time (e.g., within any 2-h period), an amount of food that is definitely larger than what most individuals would eat in a similar period of time under similar circumstances" (APA, p. 345), the requirement that binges be necessarily large has been questioned by some researchers (e.g., Latner, Hildebrandt, Rosewall, Chisholm, & Hayashi, 2007). A perceived loss of control during the binge episodes must also be present and may be the more important factor (rather than size; Latner et al., 2007). Binges are triggered by a variety of factors including hunger, stress, boredom, negative mood, feelings and thoughts associated with body image, and food cravings (APA). The *DSM-5* body image criterion for BN is less specific than for AN and worded only as "Self-evaluation is unduly influenced by body shape and weight" (APA, p. 345).

Table 2 DSM-5 diagnostic criteria for bulimia nervosa

A	Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following
	1. Eating in a discrete period of time (e.g., within any 2-h period) an amount of food that is definitely larger than what most individuals would eat in a similar period of time under similar circumstances
	2. A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)
B	Recurrent in appropriate compensatory behaviors in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, or other medications; fasting; or excessive exercise
C	The binge eating and compensatory behaviors both occur, on average, at least once a week for 3 months
D	Self-evaluation is unduly influenced by body shape and weight
E	The disturbance does not occur exclusively during episodes of anorexia nervosa

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In earlier versions of the *DSM*, it was possible for a person to be diagnosed with both AN and BN. With the current system, BN cannot be diagnosed if it occurs only in the context of AN. Such an individual would be diagnosed as having the binge eating/purging subtype of AN. There is evidence that BN occurs on a continuum with the binge eating/purging subtype of AN, whereas the restricting subtype is qualitatively different from both other disorders (Gleaves, Lowe, Green, Cororve, & Williams, 2000).

Binge-Eating Disorder (BED)

BED has recently been accepted as a formal diagnosis in the *DSM-5* (APA, 2013) (Table 3). BED is characterized by the presence of recurrent binge eating (as seen with BN) but in the absence of the compensatory behaviors that occur with BN. Persons with BED may not be as restrictive in their eating as persons with BN, and a large percentage of individuals are consequently obese. Persons with BED are very often dissatisfied with their bodies. The shape and weight concerns of obese individuals with BED, as well as their eating-related and general psychopathology, quality of life, and even physical health, are significantly more impaired than those of obese individuals without BED (Wilfley, Wilson, & Agras, 2003) with overvaluation of shape and weight considered a marker of symptom severity in BED (Grilo, Ivezas, & White, 2015). Moreover, results from a recent systematic review highlighted the role of negative emotion in precipitating binge eating for individuals with BED but not for obese individuals without BED (Leehr et al., 2015). The range and frequency of comorbid psychopathology for BED is similar to that for BN, and the mortality rates for BED may actually be higher than with BN because the former is associated with obesity (Agras, 2001).

Table 3 DSM-5 diagnostic criteria for binge-eating disorder

A	Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following
	1. Eating in a discrete period of time (e.g., within any 2-h period) an amount of food that is definitely larger than what most individuals would eat in a similar period of time under similar circumstances
	2. A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)
B	The binge eating episodes are associated with three (or more) of the following
	1. Eating much more rapidly than normal
	2. Eating until feeling uncomfortably full
	3. Eating large amounts of food when not feeling physically hungry
	4. Eating alone because of feeling embarrassed by how much one is eating
	5. Feeling disgusted with oneself, depressed, or very guilty afterward
C	Marked distress regarding binge eating is present
D	The binge eating occurs, on average, at least once a week for 3 months
E	The binge eating is not associated with the recurrent use of inappropriate compensatory behavior as in bulimia nervosa and does not occur exclusively during the course of bulimia nervosa or anorexia nervosa

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Atypical Eating Disorder Variants

In the previous editions of the *DSM*, the term for atypical variants was eating disorder not otherwise specified (EDNOS), and much of the available research uses this term. Although EDNOS was a residual diagnostic category, it was particularly noteworthy because it appeared to be the most common ED encountered in clinical practice (Fairburn & Bohn, 2005), including among children and young adolescents (Nicholls, Chater, & Lask, 2000), and this was not simply due to BED being formerly categorized as EDNOS. Furthermore, it may have been more common among adolescents than among adults (Fisher, Schneider, Burns, Symons, & Mandel, 2001). With the *DSM-5* (APA, 2013), atypical EDs that do not meet the criteria for AN, BN, or BED can now be classified as other specified feeding or eating disorder (OSFED) and unspecified feeding or eating disorder (UFED). The first includes some recognized syndromes such as purging disorder (when an individual engages in purging but not binge eating) or cases of AN or BN that do not meet the duration criterion. UFED would be reserved for cases where a clinician chooses not to indicate why specific criteria are not met or where there is not enough information to make a more definitive diagnosis.

With the *DSM-5* changes to the diagnostic criteria for AN and BN, and the formal inclusion of BED, one goal was to reduce the prevalence of atypical EDs. More recent prevalence studies (Allen, Byrne, Oddy, & Crosby, 2013; Stice, Marti, & Rohde, 2013) have started to determine the impact of the new diagnostic criteria on the prevalence of atypical EDs. For both practitioners and researchers, it is important to note that a large percentage of individuals who report disordered eating may not neatly fit into one of the existing diagnostic categories. Furthermore, although the EDs each have distinct clinical features, they also share many features, which have led to a "transdiagnostic" theory of EDs (Fairburn, Cooper, & Shafran, 2003). Research suggests that certain characteristics such as overvaluation of eating, weight and shape control, and problems with self-esteem and affect are indeed transdiagnostic, whereas other features such as perfectionism, interpersonal problems, and dietary restraint likely vary across distinct forms of eating psychopathology (Lampard, Tasca, Balfour, & Bissada, 2013).

Epidemiology

Prevalence

Many of the studies on ED prevalence are based on former *DSM-IV* (APA, 2000) criteria. For example, Hoek and van Hoeken's (2003) review of the ED literature (based on *DSM-IV* criteria) reported average prevalence rates of 0.3% (AN) and 1% (BN) for young women and 0.1% (BN) for young men in the general population. Among at-risk women, however, prevalence estimates typically range from 3% to 10% (i.e., ages 15–29 years; Polivy & Herman, 2002). Research conducted with children and adolescents suggests varying prevalence rates. For instance, a US National Comorbidity Survey of 10,123 adolescents aged between 13 and 18 reported that 2.7% of the sample met criteria for an ED (AN, BN, or BED). Reported prevalence rates were more than double among females (3.8%) relative to males (1.5%) and slightly increased with age (13–14 years = 2.4%, 15–16 years = 2.8%, and 17–18 years = 3.0%) (Merikangas et al., 2010). Similarly, a study with community adolescents reported that 3% met criteria for an ED (not including EDNOS), of which 33.3% were male and 66.7% were female (Zaider, Johnson, & Cockell, 2000).

Studies of female adolescents in Italy (Cotrufo, Gnisci, & Caputo, 2005) and Spain (Ruiz-Lázaro, Alonso, Comet, Lobo, & Velilla, 2005) have estimated the following prevalence rates for EDs: 0.55–0.77% (BN), 3.47% (partial BN), 0.38% (partial BED), 0.14% (AN), 5.79% (subclinical AN), and 3.83% (EDNOS). Similar lifetime prevalence rates have also been reported among adolescent girls in Iran (0.9% (AN), 3.2% (BN),1.84% (partial AN), and 4.79% (partial BN) Nobakht & Dezhkam (2000)) and among adolescent girls in Greece and Germany (1.26–1.18% (AN), 3.15–3.54% (BN), and 13.84–19.45% (EDNOS) Fichter, Quadflieg, Georgopoulou, Xepapadakos, & Fthenakis (2005)).

It is expected that new estimated prevalence rates of AN and BN would be higher, and that rates of OSFED (formerly EDNOS) would be lower, because the recent version of the *DSM* has relaxed some of the diagnostic criteria (e.g., presence of amenorrhea in AN and symptom frequency in BN). Applying the *DSM-5*, prevalence rates among adolescent girls interviewed over 8 years were reported to be 0.8% (AN), 2.6% (BN), and 3.0% (BED), and 11.5% experienced a feeding or ED not elsewhere classified (an earlier conceptualization of OSFED and UFED) (Stice et al., 2013). In a larger study that also included adolescent males, Allen and colleagues (2013) compared the prevalence rates of *DSM-IV-TR* and *DSM-5* EDs at ages 14, 17, and 20 years. The authors reported significantly greater ED prevalence rates among female adolescents across all ages using *DSM-5* criteria (8.5–15.2%) than when applying *DSM-IV-TR* criteria (5.8–13.4%) as well as fewer unspecified diagnoses when using the *DSM-5* criteria. Among adolescent males, significantly higher rates were only found at age 17 when applying the *DSM-5* criteria (2.6%) compared to the *DSM-IV-TR* criteria (1.2%) (Allen et al., 2013).

In addition to studies of the prevalence of ED diagnoses, several researchers have examined the prevalence of eating-disordered behaviors among adolescents. For instance, Croll, Neumark-Sztainer, Story, and Ireland's (2002) research on disordered eating behaviors (i.e., binge eating or using any of the following to control or lose weight: fasting/skipping meals, using diet pills or amphetamines, laxatives, vomiting, and/or smoking cigarettes) among 9th and 12th grade students in Minnesota ($N = 81{,}247$) revealed a high prevalence of such behaviors. For instance, among 9th graders, 56% of the girls and 28% of the boys reported engaging in disordered eating behaviors. The estimates were slightly higher among 12th graders, as 57% of the girls and 31% of the boys reported disordered eating. One limitation of this research is that it included a fairly broad definition of disordered eating. However, as the authors noted, engaging in any of the above behaviors would constitute risk factors for the subsequent development of EDs.

In practice, recognizing and detecting EDs may often be restricted by the secrecy associated with binge eating and purging behaviors. Moreover, some have suggested that the prevalence of some EDs (particularly BN) may be lower among children and adolescents than adults for practical reasons, such as not having access to money or privacy required for binge eating (Netemeyer & Williamson, 2001). Similarly, although AN may be more obviously detectable because of patients' extreme low weight, such detection may be more difficult when the low weight is a manifestation of a failure to gain weight (Campbell & Peebles, 2014). Overall, we view proper assessment as critical for diagnosis and treatment, and there are many issues specific to assessment of children and adolescents with eating problems. See Lask and Bryant-Waugh (2013), Rosen (2010), or Weaver and Liebman (2011) for a more in-depth discussion of assessment of EDs among children and adolescents.

Incidence and Time Trends

Lewinsohn, Striegel-Moore, and Seeley (2000) reported the incidence of EDs to be less than 2.8% by age 18, and 1.3% for individuals aged 19–23 years. In contrast, Rastam, Gillberg, and Garton (1989) screened the entire population of school children in an urban region of Sweden ($N = 4291$) and reported 3 cases of BN, 17 cases of AN, and 3 cases of a partial AN syndrome. In their review of the research, Hoek and van Hoeken (2003) reported the incidence of AN to be 8 cases per 100,000 population per year and noted that the incidence rates for AN are the highest for females in the 15–19 age group. They estimated the incidence of BN to be 12 cases per 100,000 population per year. In the United Kingdom, data gathered from primary care records indicated the incidence of EDs was also highest for females aged 15–19 and for boys aged 10–14 (Micali, Hagberg, Petersen, & Treasure, 2013). In their review on ED incidence, Smink, van Hoeken, and Hoek (2012) reported that, although overall incidence of AN has remained stable, there has been an increase in this high-risk group of 15–19-year-old girls. They suggest that this could be due to thorough and early detection of AN or an earlier age at onset. Regarding BN, Smink et al.(2012) reported incidence rates to be decreasing since the early 1990s.

With regard to time trends, Van Son, van Hoeken, Bartelds, van Furth, and Hoek (2006) assessed the incidence of EDs in the Netherlands during two time periods, 1985–1989 and 1995–1999. The authors reported that although the incidence of AN was fairly stable for the general population (i.e., 7.4–7.7 per 100,000), the incidence for the 15–19-year-old female age group significantly increased from 56.4 to 109.2 per 100,000. Of the individuals diagnosed with AN between 1995 and 1999, only one (2%) was male. In contrast, they reported that the incidence of BN decreased somewhat (nonsignificantly) from 8.6 to 6.1 per 100,000, consistent with other research (Keel, Heatherton, Dorer, Joiner, & Zalta, 2006). An additional time trend is that age of onset for both AN and BN may be decreasing over time (Favaro, Caregaro, Tenconi, Bosello, & Santonastaso, 2009).

Regarding trends in ED-related symptomatology, Neumark-Sztainer et al. (2012) examined trends in weight and weight-related attitudes and behaviors among adolescents in 1999 and 2010. Among girls, there was no increase in obesity, and dieting and unhealthy and extreme weight control behaviors both decreased. Body dissatisfaction did not change over time. The trends were less consistent among boys: extreme weight control behaviors decreased; however, dieting and unhealthy weight control behaviors remained constant. There were also significant increases to obesity, perceptions of being overweight, and body dissatisfaction in 2010 than in 1999. Fichter et al. (2005) reported significant increases in weight phobia and bulimic behaviors from approximately 1979 to 1998 among Greek girls in Germany but, interestingly, observed the reverse for the male adolescents, whose weight phobia scores decreased from the first to second assessment.

Gender Differences

As reflected by the incidence and prevalence rates, EDs typically occur less frequently among males than among females (Mitchison & Hay, 2014). One possibility is that the prevalence of AN is higher among boys than it appears to be but is not readily recognized due to its reputation as a stereotypically female disorder. Alternately, extant assessment instruments may be better at detecting ED symptomatology among women than men due to variability in symptom presentation. Thus, research examining EDs among men and boys may have been limited by the tendency toward misdiagnosis, although greater attention has been devoted to this problem in recent years.

In general, data suggest that boys with EDs typically strive for a more muscular body ideal, rather than the thin ideal typically pursued by girls (McCreary & Sasse, 2000; see Labre, 2002, for a review on adolescent boys and the muscular ideal). Although EDs have been diagnosed among individuals of all sexual orientations, bisexual and homosexual orientation may be particular risk factors for developing EDs (Austin et al., 2004). The prevalence of homosexuality and bisexuality is higher among men with BN than in the general population (43% versus 10%; Carlat, Camargo, & Herzog, 1997); however, it is not clear whether this applies to adolescents. Furthermore, athletes (e.g., wrestlers, gymnasts) and other individuals for whom physical appearance and body shape are especially important (e.g., body builders) are at a higher risk of developing BN because they need to maintain their weight at or below specific thresholds (Beals, 2004).

For boys, the following estimates are available for lifetime prevalence rates: 6.5% (any ED), 0.2% (AN), 0.4% (BN), and 0.9% (BED) (Kjelsås, Bjørnstrøm, & Götestam, 2004). Among children and adolescents, consistently higher proportions of female than male patients present to ED treatment programs (e.g., Geist, Heinmaa, Katzman, & Stephens, 1999; Peebles, Wilson, & Lock, 2006), but there may be some gender differences in the presentation of these disorders. For instance, Geist et al. (1999) reported that male adolescents presented with significantly lower drive for thinness and body dissatisfaction than their female counterparts. However, the authors noted that in the absence of adolescent male norms on the instrument used, their results may be difficult to interpret.

Among patients younger than age 13, males and females may be equally affected (Rosen, 2010). In comparing a large sample ($N = 959$) of children and adolescents ages 8–19 years in an ED treatment program, Peebles et al. (2006) reported that compared with older adolescents (mean age = 15.6 years, $SD = 1.4$), younger patients (mean age = 11.6 years, $SD = 1.2$) were more often male, presented at a lower percentage of ideal body weight, and lost weight more rapidly. Specifically, in the younger sample, 16.5% was male, whereas 7.8% of the older sample was male. In the entire sample, most of the patients were female (91.1%) and presented with EDNOS (51.3%), although there were also large proportions presenting with AN (35.8%) and BN (12.9%).

Comorbidity

EDs are often accompanied by a wide range of medical and/or psychological problems. Perhaps the greatest attention has been devoted to the co-occurrence of EDs with mood disorders (Stice, Hayward, Cameron, Killen, & Taylor, 2000; Stice, Presnell, & Bearnman, 2001; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011) and substance abuse disorders (Dansky, Brewerton, & Kilpatrick, 2000). Among female adolescents with first onset AN, 47.3% were found to meet criteria for an additional psychiatric disorder, most commonly mood (major depression or dysthymia) and anxiety disorders (particularly, social phobia and obsessive-compulsive disorder). Those diagnosed with binge–purge subtype experienced a higher frequency of comorbid diagnoses as well as increased suicidal ideation and self-harm behavior compared to those with restrictive AN (Bühren et al., 2014). Of note, the large US National Comorbidity Survey (*N* = 10,123) reported that AN was only associated with oppositional defiant disorder. However, BN and BED were significantly associated with most disorders assessed, particularly mood and anxiety disorders. Among those with BN, more than 1/2 reported suicidal ideation and more than 1/3 reported having made a suicide attempt (Swanson et al., 2011). In another study with adolescents, Zaider et al. (2000) reported that individuals with dysthymia, panic, and major depressive disorder were significantly more likely than those without these disorders to have an ED. Even after controlling for the effects of other Axis I and Axis II psychopathology, dysthymia independently predicted EDs.

EDs also appear to be highly comorbid with substance use problems (Bulik et al., 2004), and approximately 20–46% of women with EDs report a history of problems with alcohol and/or drugs (Bulik et al.; Conason, Brunstein Klomek, & Sher, 2006). Researchers have suggested that the powerful drive for thinness that is central to EDs may increase the likelihood of abusing stimulant drugs for weight loss reasons (Measelle, Stice, & Hogansen, 2006). Moreover, if binge eating and subsequent compensatory behaviors engender feelings of guilt, the individual may turn to substance use to modulate his or her negative affect.

In their study of 290 adolescents, Mann et al. (2014) reported a lifetime prevalence of substance use of 24.6% for those with AN, 48.7% for those with BN, and 28.6% for those with EDNOS. A diagnosis of BN was strongly associated with regular alcohol consumption, and tobacco use was significantly more frequent in those with BN compared with AN. Consistent with these data, individuals with restricting anorexia reported less substance use than the general (nonclinical) population (Stock, Goldberg, Corbett, & Katzman, 2002). Finally, in their longitudinal study with adolescent girls, Measelle et al. (2006) reported that initial eating psychopathology predicted increases in substance abuse symptoms over a 5-year period.

In addition to comorbid psychological conditions, individuals with EDs are prone to experience a host of significant medical consequences and correlates, such as gastrointestinal complications, dangerously low body weight, and dental caries (Campbell & Peebles, 2014). Specifically, individuals with AN are susceptible to experiencing osteoporosis and osteopenia, cardiovascular problems, and orthopedic problems due to the combined effects of excessive exercise and nutritional deficiencies (Brambilla & Monteleone, 2003). Individuals with BN are likely to experience various medical complications including electrolyte imbalances, dental problems, and cardiovascular problems (Brambilla & Monteleone, 2003).

Course and Outcome

In evaluating the longitudinal course of EDs, Kotler, Cohen, Davies, Pine, and Walsh (2001) reported that BN during early adolescence is associated with a 9-fold and 20-fold increase in risk for BN in late adolescence and adulthood, respectively. Moreover, BN in late adolescence was found to be associated with a 35-fold increase in risk for BN in adulthood. In another longitudinal study on female adolescents (aged 12–15 years at initiation of study), Measelle et al. (2006) examined the course of co-occurring disorders, including EDs, over a 5-year period. They reported that ED symptoms increased substantially over time, at fairly constant rates. Steinhausen (2009) reported that for 20% of AN cases, across all ages of onset, the course is chronic, highlighting the treatment challenges often associated with AN. Overall, the course and outcome for EDs varies as a function of the disorder and a host of other predictive factors. Among patients with AN, deaths are due to either physical complications or suicide. Of all psychiatric disorders, AN appears to have the highest mortality rate, approximately 5.6% per decade (Agras, 2001). In a meta-analysis of mortality rates in patients with EDs, Arcelus and colleagues reported that one in five adults with AN who died had committed suicide (Arcelus, Mitchell, Wales, & Nielsen, 2011).

In terms of ED outcome, Steinhausen (2002) reviewed data from 119 outcome studies with follow-ups of greater than 10 years and reported mean values of 73.2% for recovery, 8.5% for improvement, 13.7% for chronicity, and 9.4% for mortality. Factors contributing to poor prognosis included vomiting, purgative behaviors, illness chronicity, and obsessive-compulsive symptoms. Patients who were followed up for a longer duration tended to have better outcomes, highlighting the extended time it can take for full recovery. Adolescent-onset AN tends to have better outcomes than adults (Rosen, 2010; Steinhausen, 2009); however, those very young (typically prepubertal) tend to have poorer outcomes (Wentz, Gillberg, Anckarsäter, Gillberg, & Råstam, 2009). There is a strong evidence base supporting the necessity of early treatment and weight gain in adolescent AN to maximize positive outcomes (e.g., Le Grange, Accurso, Lock, Agras & Bryson, 2014). In a Swedish study, Wentz and colleagues (2009) followed up 51 individuals with adolescent-onset AN over an 18-year period. At follow-up, there were no deaths; 12% still had an ED (AN, EDNOS, or BN), 39% experienced another psychiatric disorder, and 25% were unable to work. Poor prognosis was associated with being a younger age at diagnosis, premorbid obsessive-compulsive disorder and the presence of autistic traits. These findings are similar to those of Saccomani, Savoini, Cirrincione, Vercellino, and Ravera (1998) who also reported zero deaths and a negative outcome in 14% of cases. The authors noted that poor outcome was associated with greater severity of the disorder at initial presentation, the length of inpatient treatment, and comorbidity with mood and personality disorders.

Although longer-term outcome seems to be better for individuals with BN than for AN, BN is still associated with a considerable amount of relapse and chronicity (Agras, 2001). In his review of the literature, Agras surmised that only 10% of individuals with BN continue to experience the full syndrome at 10-year follow-up and that less than 1% develop AN. At 10-year follow-up, about 60% of individuals are in full or partial remission from the disorder, but between 30% and 50% continue to have a clinical ED. Consistent with these findings, Steinhausen and Weber (2009) reviewed 79 BN outcome studies conducted over the past 25 years and reported that 45% of patients showed full recovery from BN, 27% improved considerably, and nearly 23% had a chronic course. The mortality rate was 0.32%, crossover to another ED at follow-up was 22.5% (EDNOS, followed by AN, and then BED; however, the latter may be underreported given the age of some studies when BED was less understood), and reporting other psychiatric disorders at the outcome assessment was common.

In comparison to AN and BN, the course and outcome for BED appears to be more positive. Among young women with BN or BED, Fairburn, Cooper, Doll, Norman, and O'Connor (2000) observed that over 5 years the outcome of those with BN was relatively poor but that the majority of the BED group made a full recovery despite not having received treatment. However, that sample might have been younger and slimmer than is often typical of BED. Obesity may be an outcome in a proportion of cases (e.g., 28%; Wade et al., 2006). Finally, less is known about the course and outcome of EDNOS. Among a sample of ED patients enrolled in the Collaborative Longitudinal Personality Disorders Study, Grilo et al. (2003) reported that the 2-year course for EDNOS was better than for BN (40% remitted for BN versus 59% for EDNOS). Notably, Grilo et al. (2003) also found that the course for both BN and EDNOS appeared to be unrelated to the presence, severity, or change in comorbid personality disorder or other Axis I disorder. Given the paucity of research in this area, further research is needed to better understand the course and outcome of BED and EDNOS.

Interventions and Empirical Evidence

In the following sections, we review the literature on psychologically based interventions for EDs. Pharmacological interventions, although beyond the scope of this chapter, are also used in some situations. See Van den Heuvel and Jordaan (2014) for a review.

Inpatient Treatment

Outpatient treatment is the norm for children and adolescents with EDs; however, a relatively small proportion of these patients require inpatient treatment in psychiatric or pediatric units. The admission criteria, goals, treatment methods, and duration of stay vary widely across inpatient settings, and such treatment decisions are based on limited research evidence. Anzai, Lindsey-Dudley, and Bidwell (2002) suggested the following admission criteria for inpatient psychiatric care for individuals with AN: (1) poor medical status but not so severe as to warrant medical hospitalization (low pulse, temperature, blood pressure, or potassium; dehydration), (2) low body weight and refusal to eat (BMI <17 or weight <75% of expected for height/weight or, for children and adolescents, food refusal or rapid weight loss), (3) low motivation and compliance (denial of problems, refusal to eat more than minimum amount), (4) poor family support (absent or not sufficient to make progress), (5) purging behavior (to the point of jeopardizing health, with an inability to stop or decrease behavior), and (6) comorbid psychiatric complications (suicidality or severe comorbid disorders warranting hospitalization). Anzai et al. (2002) also noted that individuals with AN require hospitalization more often than BN patients, and whereas treatment for AN emphasizes refeeding and weight gain, BN inpatient treatment focuses on providing a structured setting for patients to eat adequate meals without engaging in binge eating and purging. Thus, guidelines for inpatient treatment are mostly relevant for AN, as most patients with BN can be treated on an outpatient basis, and outcome may be comparable to inpatient treatment (Zeeck et al., 2009).

A primary goal of inpatient treatment for EDs is medical and nutritional management, particularly in cases where patients present for treatment at a late stage of their ED and have multiple weight and metabolic problems (Patel, Pratt, & Greydanus, 2003). For instance, patient symptoms such as dehydration, electrolyte and fluid imbalances, hypotension, cardiac dysrhythmias, and seizures require urgent medical care, and, thus, the basis of the medical management approach to EDs is nutritional rehabilitation (Patel et al., 2003).

Anzai et al. (2002) suggested that the first components of AN treatment, refeeding and weight restoration, may be best administered in inpatient settings alongside close monitoring of physical risk. Moreover, they noted that recovered AN patients who were never hospitalized often reported that if they could start again, they would choose to begin treatment via hospitalization, as it would facilitate sooner recovery with less suffering. However, given the dramatic changes in inpatient psychiatric services and managed care in the United States, the previously typical 3–6-month admission for AN treatment has changed substantially. For instance, Anzai et al. reported that AN patients typically stay in an acute inpatient unit for 7–10 days, after which they are transferred to a partial hospital program for 1–3 weeks and then, finally, transitioned to outpatient treatment. In most cases, patients with AN can receive oral refeeding, with the objective of gaining 1–3 lbs per week of inpatient treatment (Patel et al., 2003).

Not surprisingly, those who receive inpatient treatment tend to gain weight faster than those who receive outpatient treatment (Hartmann, Weber, Herpetz, & Zeeck, 2011). Davies and Jaffa (2005) assessed weekly weight gain among adolescents with AN in a United Kingdom inpatient unit ($N = 53$) and reported that the average weight gain was 0.82 kg/week. Patients did not differ in average weight gain based on whether they had received prior inpatient treatment, but those with an initial lower percentage of expected body weight were faster to gain weight. Research has demonstrated that, among adolescent and adult females admitted for inpatient treatment for AN, the only predictor of outcome at 1-year follow-up was rate of weight gain. Those who gained less than ≤0.8 kg per week were more likely to deteriorate after discharge (Lund et al., 2008). Similarly, low weight at discharge is a risk factor for rehospitalization (Steinhausen, Grigoroiu-Serbanescu, Boyadjieva, Neumärker, & Metzke, 2008).

Although inpatient treatment is typically more appropriate for patients with AN than BN, there are some instances in which hospitalization for BN is necessary. Some reasons for the hospitalization of children or adolescents with BN may include (1) severe cardiac or physiological disturbances caused by binge eating and purging; (2) persistent suicidal ideation/attempts, self-harm, or psychosis; (3) intractable binge eating and purging that have not responded to outpatient treatment or partial hospitalization; or (4) serious comorbid conditions that interfere with treatment (Robin, Gilroy, & Dennis, 1998). For BN patients, the main treatment objective is to establish normal nutritional intake without purging, binge eating, or restricting.

A limitation of extant research on inpatient treatment outcome is that there have been few controlled investigations on outcome for adolescents with AN. The Trial of Outcome for Child and Adolescent Anorexia Nervosa (TOuCAN) in the United Kingdom compared inpatient treatment with specialist outpatient care and treatment as usual (TAU) in a general community child and adolescent mental health service. Overall, the researchers found no statistically significant differences between the three settings in terms of AN treatment outcome at 1-, 2-, and 5-year follow-up, providing little support for lengthy, and costly, inpatient admissions. Specialist outpatient treatment was considered most cost-effective, and patients and caregivers were most satisfied with specialist treatment. However, poor adherence to initial randomization (65% across the sample and 49% in the inpatient group) limits the strength of these findings (Gowers et al., 2010). These findings, and study limitations, are similar to earlier research conducted with adolescent and adult AN patients (Crisp et al., 1991).

In another recent randomized controlled study (Madden et al., 2015), 82 medically unstable adolescents with AN were assigned to either a longer inpatient admission for the purpose of weight restoration (to 90% expected body weight) or a shorter admission for medical stabilization. Post discharge, all of the adolescents received 20 sessions of outpatient family-based treatment and were followed up at 6 months and at 12 months. Other than expected differences in higher body weight after hospitalization, the authors reported no differences between the groups in terms of hospital days needed after admission, readmission rates, or rates of remission. They concluded that prolonged hospital admissions provided no added benefit to clinical outcomes when effective outpatient treatments are available (Madden et al., 2015). Gowers, Weetman, Shore, Hossain, and Elvins (2000) reported that outpatients demonstrated a better outcome 2–7 years after initial presentation, and the primary predictor of poorer outcome was admission to inpatient care. Although this study was not randomized and inpatient treatment may have simply reflected greater severity, its results suggest that caution is necessary in prescribing inpatient care (Gowers & Bryant-Waugh, 2004).

To understand the experience of adolescents undergoing inpatient treatment for AN, Colton and Pistrang (2004) conducted semi-structured interviews with young women (N = 19) in inpatient ED units. The authors reported that the patients maintained positive as well as negative views about their treatment, characterized by themes of confusion about their illness, readiness for treatment as a key to recovery, advantages and disadvantages of social support from other patients, individual treatment from staff, and the value of being a collaborator in treatment.

In summary, most hospitalization programs for EDs are multidisciplinary and include a mixture of treatment components. The foremost goal is to achieve medical and nutritional stabilization, weight restoration, and regular eating, while closely monitoring physical risk. Nasogastric feedings are infrequently required but may be needed when the patient is unable to tolerate food orally to gain sufficient weight. Treatment also focuses on facilitating fundamental change to attitudes about weight, shape, and appearance and also disrupting the binge–purge cycle. In addition to focusing on specific ED symptoms, inpatient treatment aims to promote individual change and growth (affect regulation, self-identity) and assists with the acquisition of skills needed to deal with life issues and social engagement (e.g., communication, conflict resolution). Although inpatient admissions facilitate prompt and necessary weight restoration, inpatient treatment remains expensive, and there is conflicting evidence as to the long-term benefits of prolonged admissions.

Partial Hospitalization

In a stepped-care framework, treatment that constitutes the least restrictive alternative, but is still believed to be helpful, is the first treatment attempted (Davison, 2000). A form of treatment that is more intensive than outpatient treatment but less intensive, less restrictive, and less costly than inpatient treatment is partial hospitalization or day treatment programs.

Partial hospital programs often use the same treatment strategies and have the same treatment goals as inpatient programs. A descriptive report noted that in three typical day treatments for eating-disordered patients of all ages, these programs regularly use group meals, nutrition and cooking education groups, body image and counseling groups, and groups that address social skills, assertiveness, family issues, and relationships (Zipfel et al., 2002). However, because patients return home in the evening, they spend less time on the unit. Thus, such programs permit patients to remain in their natural environments during the course of treatment. Staying in the natural environment may facilitate more rapid learning and generalization of therapeutic skills to home and school settings. These programs also allow patients to continue to function in their everyday social roles and to have continued family contact and support (Herpertz-Dahlmann et al., 2014; Zipfel et al., 2002).

Outcome research on day treatment programs for children or adolescents with EDs, and even for adults, is limited. One randomized controlled trial to date has compared day-patient treatment with inpatient treatment in adolescent AN (Herpertz-Dahlmann et al., 2014). In that study, 179 adolescents received either day-patient care after a period of brief medical stabilization or continued inpatient care and were followed up at 12 months after admission. At follow-up, there were no significant differences between the two groups in terms of weight gain and maintenance, readmission rate, or number of serious adverse events, suggesting that day-patient care can be an effective and safe alternative to inpatient care.

In a small uncontrolled study of adolescents with AN ($N = 26$), Goldstein et al. (2011) examined the effectiveness of a day program on both weight and eating pathology. Results indicated clinically significant weight gain and improvements in eating-disordered behavior, and trends indicated that these improvements were maintained at 6-month follow-up. Similarly, Danziger, Carcl, Varsano, Tyano, and Mimouni (1988) described a follow-up of 32 girls with AN in a pediatric day treatment program that involved parents as participants and providers in the therapy. Nine months after treatment, the majority of cases showed a healthy restoration of weight, menstruation, body image, eating and exercise habits, and social functioning.

Two of the 3-day programs described by Zipfel and colleagues (2002) have been examined in uncontrolled research trials. These programs have shown preliminary evidence of efficacy in a range of age groups. Among 51 adult women with AN, BN, or subthreshold variants of these disorders, treatment outcomes and direct costs of inpatient and partial day hospital treatment were compared (Williamson, Thaw, & Varnado-Sullivan, 2001). Based on disorder severity, patients were assigned to either inpatient or day treatment. Although the outcome of the two treatments was similar, the day hospital program was substantially less costly. Savings per patient in the day hospital program were $9645 (43% of the cost of inpatient cases). The proportion of patients classified as recovered across the two treatments was 63%.

These findings from a small number of studies suggest that partial hospitalization programs might be an effective and less costly alternative to inpatient care. However, more randomized controlled studies are needed to compare the efficacy of day treatment with other treatment modalities, inpatient, and outpatient treatments. This is a particular research priority for the treatment of children, as day programs allow patients greater time with their family and more opportunity to participate in normal activities outside of hospital, as well as being potentially more cost effective.

Outpatient Treatment

In this section we highlight four forms of outpatient treatment for childhood and adolescent eating disturbances. Certain caveats should be noted, however. Although growing, the research base concerning these treatments is limited, due to factors such as the rarity of these disorders and the difficulty in recruiting and retaining patients in treatment trials (Couturier, Kimber, & Szatmari, 2013). In addition, several studies on AN that have found no differences between groups have had small sample sizes. In such studies, it is important not automatically to interpret a lack of significant differences across conditions as treatment equivalence (Fairburn, 2005).

Family-Based Treatment

Most children and adolescents with EDs are treated on an outpatient basis. The most widely researched form of outpatient treatment for childhood EDs is family-based therapy (FBT). Clinical researchers at the Maudsley Hospital in the United Kingdom developed FBT, and it is based on a model of mobilizing family resources to help the family refeed the patient (Lock & Le Grange, 2015). This treatment has support from well-conducted clinical studies (Lock, 2015). The APA (2006) and National Institute for Health and Care Excellence (NICE) (2017) guidelines for the treatment of EDs recommend family treatment for the treatment of child and adolescent EDs.

Early in treatment, the therapist emphasizes that the family is not at fault for the illness but that they must take responsibility for helping to overcome it. Treatment consists of three major phases. First, it focuses on the primary goal of refeeding the patient. During this phase, the therapist aims to strengthen the bond between the two parents in their joint refeeding efforts and between the patient and any siblings available to provide support. During the second phase of treatment, family issues that may be interfering with refeeding are identified and addressed. The third treatment phase is initiated only after healthy weight and eating patterns have been achieved. At this final stage, treatment centers on building a healthy relationship between the adolescent and the family that is not focused primarily around the ED (Lock & Le Grange, 2015).

FBT has been tested in a number of randomized controlled trials. These studies have investigated its efficacy as well as its ideal length and format. In a meta-analytic review of 12 randomized controlled trials of FBT for adolescent AN, Couturier et al. (2013) reported that FBT tended to demonstrate a similar outcome to individual treatment; however, FBT was superior at both 6-month and 12-month follow-up. It is still unclear what components of family therapy account for its efficacy. Research has demonstrated that parental self-efficacy in FBT is predictive of adolescent outcomes in FBT (Robinson, Strahan, Girz, Wilson, & Boachie, 2013). Le Grange et al. (2012) also identified that those adolescents with more severe eating psychopathology and low levels of family conflict tend to perform better in FBT than with individual therapy. However, other components could include parental control over eating, changes in the family dynamics, or other unknown factors (Lock & Le Grange, 2005).

In their randomized controlled trial comparing FBT and adolescent-focused individual therapy (AFT), Lock et al. (2010) examined 121 adolescents with AN over a 12-month follow-up period. They found that although there was no significant difference between the groups at the end of treatment, the FBT group had significantly higher remission rates than the AFT group at 6-month (40% versus 18%) and 12-month follow-ups (49% vs. 23%). The authors followed up a convenience subgroup of the original sample ($N = 79$) after 4 years and found that the outcomes had remained stable, irrespective of treatment group (Le Grange, Lock et al., 2014).

Subsequent research has investigated the optimal format and length of family therapy for AN. Eisler et al. (2000) compared two forms of family therapy: conjoint family therapy (CFT) and separated family therapy (SFT). In CFT, 19 adolescents with AN were seen together with their parents, and, in SFT, 21 adolescents with AN were seen separately from their parents. SFT parents had regular sessions with the same therapist. The goals and techniques used in both therapy types were similar between the groups. The SFT group showed small and nonsignificant differences in ED symptoms. However, more substantial benefits in general psychopathology (mood, obsessionality, and psychosexual adjustment) followed CFT. SFT might be more appropriate in families with high levels of conflict. In families where frequent criticism from mothers was directed at the patient, SFT was significantly superior. Only four patients in this study required concurrent hospitalization. In a smaller study, these treatment formats were also compared among 18 adolescents with AN randomly assigned to CFT or SFT (Le Grange, Eisler, Dare, & Russell, 1992). Inpatient treatment was also required during the course of treatment. Both treatments brought about clinically significant improvements in weight and psychological functioning, with few differences between the treatment formats.

Lock, Agras, Bryson, and Kraemer (2005) examined the ideal length and dose of family therapy. These investigators compared the standard therapy length of 20 sessions over 12 months to a short form of therapy offering 10 sessions over 6 months. Whereas the standard-length therapy covered all three phases of treatment, the short form of therapy primarily focused on the first and second phases with less time for general adolescent concerns and building the family relationship. In this randomized controlled trial, 86 adolescents with AN showed similar gains in BMI, ED psychopathology, and general psychopathology across both the short and long treatment conditions at 12 months. Although 19 patients required hospitalization during treatment, these were distributed evenly across the two treatments. Patients with high levels of eating-related obsessional thinking gained more weight in the longer treatment. Similarly, those from non-intact families experienced greater improvements in eating psychopathology in the longer treatment. Across the two groups at 1 year, 96% of patients no longer met criteria for AN, and 67% achieved a healthy BMI (>20). Thus, for the majority of AN patients (especially those from intact families and those who are not exceptionally high on eating-related obsessionality), a short form of FBT is likely to be as effective as standard-length treatment. These findings were maintained at a long-term follow-up (on average, 4 years), when no significant differences between the groups were found and 89% of all patients were at a healthy weight (Lock, Couturier, & Agras, 2006).

Researchers have also started to explore adaptive approaches for those who do not respond initially to FBT. Given the importance of early weight gain for symptom remission (Le Grange et al., 2014), Lock et al. (2015) examined the feasibility of using a novel three-session treatment called intensive parental coaching to enhance parental self-efficacy for those who were not gaining the weight expected in the early stages of FBT. The authors observed that the additional coaching improved the weight recovery rates of the poor early responders to the level of those who responded early in treatment. Further research is needed to corroborate these findings. Similarly, preliminary research into skills training and psychoeducation for parents/caregivers of adolescents with AN related to the interpersonal challenges in the family that may maintain AN has shown promising results. A randomized controlled trial (the ECHO trial; Experienced Carers Helping Others) comparing guided self-help ECHO (in addition to TAU), self-help ECHO (in addition to TAU), and TAU only is currently underway (Rhind et al., 2014).

Additional forms of family therapy have been examined as well. A version of family therapy called behavioral systems family therapy (BSFT) has also been compared with an individual treatment, ego-oriented individual treatment (EOIT, described below under psychodynamic treatment). BSFT was similar to the Maudsley model of FBT, with a few subtle differences. Robin and colleagues (1999) compared these treatments among 37 adolescents with AN, 16 of whom required concurrent hospitalization (11 BSFT and 5 EOIT patients). Immediately after treatment and at a 12-month follow-up, patients in the BSFT group had gained more weight. A greater proportion of BSFT patients resumed menstruation after treatment (94% vs. 64%). This difference was no longer statistically significant at follow-up, when both groups had similar rates of menstruation recovery. However, the more rapid response of menstruation and weight gain to family therapy suggests that BSFT was quicker acting than individual treatment. In a disorder as medically compromising as AN, speed of recovery can be an important consideration, and a faster-acting treatment would generally be more advisable.

Although AN in younger children is rare, a large case series also provided support for the use of FBT in this population. Thirty-two children (average 11.9 years) showed clinically significant improvements in eating-disordered thinking patterns and body weight gain following family therapy (Lock, Le Grange, Forsberg, & Hewell, 2006). These patients closely resembled those in a comparable adolescent sample before and after treatment. This study suggested that efficacy of FBT did not depend on addressing issues of adolescent development, and these issues may not be crucial to treatment, even with adolescents.

There have been few randomized controlled trials of family therapy for adolescents with BN. In a recent randomized controlled trial comparing FBT with cognitive behavioral therapy (CBT), Le Grange, Lock, Agras, Bryson, and Jo (2015) examined 130 adolescents with BN. Participants were given treatment over 18 sessions (6 months in total) and followed up at 6 and 12 months. The authors observed that greater symptomatic improvement (abstinence from binge eating and purging for a period of 4 weeks) occurred in the FBT group than the CBT group at end of treatment and at 6-month follow-up. However, at 12-months, there were no significant differences between the two treatments. Along with FBT being a faster-acting treatment, there were few hospitalizations in the FBT condition. Of note, by 12 months, less than half of all of the participants were recovered regardless of treatment condition suggesting that further research is needed to refine treatments in order to increase recovery rates. (For a description of the treatment strategies used in FBT for adolescent BN, see Le Grange, Lock, & Dymek, 2003).

In an earlier study, Le Grange, Crosby, Rathouz, and Leventhal (2007) compared FBT to supportive psychotherapy (SPT), a nonspecific supportive treatment, for adolescents with BN. Eighty adolescents were randomly assigned to receive either 20 sessions of FBT or SPT over a 6-month period. The authors reported significantly higher binge and purge abstinence for the FBT group, compared to SPT at end of treatment and at 6-month follow-up. FBT was also a faster-acting treatment than SPT and resulted in significantly more improvement on behavioral and attitudinal aspects of eating pathology. Conversely, a case series described eight adolescents with BN treated with FBT (Dodge, Hodes, Eisler, & Dare, 1995). Standard FBT for AN was modified to address compensatory behaviors and shifted the focus from weight gain to regular eating. At 12 months after the start of treatment, there were significant reductions in eating pathology and in the level of self-harm behaviors, which were initially present in half of the patients. However, only one patient achieved a good outcome as defined by the Morgan-Russell criteria listed earlier (Morgan & Russell, 1975).

Cognitive-Behavioral Therapy

CBT focuses on identifying and modifying dysfunctional thoughts and behaviors related to eating, weight, and body shape. Therapists challenge patients' thoughts in treatment through cognitive restructuring and behavioral experiments. Another primary goal of treatment is to establish regular eating patterns, with the assistance of self-monitoring and dietary planning (see Waller et al., 2007 for a comprehensive CBT treatment manual for EDs). Gowers (2006) argued that EDs are a classic example of a problem in which abnormal thoughts and behaviors combine to result in physical and social disability; thus, he argued that CBT should, in theory, be effective. In their abovementioned randomized controlled trial comparing specialist outpatient, generalized outpatient care and inpatient treatment for adolescent AN, Gowers et al. (2007) reported that those in the specialist outpatient setting received a package of care which included up to 6 months of CBT. Although the authors did not find any significant differences between the treatments, CBT was considered more cost effective (Byford et al., 2007).

Enhanced CBT (CBT-E), developed by Fairburn et al. (2003), is a transdiagnostic personalized treatment for EDs that focuses on modifying the mechanisms thought to maintain all forms of ED psychopathology. Given that not all adolescents recover from AN or BN after receiving FBT, and that it may not be suitable for all families (Lock et al., 2010), researchers are starting to investigate the effectiveness of CBT-E for adolescent EDs.

In an uncontrolled study, Dalle Grave, Calugi, Conti, Doll, and Fairburn (2013) examined 46 adolescent girls who received 40 sessions of CBT-E as a sole treatment. Participants also received two 60-min preparatory sessions and one review session 20 weeks after the end of treatment. Parents were intermittently involved in the therapy (an initial 1-h assessment within the first 2 weeks and eight 15-min sessions throughout therapy). The authors reported that 63% completed the treatment, 19.6% were classed as nonresponders (e.g., needed additional support post therapy or failed to make sustained progress), and 17.4% dropped out. Among the treatment completers, there was a substantial improvement in ED psychopathology and weight, although only 32.1% of completers gained weight to reach 95% of their expected weight. Changes were maintained after a 60-week follow-up period, and 44.8% had reached 95% of expected weight. The authors argued that these promising findings indicate the need for randomized controlled trial comparing CBT-E and FBT in AN.

CBT for adult AN has been tested in a small number of clinical trials. For example, in 24 adult AN patients, Channon, de Silva, Hemsley, and Perkins (1989) compared CBT to both behavior therapy (BT) and a low-contact treatment administered by psychiatrists. Not surprising considering the small sample, the three treatments did not statistically differ from each other on outcome. All patients improved significantly on nutritional status, menstrual functioning, and body weight. However, patients had better treatment attendance with CBT than with BT. CBT also resulted in fewer early dropouts in a 12-month comparison of CBT and nutritional counseling in adult AN patients following hospitalization. CBT patients remained significantly longer without relapsing (44 vs. 27 sessions); 22% versus 53% of patients relapsed in CBT versus nutritional counseling (Pike, Walsh, Vitousek, Wilson, & Bauer, 2003). Similarly, a comparison of CBT and dietary counseling found a much lower dropout rate with CBT; indeed, all patients dropped out of dietary counseling by 3 months (Serfaty, Turkington, Heap, Ledsham, & Jolley, 1999). In addition, all patients refused to provide data for a 6-month follow-up. This study dramatically illustrates some of the difficulties encountered in conducting research with those with AN. In addition, Fairburn (2005) argued that nutritional counseling without concurrent psychotherapy is not a sufficiently rigorous comparison group against which to test CBT.

In an uncontrolled study, Fairburn and colleagues (2013) examined the immediate and long-term outcome for 99 adults with AN following CBT-E. For those who completed the treatment (64%), there was a reasonable increase in weight ($M = 7.47$ kg) with 62% achieving a BMI over 18.5. These gains tended to be maintained after a 60-week follow-up period, although those with a BMI over 18.5 reduced to 55%. ED psychopathology also improved. Similar to the Dalle Grave et al. (2013) study, these findings provide support for the use of CBT-E; however, randomized controlled trials are needed to confirm its therapeutic efficacy for AN.

Interestingly, the results of one study cast doubt on the superiority of CBT in a comparison to another manualized psychotherapy, interpersonal therapy (IPT), and to a nonspecific clinical management condition providing supportive psychotherapy (McIntosh et al., 2005). Patients were

55 women (aged 17–40) diagnosed with AN using a slightly higher than usual weight criterion to define the disorder (BMI <19). Thirty percent of all patients were considered much improved or had minimal symptoms after treatment. However, despite the authors' predictions, the nonspecific control treatment was superior to CBT and IPT on global measures of ED symptoms. Thus, there is not yet strong support for the use of any specific individual psychotherapy for adult AN. Although CBT has been associated with improved psychological and physical outcomes as well as reduced dropout rates, it has yet to show superiority to other treatments for AN (see Galsworthy-Francis & Allan, 2014, for a review).

In addition to AN research, Schmidt et al. (2007) compared the effectiveness of CBT guided self-help and FT in adolescent BN. In their sample of 85 participants, binge eating significantly reduced in the CBT group after 6 months; however, no significant difference was seen between the two treatments at 12 months. The authors attributed the initial superiority of CBT to the modality focus on reduction of binges for recovery. Of note, almost a third of potential participants who refused to join the study reported not wishing to have family involved in their treatment. This finding suggests that adolescents may be more motivated to receive CBT rather than FBT and highlights the importance of also offering individualized appointments to adolescents (as per NICE guidance; NICE, 2017). Similar to the Le Grange et al. (2015) study also comparing CBT and FT mentioned earlier, there were no significant differences between the treatments at 12 months; however, this study had the opposite outcome at the end of treatment and at 6 months. The findings of Schmidt and colleagues may have been impacted by a smaller sample size. Put together, the research suggests that both modalities may be viable treatment options for adolescents with BN but CBT may be more suitable for those older adolescents who do not wish to have their families involved in their treatment.

For adults with BN, CBT is considered the treatment of choice (Hay, 2013). For example, both the APA (2006) and the NICE (2017) recommended CBT as the leading evidence-based treatment for BN in their evidence-based guidelines for the treatment of EDs. The efficacy of CBT for BN has been supported by strong evidence from randomized controlled trials. CBT involves weekly individual sessions over 4–5 months and typically results in complete remission in about 40% of cases (Wilson & Fairburn, 2002). Treatment does not typically affect patients' body weight. The majority of therapeutic gains occur in the first few sessions of treatment, significantly sooner than in comparison treatments (Wilson et al., 1999). This finding suggests that CBT is relatively fast acting. Similarly, more patients achieved remission by the end of CBT than by the end of IPT, although this difference leveled off by a 12-month follow-up (Agras, Walsh, Fairburn, Wilson, & Kraemer, 2000; Fairburn et al., 2015). Randomized controlled trials studying a wide range of EDs together have also demonstrated the efficacy for CBT-E for those above and below a BMI of 17.5 (Byrne, Fursland, Allen, & Watson, 2011; Fairburn et al., 2009).

Although experts recommend CBT for adolescents with BN when FBT is ineffective or unacceptable (NICE, 2017), it is important that age-related modifications be made to fit the adolescent patient's level of development and circumstances. It is also essential that the patient's family be included as appropriate. Lock (2015) recommended that treatment for adolescent BN considers normal developmental tasks during adolescence, involving families where possible to enhance skills generalization and being aware of expected emotional limitations given their age.

Again, although inferences can only be made from research with adults, CBT is also established as a treatment for BED, efficacious in reducing binge eating and associated psychopathology, even over long-term follow-up (Vocks et al., 2010). Generally, CBT does not produce clinically significant weight loss (Berkman et al., 2015) and thus does not effectively treat the obesity often associated with BED. Descriptive research has now documented the presence of BED among a proportion of children presenting for obesity treatment (Decaluwe & Braet, 2003). Therefore, evaluating the effect on childhood

BED of weight control treatment and other therapies should be a research priority.

Psychodynamic Therapy

One randomized trial has examined a form of psychodynamic therapy for adolescents with AN. The study by Robin et al. (1999), described earlier, compared a version of family therapy to ego-oriented individual treatment (EOIT). EOIT emphasized developing ego strength, learning coping skills, individuating from the family, and identifying and modifying any dynamics that may be blocking eating. EOIT led to decreases similar to family therapy in conflicts during family interactions even though sessions were individually conducted; however, EOIT took effect less immediately than family therapy.

Time-limited versions of psychodynamic treatment for AN have also been tested with adults. A randomized controlled trial investigated three specialized treatments and a low-contact control treatment in 84 women with AN (Dare, Eisler, Russell, Treasure, & Dodge, 2001). Focal psychoanalytic therapy addressed the meaning of the patients' symptoms in light of their history and family relationships, as well as the effect of these symptoms on their relationships (including the relationship with the therapist). This treatment was compared to cognitive analytic treatment (CAT), in which components of cognitive therapy were integrated with components of psychodynamic therapy such as interpersonal and transference issues. Family therapy was the third specialized treatment tested in this investigation. After 12 months, the three specialized treatments were similar in outcome, and both focal psychoanalytic therapy and family therapy were superior to the control treatment. However, patients did poorly in all treatments. Only 30% of patients in the three treatment groups no longer met criteria for AN (compared to 5% of patients in the control treatment). The study may have had insufficient power to detect differences among the specialized treatments, and patients had a long history of illness (6.3 years on average), indicating poor prognosis. Similarly, Treasure et al. (1995) found no differences between CAT and another specialized therapy, behavior therapy (emphasizing psychoeducational techniques), administered to 30 adult AN patients. This study, as well as that of Dare et al. (2001), may have been underpowered. In an adult study comparing 2 years of psychoanalytic psychotherapy and 5 months of CBT for BN (Poulsen et al., 2014), those who received CBT had higher remission rates at 5 months (42%) than those who received psychoanalytic psychotherapy (6%) as well as at 2-year follow-up (44% versus 15%). Although patients might get better with psychoanalytic psychotherapy, this study again suggests that CBT is faster acting and more effective over time. Based on the research so far, there is no compelling evidence that psychodynamic therapy is more effective than alternative specialized treatments for AN or BN with adolescents or adults.

Interpersonal Therapy

IPT is a specific, time-limited form of psychodynamic treatment that focuses on resolving interpersonal difficulties that contribute to the onset or maintenance of the disorder. Four potential problem areas typically constitute the focus of treatment: grief, interpersonal disputes, role transitions, and interpersonal deficits. The study discussed above, which compared CBT, IPT, and nonspecific clinical management in adult women with AN, found IPT to be the least efficacious of these three treatments (McIntosh et al., 2005). IPT has shown similar efficacy to CBT in adults with BN, but its benefits may be more delayed (Agras et al., 2000; Fairburn et al., 2015). Research also supports the use of IPT for BED in adults (Wilfley et al., 2002) as well as its use with other problems (i.e., depression) among adolescents (O'Shea, Spence, & Donovan, 2015). However, the lack of research specifically on IPT for EDs in this age group suggests that this treatment should not be considered an optimal first-choice intervention.

Summary of Treatment Literature

Overall, the state of the research base varies depending on which disorder and which age group is being considered. The prognosis is better for children and adolescents than for adults, but there is still limited research with younger ages. One limitation with the current literature on treatment of child and adolescent EDs is that much of it has been based on adults rather than children and/or adolescents. Extrapolating from the adult literature may or may not be appropriate. Gowers and Bryant-Waugh (2004) listed four arguments in favor of such extrapolation and five reasons why such extrapolation may not be warranted.

In the last 10 years, there has been an increase in controlled trials for child and adolescent EDs. In a recent systematic review of psychosocial interventions for adolescents EDs, Lock (2015) concluded that, for adolescents with AN, the only well-established treatment is FBT. Recent randomized controlled studies have confirmed the efficacy of this approach; however, not all families or adolescents with AN benefit from FBT, suggesting the need for continued research into effective and novel interventions for adolescent AN. There is growing support for interventions that are offered to an adolescent (e.g., CBT-E), with NICE (2017) recommending these if FBT is contraindicated or ineffective, and although these may be more acceptable to the young person, further randomized controlled studies are necessary.

For BN, there is also a notable lack of research specifically with adolescents or children, although the randomized trials that have been completed (Le Grange et al., 2007, 2015; Schmidt et al., 2007) suggest that FBT and CBT might both be effective. However, little is known about which type of patient would benefit from which therapy. The efficacy of CBT for BN among adults (whose samples often include adolescents) has been well established, and NICE (2017) recommended CBT as the leading evidence-based treatment for BN. Among children and adolescents, they recommend FBT as the first line treatment for BN; however, for those where FBT is unacceptable, contraindicated or ineffective, CBT should be offered. IPT for BN has been studied among adults and also among adolescents for different problems but not for BN.

BED may have the best prognosis, although research with children and adolescents is clearly needed. More research with other atypical variants of EDs, particularly given how common they have been in clinical practice, is also necessary. More research on the treatment of various subtypes of OSFED as well as more controlled research on the transdiagnostic approach described by Fairburn et al. (2003) and how this model applies to children and adolescents would help fill these gaps in the literature. Finally, research could consider novel approaches to working with adolescents, such as web-based and technologically enhanced guided self-help approaches, as well as looking at ways to enhance existing family-based interventions to improve outcomes.

Concluding Remarks

The EDs are potentially life-threatening conditions that are also treatable. Early detection and intervention is crucial, and expertise in assessment and treatment of EDs is valuable for those working with children and adolescents (Campbell & Peebles, 2014). Although the treatment literature has increased in the past decade, more robust research is needed with these age groups to enhance current treatments and to explore novel treatment approaches in order to improve treatment outcomes for adolescents with EDs.

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Feeding Disorders

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Pediatric Feeding Disorders: Clinical Presentation and Diagnosis

Feeding problems are prevalent within the pediatric population, occurring in up to 45% of typically developing children and as many as 80% of children with disabilities (Ahearn, Castine, Nault, & Green, 2001; Linscheid, 2006; Williams, Gibbons, & Schreck, 2005). A wide-ranging spectrum of issues exist among reported feeding difficulties, from mild problems like picky eating to more severe problems like total food refusal and liquid or tube dependence. Although some difficulties fall within the scope of typical child development, often resolving in the absence of formal treatment, pediatric feeding disorders occur when such difficulties result in impairments in social functioning, irrespective of nutritional deficiencies or loss of weight (Murphy & Zlomke, 2016). Common feeding problems encountered in children include problems related to *feeding skill delay and deficits* such as lack of self-feeding, failure to advance texture, oral motor dysfunction, swallowing problems, and respondent choking, gagging, and vomiting, as well as *maladaptive and disruptive mealtime behavior* including aggression, throwing food, tantrums, food refusal and food selectivity, packing or pocketing food, and eating too much or too little in addition to eating too fast or too slow (Berlin, Davies, Lobato, & Silverman, 2009).

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In the current *Diagnostic and Statistical Manual of Mental Disorders*, feeding disorders have been classified under a new category referred to as Avoidant/Restrictive Food Intake Disorder (ARFID). Diagnostic criteria include restricted feeding and lack of interest or avoidance of food based on sensory properties of the food or fear of consequences that may result from eating (American Psychiatric Association, 2013). Although some of the aforementioned feeding problems might not necessarily be captured under the ARFID diagnostic category, all of them are likely to cause functional impairment to some extent, thereby warranting intervention.

Some common feeding disorders, discussed in more detail below, include food selectivity, food refusal, and lack of developmentally appropriate feeding skills.

Food Selectivity

Food selectivity is a common feeding difficulty typically characterized as the chronic failure to meet recommended nutritional needs due to the consumption of a limited variety of foods (Shore & Piazza, 1997). Food selectivity can be further delineated as selectivity by type (e.g., refusal to consume vegetables), texture (e.g., refusal of tabletop textures such as apple slices in favor of pureed textures such as apple sauce), or even brand (e.g., only eating fries from one restaurant and refusing store-bought fries or fries from other restaurants). Though selective eaters might sustain normal weight and growth, they lack requisite nutrition for healthy development as a result of prolonged dietary restrictions.

Food Refusal

The term "food refusal," when used to describe a type of feeding disorder, typically refers to children who reject consuming most if not all foods when presented (Field, Garland, & Williams, 2003) and can also be used to describe children who consume some foods yet at inadequate volumes (Williams, Field, & Seiverling, 2010). Total food refusal and liquid dependence are two severe forms of food refusal where the child either refuses oral consumption altogether or only consumes fluids while refusing to consume solid food, respectively. Enteral feedings are a common medical intervention aimed at addressing the nutritional deficits associated with severe cases of food refusal where a nutritionally insignificant amount of food is consumed orally. Enteral tube feedings (ETF) can be used alone or in conjunction with oral and intravenous nutritional supplementation and require that a nutritionally complete food be pumped directly into the stomach, duodenum, or jejunum on a set schedule to provide requisite nutrition. Although ETF is often medically necessary to stabilize children whose health has been compromised by severe weight loss or nutritional deficiencies (e.g., iron deficient anemia), there are a number of potential physical and developmental concerns that can result from the procedure. For example, children can experience local wound infections, tube dislodgement, and tube blockage or fracture (Holmes, 2012); furthermore, children may become tube dependent even when ETF is no longer medically necessary which might inhibit the development of oral feeding (Morris, 1989).

Feeding Skill Deficits

Skill deficits related to feeding are often multifactorial in etiology. Examples of potential contributing factors include structural abnormalities (e.g., cleft lip/palate, mandibular hypoplasia), medical complications such as food allergies and gastroesophageal reflux disease (GERD), genetic disorders (e.g., cerebral palsy, Down syndrome), neuromuscular and developmental delays (e.g., hypotonia, lack of communication), and environmental factors. These organic and nonorganic determinants might produce a variety of skill deficits including swallowing disorders, packing, chewing deficits, and a lack of self-feeding.

Swallowing dysfunction (i.e., dysphagia) is characterized by difficulties or pain when swallowing. There are several voluntary and reflexive behaviors that contribute to swallowing, including bolus formation, bolus transfer, initiation of the swallow, and passage of the bolus through the esophageal sphincter. Difficulty in completing any one of these behaviors can put a child at risk for aspiration, pneumonia, gagging, choking, and vomiting (Arvedson, 2008). Packing occurs when an accepted bite of food is held or "pocketed" in the mouth in the absence of swallowing. Much like dysphagia, there is also a risk of aspiration. Chewing deficits constitute a variety of problems and, like dysphagia and packing, can result from a range of organic factors. Treatment of chewing and swallowing deficits should be based on the specific type of deficit(s) exhibited (Kadey, Roane, Diaz, & Merrow, 2013). In some cases, chewing deficits might not have any identifiable organic origin. For example, deficits with chewing can develop from a lack of learning opportunities resulting from prolonged use of tube feedings in which oral consumption is infrequent or does not occur (Morris, 1989). Self-feeding or independence with feeding, similar to chewing deficits, can be delayed as a result of environmental factors (e.g., lack of opportunities to practice due to prolonged bottle dependence). However, these delays can also result from some of the genetic and developmental etiologies mentioned previously, especially when motor movements to reach for, pick up, bite, and chew are effortful. In general, difficulty eating might reduce the motivation to eat, and this lack of motivation should be considered when developing a comprehensive intervention plan, by teaching appropriate feeding skills, and thereby decreasing response effort (Kadey et al.). Prior to intervention, each of these deficits should be evaluated for potential organic causes, and medical clearance must be obtained.

Medical, Developmental, and Social Outcomes

The aforementioned feeding disorders usually require some form of intervention to address a variety of negative biomedical, developmental, and social outcomes. Untreated feeding disorders that result in malnutrition and weight loss can lead to impairments in intellectual, emotional, and academic development, (Hoch et al., 2001) in addition to familial stress (Greer, Gulotta, Masler, & Laud, 2008), while children who engage in food selectivity and consume a large volume of their preferred foods may experience unhealthy weight gain when those foods are rich in calories and fat. Obesity in childhood has been linked to an increased prevalence of type II diabetes, high cholesterol, hypertension, and a number of social consequences (e.g., ostracism, bullying, weight preoccupation; Dietz, 1998). Although this subpopulation does not experience the immediate biomedical concerns associated with marked weight loss, developmental delays, or need for enteral feedings, they are likely to experience drastic long-term outcomes as a result of their feeding problem and would likely benefit from interventions targeting improved nutrition.

Malnutrition that results from feeding disorders can often lead to delays with young children, including cognitive impairment, in particular during the sensitive period of development between birth and 5 years of age. Children can also display delays in speech, social responses, motor development, and might fail to reach other major developmental milestones within an appropriate window of time. These symptoms, in conjunction with weight loss or stagnation, are sometimes referred to as "failure-to-thrive," a condition that describes the child's decelerated or arrested development (Heffer & Kelley, 1994).

As eating is typically a social activity, feeding difficulties can also limit the number of social opportunities for children as they no longer participate in mealtimes (e.g., family dinner, school lunch). In fact, the child's participation in such settings might be an unpleasant experience for everyone involved. For example, a child who engages in total food refusal, and as a result receives feedings via a gastrostomy tube, might miss important learning opportunities to engage in social behaviors most common at mealtimes. Attempts to include the child might lead to inappropriate mealtime behaviors (e.g., gagging, vomiting, crying, aggression, self-injury), behaviors commonly exhibited by children with feeding difficulties. These experiences likely make mealtimes difficult for families if the caregivers' attention is consumed with managing such behaviors, preventing them from enjoying their own meal and interacting with other members of the family (Greer et al., 2008).

Multidisciplinary Assessment: The Role of Applied Behavior Analysis

As previously mentioned, feeding disorders have been categorized as *feeding skill delays and deficits* and *maladaptive feeding behaviors and disruptive mealtime behaviors* (Berlin et al., 2009). It is important to note that the feeding problems within these broad categories are not always distinct from one another and generally occur within a relational context. Thus, Berlin et al. proposed a third grouping of feeding problems characterized as *relational or family difficulties and unpleasant mealtime environments*, in which feeding problems are identified in the context of family difficulties such as an antagonistic environment, parents' own aversions surrounding mealtimes, and mealtime interactions that are coercive in nature. In other words, parental mismanagement may be responsible for the development and/or maintenance of feeding problems. Given the complexity of pediatric feeding disorders in clinical presentation and diagnosis, biological, behavioral, and psychosocial factors must all be considered and addressed (Berlin et al.). As such, a multidisciplinary approach is the suggested model of care for the assessment and treatment of severe feeding disorders (Cornwell, Kelly, & Austin, 2010), including speech and/or occupational therapy, medical and dietary interventions, psychosocial support provided by a social worker or psychologist, and a strong emphasis on behavioral interventions.

Though the etiology of feeding problems varies widely and can include medical complications such as GERD allergies, and structural abnormalities that impact chewing and swallowing, maladaptive feeding behaviors exhibited by children, regardless of initial precipitating events, can all be attributed to environment-behavior relations. In other words, maladaptive feeding behaviors are learned behaviors often maintained by negative reinforcement contingencies (Clawson & Elliott, 2014), and regardless of underlying structural, neurological, cardiorespiratory, and/or metabolic features of feeding disorders, there is often a significant behavioral component. In fact, a study by Burklow, Phelps, Schultz, McConnell, and Colin (1998) identified significant behavioral contributions to feeding disorders in as many as 80% of children referred to a multidisciplinary feeding clinic.

Consequently, applied behavior analysis is uniquely important in multidisciplinary assessment and treatment because even after underlying medical, developmental, sensory, or psychosocial challenges have been addressed, maladaptive feeding behaviors are likely to persist if the reinforcement contingencies that maintain such behavior are not identified and disrupted. Further, treatments that include behavioral interventions may also act to increase the child's compliance with treatments focused on oral-motor skill development used by speech pathologists or occupational therapy (Clawson & Elliott, 2014). In order to develop a comprehensive treatment that addresses the function of maladaptive mealtime behavior, a functional behavioral assessment, as described below, is critical.

Assessment

Various types of questionnaires, observations, and other assessment methodologies can be used to gather information on the severity of feeding problems and other qualitative aspects regarding mealtimes, as well as types of inappropriate mealtime behavior the child exhibits and events that might influence their persistence.

Indirect Assessment

Studies evaluating indirect methods as a means to obtain information regarding the function of problem behavior have been largely unsuccessful in identifying behavioral functions as compared to functional analysis methodology (Smith, Smith, Dracobly, & Peterson Pace, 2012; Zarcone, Rodgers, Iwata, Rourke, & Dorsey, 1991). However, use of initial surveys for obtaining crucial information pertaining to medical concerns (e.g., physical abnormalities, allergies), past interventions, and food preferences can not only be useful in ensuring the safety of the child but helpful in guiding potential intervention approaches as well.

Questionnaires such as the Brief Autism Mealtime Behaviors Inventory (BAMBI; Lukens & Linscheid, 2008), Children's Eating Behavior Inventory (CEBI; Archer, Rosenbaum, & Streiner, 1991), and Screening Tool of Feeding Problems (STEP; Matson & Kuhn, 2001) can be used as assessment tools to identify whether a child has a feeding problem or as the dependent measure in determining efficacy of interventions. For example, the BAMBI has been shortened to a 15-item survey in which parental report on questions pertaining to food selectivity, disruptive mealtime behavior, food refusal, and mealtime rigidity is obtained (DeMand, Johnson, & Foldes, 2015; Lukens & Linscheid). These types of assessments are useful for specific purposes such as identifying whether intervention is warranted for an individual but will likely fall short when used as the sole method for obtaining accurate information regarding the function of inappropriate mealtime behavior. Nonetheless, indirect assessments such as interviews are valuable in a number of ways. For example, assessing the types of foods a child currently consumes via questionnaire could inform their inclusion in a direct assessment (e.g., preference assessment), examining dietary patterns via food logs might inform the types of foods necessary to include in an intervention to better nutritional outcomes, and obtaining information regarding problems related to cross-discipline expertise might inform the need for including alternate professionals (e.g., dental problems warranting a dentist, oral motor deficits warranting a speech and language pathologist) in cases where behavior analysts are providing treatment outside of a multidisciplinary team.

Descriptive Assessment

In general, studies have shown descriptive assessments to be insufficient for obtaining accurate information regarding the function of problem behavior when comparing the outcomes obtained from descriptive assessments with functional analysis (see description below; e.g., Pence, Roscoe, Bourret, & Ahearn, 2009). However, the initial process for identifying environment-behavior relationships for subsequent manipulation in functional analysis might hinge on the careful observation of these relationships by clinicians. For example, in a seminal functional analysis study conducted by Piazza, Fisher, et al. (2003), the experimenters utilized contingencies in the functional analysis that were informed by the prior descriptive observations of caregiver-conducted meals. Despite the lack of research comparing the obtained function of inappropriate mealtime behavior from descriptive and functional analysis methods, the outcomes from descriptive assessment studies have been crucial in showing that a number of environmental events such as caregiver attention (e.g., coaxing, reprimands), delivery of preferred items (e.g., toys, preferred foods), and escape from bite presentations are events that likely take place during meals (Borrero, Woods, Borrero, Masler, & Lesser, 2010; Piazza, Fisher, et al.). Thus, descriptive methods could be useful in conveying to caregivers and other professionals how these events might be playing a role in the maintenance of a feeding problem.

Preference Assessments

Generally, preference assessments are often used in research and clinical practice to identify potential reinforcing stimuli, both leisure and edible. With respect to assessing foods for individuals with feeding problems, the process or outcome of conducting a preference assessment can serve several additional purposes such as confirming caregiver report of the topographies of problem behavior their child exhibits and which foods are consistently refused. For the sake of assessment of feeding problems prior to a treatment evaluation, preference assessments are typically used to identify foods that are not consumed altogether. Although, it is possible preference assessments could be utilized to identify foods that are inconsistently accepted or consumed relative to foods that are not accepted at all. It is possible those foods that are consumed more frequently, albeit not to a sufficient level, might be more easily incorporated into the child's diet with less intrusive interventions than foods the child completely refuses. Although more research needs to be conducted using such an assessment, it is likely that these procedures would only be applicable for cases of picky eating rather than children who exhibit more severe forms of feeding problems.

The utility of different preference assessments might depend on what function they are being used for. For example, a paired stimulus preference assessment (PSPA; Fisher et al., 1992) is typically used to obtain a relative hierarchy of preference across foods. However, given that children with feeding problems often refuse to consume foods when presented, the typical outcome of a PSPA is that the majority of foods are not consumed even when preferred foods are used in combination with non-preferred foods during the assessment. The result of the PSPA being that consumption occurs for a few of the preferred foods whereas consumption does not occur for any other foods. Further, consumption is not likely to occur during the PSPA if the child engages in total food refusal or preferred foods are not incorporated into the preference assessment. Thus, a hierarchy of preference cannot be obtained, defeating the original purpose of using the PSPA. Alternatively, a single stimulus preference assessment (SSPA; Pace, Ivancic, Edwards, Iwata, & Page, 1985) might be the most practical preference assessment and yield the resulting information if the goal is to corroborate caregiver report of foods their child likely refuses and identify what foods the child will or will not consume.

Other preference assessments such as the multiple stimulus without replacement (MSWO; DeLeon & Iwata, 1996) have not been employed as frequently as the PSPA when assessing preferences for this population; however, there might be practical utility in using different preference assessment arrangements dependent on various types of feeding problems. For example, as noted above, the SSPA is likely most useful when wanting to obtain information about whether a child will or will not consume a specific food. In contrast, the MSWO arrangement might be most similar to a typical meal in that multiple foods are presented at the same time. Thus, this arrangement would make it possible to examine the sequencing of bites within a meal. Likewise, assessment of bite sequencing could occur if bites are replaced as in the multiple stimulus with replacement preference assessment (Windsor, Piché, & Loche, 1994), if free access is provided similar to that of the free operant preference assessment (Roane, Vollmer, Ringdahl, & Marcus, 1998) or if foods are restricted as exclusive consumption occurs, as in the response-restriction preference assessment (Hanley, Iwata, Lindberg, & Conners, 2003). In addition, if several foods (with a range of preference) are available to the child to consume in any order, one would be able to measure at what point problem behavior occurs. For example, the SSPA and MSWO presentation methods might be useful to distinguish whether the child will engage in inappropriate mealtime behavior when non-preferred foods are presented in isolation (SSPA) or when presented simultaneously with preferred foods (MSWO). In addition, both might be important assessments if the recommendation is to provide exposure to a variety of foods as a possible least intrusive intervention where caregivers or therapists might present non-preferred foods on a time-based schedule. However, applying preference assessments in this way has yet to be empirically validated and, like any direct assessment, will only prove to be useful if they provide valuable information in guiding the design of subsequent treatments and predicting successful applications or outcomes.

As an example, Munk and Repp (1994) utilized an assessment procedure in which 10–12 types of food (e.g., pears, chicken) were presented at up to four possible textures (e.g., ground, chopped) for five individuals with feeding problems. The experimenters recorded acceptance, refusal, expulsion, and inappropriate mealtime behavior in an effort to categorize each child's feeding problem as total food refusal, selectivity by type, selectivity by texture, or selectivity by both type and texture. The pattern of behavior that would be expected for each category would be refusal to consume all foods when presented across all textures, only consuming a few foods regardless of texture but refusing other types of foods, consuming foods at one texture but not another, and only consuming some foods at some textures but refusing other foods, respectively. Subsequent research has demonstrated that the assessment procedures proposed by Munk and Repp can identify functional relationships between dimensions of foods and behavior such as accepting, consuming, or expelling as well as predict successful intervention strategies (e.g., Patel, Piazza, Santana, & Volkert, 2002).

In addition to the possibility of preference assessments being used to inform treatment development, preference assessments might also be used in a pre- and posttreatment format to measure both generalization and maintenance. As we noted previously, the PSPA can be limited in assessing the hierarchy of preference between foods for this population; however, researchers have begun utilizing pre- and posttreatment PSPAs to measure changes in preferences following intervention (e.g., Fernand, Penrod, Brice Fu, Whelan, & Medved, 2015; Penrod & VanDalen, 2010). The pre- and posttreatment PSPA allows for measurement of both generalization and maintenance. Generalization is measured if foods are included in the PSPA that the child was not exposed to during intervention, and consumption occurs with those foods during the posttreatment PSPA. Finally, the posttreatment PSPA allows for an assessment of the possibility for fading treatment in that the PSPA is typically implemented under baseline contingencies (i.e., escape is available and no programmed consequences are delivered). Thus, treatment components are removed during the PSPA, and one possible variable maintaining consumption is the change in preference that occurred during treatment, indicating that consumption might be likely to occur in the future (i.e., maintain) without formal intervention components as a result of the shift in preference.

Functional Analysis

Functional analysis methodology (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) has been used as a means to identify variables that influence the occurrence of problem behavior and are considered the only assessment method that reliably identifies a functional relationship between two variables, typically between environmental events and a response class. Girolami and Scotti (2001) were one of the first to extend functional analysis procedures to the assessment of inappropriate mealtime behavior in an effort to identify the circumstances under which those behaviors are likely to occur; however, since then a number of studies have utilized similar methodology by arranging variations of attention, escape, tangible (toy and edible), and control conditions (e.g., Bachmeyer et al., 2009; Piazza, Fisher, et al., 2003). Typically in the attention condition of a functional analysis, a bite of food is presented for a predetermined amount of time and remains fixed in position until that interval lapses, regardless of problem behavior. However, inappropriate mealtime behavior results in the delivery of attention (e.g., consoling, coaxing, reprimands). Increased problem behavior in this condition would suggest the child's inappropriate mealtime behavior is sensitive to social-positive reinforcement in the form of attention. In the escape condition, a bite of food is presented for the same interval of time as decided upon in the attention condition. However, the bite of food is removed, and the demand to eat the bite is terminated for a brief amount of time (e.g., 20 s) contingent upon inappropriate mealtime behavior, and no other programmed consequences are provided for problem behavior, that is, attention is not provided in the escape condition. Elevated problem behavior in this condition would suggest that the child's inappropriate mealtime behavior is sensitive to social-negative reinforcement in the form of escape from eating or bite presentations. During the tangible condition, the arrangement is the same as the previous conditions; however, attention and escape are not provided. Instead, a preferred item (either a toy or food) is presented contingent upon the occurrence of problem behavior. Increased problem behavior in this condition would suggest the child's inappropriate mealtime behavior is sensitive to social-positive reinforcement in the form of access to preferred items. Lastly, during the control condition, either the bite of food used in the other conditions is presented (e.g., Piazza, Fisher, et al.) or a preferred food is presented (e.g., Najdowski et al., 2008). Typically in this condition, noncontingent access to attention is provided, and in some cases noncontingent access to toys is provided (if assessing a tangible function), and no programmed consequences are provided if inappropriate mealtime behavior occurs. A number of studies have presented variants of the aforementioned conditions using a variety of designs including reversal (e.g., Piazza, Fisher, et al.) and multielement designs (e.g., Najdowski et al.), as well as pairwise (LaRue et al., 2011) and brief analyses (e.g., Wilder, Normand, & Atwell, 2005). Together, previous research has identified inappropriate mealtime behavior is likely to serve an escape function (e.g., Piazza, Fisher, et al.) pointing to the importance of interventions focused on decreasing the aversive properties of foods, feeding apparatus, or mealtime context as well as those which terminate the relationship between the escape contingency for engaging in inappropriate mealtime behavior.

Intervention

Although there is a range of medical conditions that can influence the development of feeding disorders, the previous section has highlighted how behavioral factors can often play a large role in both the development and maintenance of feeding problems. Indeed, the functional analysis literature has highlighted how both negative reinforcement (i.e., the removal or avoidance of non-preferred foods) and positive reinforcement (e.g., Bachmeyer et al., 2009; Najdowski et al., 2008; Piazza, Fisher, et al., 2003) can participate in the development and maintenance of inappropriate mealtime behavior. There are several other factors to consider when pursuing a broad functional analysis of feeding disorders, though. For example, Babbitt et al. (1994) suggested that there are two general issues, which might overlap, that often contribute to the presence of a feeding disorder: (1) motivational problems and (2) skills deficits. Along these lines there are a number of interventions that might be pursued to target both motivation and skill deficits.

The effectiveness of behavioral interventions in the treatment of pediatric feeding disorders has been well documented. Specifically, behavioral interventions have been used to address inappropriate mealtime behaviors (Bachmeyer et al., 2009), food selectivity (Najdowski, Wallace, Doney, & Ghezzi, 2003; Piazza et al., 2002), packing (Gulotta, Piazza, Patel, & Layer, 2005; Patel, Piazza, Layer, Coleman, & Swartzwelder, 2005), total food refusal (Gulotta et al., 2005; Mueller, Piazza, Patel, Kelley, & Pruett, 2004; Shore, Babbitt, Williams, Coe, & Snyder, 1998), swallowing problems (Greer, Dorow, Williams, McCorkle, & Asnes, 1991; Lamm & Greer, 1988), and self-feeding (Collins, Gast, Wolery, Holcombe, & Leatherby, 1991; Luiselli, 2000). This section considers less intrusive interventions, namely, those that involve positive reinforcement and antecedent interventions and those that strengthen skills involved in feeding.

Importantly, in our clinical experience the extent to which less intrusive interventions are successful in the absence of extinction is often related to the severity of inappropriate mealtime behavior, and this is consistent with patterns in the research literature as well (Seubert, Fryling, Wallace, Jiminez, & Meier, 2014). That is to say, less intrusive interventions, those that don't involve extinction, seem more likely to be successful for less severe feeding problems. To be sure, there are a great variety of interventions that might be characterized as less intrusive. Given this, our aim is to provide an overview of some of the strategies that have been evaluated within the research literature, but at the same time we acknowledge that our review is selective and that more thorough reviews might be pursued. We begin by reviewing perhaps one of the most straightforward behavioral interventions, differential reinforcement of alternative behavior.

Differential Reinforcement of Alternative Behavior (DRA)

DRA consists of providing access to a reinforcer contingent upon a target behavior and not providing access to this reinforcer in the absence of the target behavior. Within the context of a feeding intervention, DRA consists of providing reinforcers contingent upon acceptance and consumption of non-preferred foods and withholding those reinforcers in the absence of acceptance or consumption. Interestingly, while this intervention may seem to be the most straightforward behavioral intervention, only a handful of studies have demonstrated its effectiveness in isolation. A study by Riordan, Iwata, Finney, Wohl, and Stanley (1984) demonstrated how positive reinforcement in the form of access to preferred items and social praise could be used to improve the number of bites accepted with three children admitted to an inpatient feeding disorders program. Brown, Spencer, and Swift (2002) described the successful use of DRA with a 7-year old who was a picky eater. In this study, parents were instructed to give their child a rule (e.g., "if you eat X you can have some Y"), and this contingency was successful at increasing consumption across three foods. Other researchers have examined DRA in combination with other interventions, suggesting that it may be a useful, though not necessarily critical, component of behavioral treatment packages (e.g., Najdowski et al., 2010). However, other research has shown that DRA is not successful at improving feeding behavior in isolation (e.g., Najdowski et al., 2003; Patel, Piazza, Martinez, Volkert, & Santana, 2002; Penrod, Wallace, Reagon, Betz, & Higbee, 2010), but that it may be helpful toward reducing challenging behavior associated with mealtimes (Piazza, Patel, Gulotta, Sevin, & Layer, 2003).

Non-contingent Reinforcement

Non-contingent reinforcement has also been studied within the feeding disorders research. Reed et al. (2004) assessed the relative effectiveness of non-contingent reinforcement and escape extinction in the treatment of four children with food refusal. Results showed that non-contingent reinforcement (access to toys and attention throughout meals) did not increase consumption of foods, but that it did reduce inappropriate mealtime behavior for some of the participants. Wilder et al. (2005) studied the effects of non-contingent reinforcement on the self-injurious behavior and food refusal of a 3-year-old child with autism and feeding difficulties. A pretreatment functional analysis confirmed that the child's self-injury was maintained by escape from food. Results showed that non-contingent reinforcement (access to a video throughout meals) resulted in a reduction in self-injury and an increase in bites accepted. Thus, there are somewhat mixed results related to the effectiveness of NCR in the treatment of feeding problems. Future researchers should continue to try to understand the contexts in which NCR is effective.

Antecedent Interventions

A number of interventions target the motivation to engage in negatively reinforced inappropriate mealtime behavior by specifically altering some aspect of the stimulus properties of non-preferred foods. These interventions generally a) target the stimulus properties of the avoided food itself or b) attempt to change the context in which the non-preferred food is presented and experienced. We will first review those interventions that have focused on changing the stimulus functions of non-preferred foods directly.

Fading and Texture Manipulations Stimulus fading and texture manipulations consist of changing the characteristics of the non-preferred foods directly. In a stimulus fading intervention, target foods (i.e., non-preferred foods) are blended with preferred foods (e.g., 70% preferred food and 30% non-preferred food). Mueller et al. (2004) improved the variety of foods two children with food refusal consumed by using a blending intervention that involved blending preferred and non-preferred foods at various ratios.

After the blending treatment, probes were conducted with both treated and untreated target foods. Results showed that consumption improved for all foods, but that consumption of foods that had not been exposed to the blending treatment only improved after several foods had been treated. Patel, Piazza, Kelley, Ochsner, and Santana (2001) evaluated a fading procedure with a child who would only consume water. Initially, the intervention involved systematically increasing the amount of Carnation Instant Breakfast ® (CIB) added to the water. When consumption was high with all of the CIB in the water, the amount of milk added to the water and packet of CIB was also systematically increased. Ultimately, the child consumed glasses of milk with a packet of CIB. Tiger and Hanley (2006) pursued a similar intervention with a child who would not drink milk. Chocolate syrup was added to the milk and systematically faded, as consumption remained high. At the end of the treatment, the child drank glasses of milk with no syrup added. These studies demonstrate that stimulus fading can be used to systematically transfer stimulus control to initially non-preferred foods and liquids.

Texture manipulations are similar to fading interventions in that the non-preferred food is directly altered in some way. Patel, Piazza, Santana, et al. (2002) evaluated a texture manipulation on the number of expulsions and grams consumed with a child who consumed foods at low textures (e.g., puree) but expelled foods at higher textures. The authors specifically reduced the textures of meats in this study, with results showing that expulsions decreased and grams consumed increased. This evaluation demonstrates that the texture of foods may be a variable to consider in the treatment of feeding problems and that texture manipulations may be pursued to improve consumption. Importantly, food texture is related to chewing and swallowing skills, and efforts to systematically increase texture after it is decreased may need to be combined with interventions aimed at developing and strengthening chewing and swallowing behavior (see below).

Simultaneous Presentation Another antecedent strategy involves providing non-preferred foods *with* preferred foods, a strategy called simultaneous presentation in the research literature. Piazza et al. (2002) conducted an evaluation of the effects of simultaneous presentation of non-preferred and preferred foods relative to the sequential presentation of non-preferred and preferred foods (i.e., only providing preferred foods after consuming non-preferred foods). Results of this study showed that two third of the participants consumed more food when non-preferred and preferred foods were provided simultaneously relative to sequentially. A final participant also consumed more in the simultaneous condition, but only when it was combined with escape extinction procedures. Ahearn (2003) also evaluated the simultaneous presentation condition with a 14-year old, mildly selective child, to improve the acceptance of three vegetables. Acceptance of all three vegetables improved when condiments (preferred food) were added to the vegetables (non-preferred foods). While these studies suggest that simultaneous presentation may be effective, other research has been less supportive. VanDalen and Penrod (2010) found that neither simultaneous nor sequential presentation methods were effective at increasing the consumption of bites with two children with autism spectrum disorder and that both methods were equally effective when combined with escape extinction. Given these mixed findings, more research is needed which identifies the circumstances in which the simultaneous presentation method is likely to be effective in the absence of escape extinction.

High-P Sequence Other interventions aim to improve consumption by altering some feature of the feeding context. One of these interventions involves the high-probability instructional sequence. Generally, the high-*p* sequence involves providing a series of instructions that the individual has a very high probability (i.e., history) of complying with prior to providing an instruction that they have a low probability of complying with. The high-*p* sequence has also had mixed effects within the feeding literature. For example, Dawson et al. (2003) found that the high-*p* sequence did not improve consumption or inappropriate mealtime behavior and that it also did not add to the effectiveness of escape extinction. Patel et al. (2006) also found that the high-*p* sequence did not improve acceptance or consumption, but that it did reduce inappropriate mealtime behavior when combined with extinction interventions relative to extinction alone. Others have found the high-*p* sequence to be effective in the absence of escape extinction (Ewry & Fryling, 2016; Meier, Fryling, & Wallace, 2012; Patel et al., 2007). It is noteworthy that these studies employed a variation of the high-p sequence wherein the high-*p* instruction was topographically similar to the low-*p* instruction (both involved taking bites from spoons) and involved participants that were generally compliant. Finally, Penrod, Gardella, and Fernand (2012) combined the high-*p* sequence with demand fading (i.e., progressively increasing the demand requirement) to improve consumption with children with food selectivity. The results of Penrod et al. demonstrate that the high-*p* sequence may be successful when combined with other interventions.

As we have mentioned before, a great number of interventions might fall within the purview of *antecedent* interventions for feeding problems. Interested readers are encouraged to consult reviews on the topic (e.g., Bachmeyer, 2009; Seubert et al., 2014). Interestingly, although appetite has been mentioned in some of the behavioral feeding literature (Linscheid, 2006), the role of appetite manipulation has not been systematically evaluated in the behavior analytic feeding literature. However, interventions such as developing a structured feeding schedule and reducing the extent to which individuals eat small amounts of food (or "snack") throughout the day seem to be part of standard behavioral recommendations for feeding intervention (e.g., Williams & Foxx, 2007).

Developing Related Skills

Chewing Relatively fewer published behavioral interventions have focused specifically on strengthening target skills related to eating. Volkert, Piazza, Vaz, and Frese (2013) examined two relatively straightforward behavioral interventions to improve chewing skills. Their first study involved examining the effects of a least-to-most prompting procedure and praise on the number of chews per bite with a typically developing 4-year-old child. Results showed that the intervention was successful at increasing the number of chews per bite across various foods (green beans, apricots, peaches, carrots, potatoes, fish sticks, and chicken). In a refinement of the first experiment, the researchers evaluated the effects of a descriptive verbal prompt (i.e., "Chew 10 times") and praise on chewing with a 14-year-old child with a developmental disability. Results showed that both chews per bite and mastication improved as a result of the intervention. These initial evaluations suggest that simple behavioral interventions might be used to improve skills associated with chewing and swallowing.

More recently, Volkert, Peterson, Zeleny, and Piazza (2014) evaluated a protocol involving a chew tube to improve chews per bite, mastication, and to decrease early swallows with three young children with feeding problems (aged 2, 3, and 4 years). Specifically, using mothers as therapists, participants were taught to first bite a chew tube, then, using least-to-most prompting, to chew the tube with a bite in it, then to chew a half tube with a bite, and finally least-to-most prompting with a bite was used alone. Target behaviors improved for each of the three participants involved in the study. These studies suggest that behavioral interventions may be used to improve chewing skills with children with feeding problems. Given the importance of skills such as chewing, it is hoped that more research focuses on this area.

Self-Feeding An additional skill related to feeding is that of self-feeding. As we have described throughout the chapter thus far, children with feeding difficulties often have histories of avoiding foods for various reasons, and, as a consequence, having caregivers feed them. This history may result in a lack of self-feeding skills in children with a history of feeding difficulties. Behavioral researchers have examined a number of procedures that may be used to improve self-feeding. Like all skills, self-feeding skills may be deficient due to skill deficits or motivational problems. Luiselli (1991, 1993, 2000) reported a number of case studies where individuals with various disabilities were taught self-feeding skills using prompting and prompt fading, differential reinforcement, and demand fading. These studies demonstrated that when self-feeding skills are weak or absent, they can be taught using common behavioral acquisition procedures.

Self-feeding can also be deficient with individuals who have a self-feeding repertoire. Recently, behavioral researchers have evaluated the use of negative reinforcement contingencies (i.e., avoidance) to increase self-feeding with individuals who have self-feeding skills. Specifically, participants were given choices between self-feeding a bite of a target food and having someone else feed them a bite of the target food, multiple bites of the target food, or multiple bites of less preferred foods (Rivas et al., 2014; Vaz, Volkert, & Piazza, 2011). Results demonstrated that self-feeding increased when children could avoid having someone feed them multiple bites of the target food or multiple bites of less preferred foods. Given this, it seems possible that once self-feeding skills are established, motivation to self-feed, perhaps especially with children, who have a history of feeding difficulties, can be improved with avoidance contingencies. Given the importance of self-feeding, much research remains to be done in this area.

Implications

As we have described, there are many interventions that have been evaluated to improve feeding behavior. While having options is often considered a good thing, perhaps the largest problem with having so many interventions is determining *when* a particular intervention should or should not be used. Clearly, for practitioners, simply having a very large menu of possible interventions is not all that is needed. Future research should focus on identifying the specific contexts where less intrusive interventions are more or less likely to be effective in the absence of extinction. In the meantime, we recommend that clinicians consider a pretreatment assessment of various treatments rather than pursue what may become a rather lengthy trial and error process. Consistent with the functional analysis logic described earlier in the chapter, this involves testing out the effects of various interventions on important target behaviors, most often acceptance, consumption, and inappropriate mealtime behavior. Such an assessment may be relatively brief; there are often notable differences that can be seen very quickly.

For example, after verifying that a child is ready and able to participate in a feeding intervention (i.e., ruling out medical causes, assessing for prerequisite skills), a therapist might discuss several intervention options with a caregiver. Collaboratively, it may be decided that two to three interventions are of interest and fit within the context of the child's situation. Then, using an alternating treatment design, therapists can "probe" the effects of different interventions (e.g., DRA and non-contingent reinforcement) on consumption and inappropriate behavior (see Fig. 1). This way, potential differences between the two interventions will be identified rather quickly, and if not, a parent could choose which intervention they find to be more preferable, and this can be pursued while planning for generalization and maintenance (more on generalization and maintenance below). While careful pretreatment assessments might be pursued in future research, we also recommend them as good clinical practice given the likely idiosyncratic responses different children will have to various feeding treatments.

Of course, as we have described above, there are situations in which less intrusive interventions are not effective in isolation, when something more intrusive is required. Again, it is our experience that these situations are closely related to the severity of the inappropriate mealtime behavior (e.g., yelling, pushing the spoon away, attempting to leave the feeding context) that children engage in. It is also possible that individuals with more lengthy histories of reinforcement for challenging behavior could require more intrusive interventions, at least initially. Much more research is

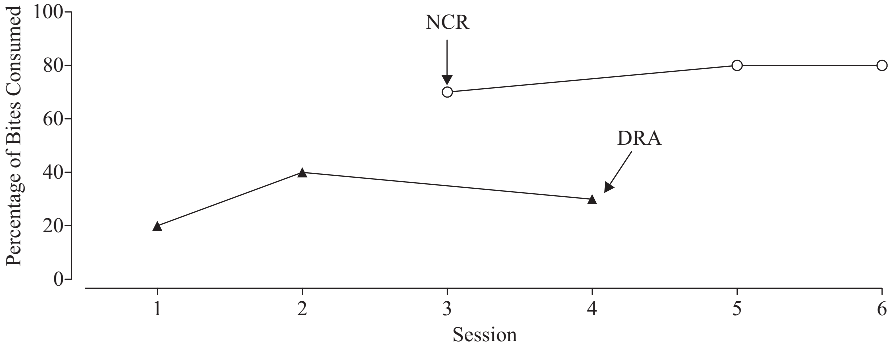

Fig. 1 Example of a brief pretreatment assessment of the effects of two interventions

needed to explore these possibilities. The following section provides a detailed overview of what we know about extinction procedures.

Escape Extinction and Procedural Variations

As noted, the use of antecedent and some consequence-based environmental manipulations to address feeding difficulties can often prove to be inefficient when dealing with more persistent problem behavior (e.g., noncompliance, continual expulsions), warranting a more intensive treatment model. In such cases, the incorporation of escape extinction within the existing intervention should be considered. At times, feeding disorders are so severe that extinction procedures can be immediately warranted as part of an initial treatment package in an effort to resolve imminent threats to health or well-being (e.g., prevention of further declines in weight and surgical placement of a gastrostomy tube). In any case, it is crucial that extinction procedures be implemented with integrity and only by individuals who have been trained to implement the procedure and recognize potential safety risks or under close supervision of someone with extensive experience in the provision of this type of treatment.

Placing any behavior on extinction will reduce the future frequency of the behavior or may stop the occurrence of the targeted behavior altogether. Extinction-based procedures involve withholding functional reinforcers when the target behavior is emitted (Cooper, Heron, & Heward, 2007). When applied to feeding difficulties, such as food refusal or food selectivity, extinction procedures typically include preventing escape from non-preferred foods or from the mealtime situation. It is speculated that escape extinction procedures are the most efficient means of addressing food refusal behavior because the negative reinforcement contingency maintaining such behavior (often escape or avoidance of non-preferred foods) is disrupted (Riordan, Iwata, Wohl, & Finney, 1980). Although the efficacy of escape extinction procedures for feeding difficulties has been demonstrated repeatedly in the literature (Ahearn, Kerwin, Eicher, & Lukens, 2001; Cooper et al., 1995; Piazza, Patel, et al., 2003), there are numerous clinical considerations to make regarding *whether* and *how* to incorporate them into a comprehensive intervention plan. With careful consideration of these variables, escape extinction procedures can be both an efficient and effective treatment component for remediating feeding difficulties when other treatment methods prove ineffective or inefficient.

Escape extinction procedures for feeding problems typically involve repeated exposure to, and continued presentation of, non-preferred or novel foods, as well as escape prevention, and shaping consumption of target foods through differential reinforcement. Application of the escape extinction procedure occurs repeatedly (i.e., across several sessions) until the child meets a termination criterion (e.g., is independently consuming the target food). The most common application of escape extinction involves what is referred to as nonremoval of the spoon (NRS). A variation of escape extinction that has received relatively little attention in the literature (yet may seem more acceptable to parents) is nonremoval of the meal (NRM; Tarbox, Schiff, & Najdowski, 2010).

Nonremoval of the Spoon (NRS) NRS is the most experimentally evaluated escape extinction procedure in the treatment of pediatric feeding disorders. Implementation of NRS may be likened to feeding an infant as the therapist holds the feeding apparatus (e.g., spoon) directly in front of the child's mouth and deposits each bite upon the child opening their mouth. Escape from the bite presentation is prevented and no longer provided for inappropriate mealtime behavior. However, escape *is* provided in the form of brief breaks from bite presentations or termination of the meal/treatment session, contingent on the emission of a previously identified alternative behavior or behavior product (e.g., acceptance, swallowing, mouth-clean). Variables to consider before implementing NRS include the frequency and rate of bite presentations, the manner in which bites are deposited, and whether or not expelled bites will be re-presented.

Bite Presentation The number of bites presented (i.e., opportunities to accept/consume) in a single treatment session may vary with respect to both frequency and rate. The reported number of bites accepted per treatment session have ranged from 1 (Allison et al., 2012; Sharp, Jaquess, Bogard, & Morton, 2010) to 51 (Penrod et al., 2010) with a mode of 20 (Ahearn, Kerwin et al., 2001; Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996; Kerwin, Ahearn, Eicher, & Burd, 1995). In general, bites are presented as discrete trials, and in addition to being presented for a fixed number of opportunities, bites are often presented on a set schedule, regardless of the behavior emitted by the child. Schedules that have been evaluated include FT-30s (Allison et al.; Patel, Piazza, Martinez et al., 2002) and FT-45s (Riordan et al., 1984). It may also be useful to employ quasi-fixed time schedules in which bites are presented every 30 s, unless the child engages in packing (Allison et al.; Patel, Piazza, Martinez et al., 2002), or the child's rate of acceptance changes in which case the rate of presentation can be modified accordingly (Cooper et al., 1995). A maximum number of bite presentations per session should be based on the average number of bites the child has been observed to consume consistently while eating their preferred foods (if relevant) so as to avoid presenting an excessive number of bites and ensure satiation is not affecting rates of acceptance or inappropriate mealtime behavior.

Bite Insertion The manner in which bites are deposited into the child's mouth varies across studies that have evaluated NRS. In some cases, bites have been inserted at any time the child's mouth was sufficiently open – including yawning, crying, and accepting the bite (Anderson & McMillan, 2001; Hoch, Babbitt, Coe, Krell, & Hackbert, 1994; LaRue et al., 2011). In other cases, the bite was held in close proximity to the child's mouth (e.g., within 1 in.), until the child opened to accept the bite independent of physical or partial physical prompting (Ahearn, 2002; Coe et al., 1997; Hoch et al., 1994). The frequency with which the child is exposed to the target food may depend on the manner in which bites are deposited during NRS. For example, if the bite is held in front of the child's lips until she/he accepts the bite, there could be fewer opportunities for the child to taste and subsequently consume the bite as compared to an NRS procedure in which bites are inserted at any opportune time. However, consideration should be given to any problem behaviors emitted by the child when making this selection. For example, children who engage in active inappropriate mealtime behavior (e.g., aggression, self-injury, operant vomiting) might be less likely to emit said behaviors when bites are deposited only when they independently open their mouth to accept.

Re-presentation of Expelled Bites Re-presentation is a treatment component requiring expelled bites to be scooped up and re-presented as a consequence for expulsion (Coe et al., 1997). Inclusion of this component might depend largely on the idiosyncrasies of the child's behaviors during the application of extinction-based feeding procedures. Prior to including this procedure, it is recommended that an assessment of the child's eating skills be conducted to ensure the presented texture can be consumed safely. This might include assessments conducted by a speech and language pathologist to rule out any physiological abnormalities or skill deficits, followed by the type versus texture assessment referred to earlier in this chapter (Munk & Repp, 1994) as previous research has reported texture can affect the rate of expulsion (Patel, Piazza, Santana, et al., 2002), in which case texture fading would also be required as part of the child's treatment package as opposed to re-presentation.

Nonremoval of the Meal (NRM) Some children will not require an intrusive trial-based procedure like NRS. Furthermore, caregivers might not feel comfortable consenting to NRS with their child. Older children, for example, who can feed themselves and who do not engage in persistent expulsion, might respond to less intrusive variations of escape extinction – specifically nonremoval of the meal (NRM). Much like NRS, NRM provides repeated exposure to and prevents escape from non-preferred food while reinforcing an alternative behavior. This procedure differs from NRS in regard to the frequency of food presentation; the food or bite is presented as a meal, and the entire mealtime situation is terminated following the emission of the alternative behavior (Tarbox et al., 2010). NRM closely resembles a common mealtime contingency enforced by parents who require their child to clear their plate before being excused from the table; however more research is needed to substantiate the effectiveness of this procedure. When selecting this method of escape extinction, special consideration should be given to the volume of food presented. Furthermore, NRM may be implemented in conjunction with bolus and volume fading (Hoch et al., 2001) to increase the likelihood that the child will contact reinforcement.

Considerations for the Use of Escape Extinction

The use of extinction-based procedures can often complement treatment packages including antecedent- and reinforcement-based interventions; however, not every child will respond favorably to escape extinction even when implemented as part of a treatment package. Moreover, caregivers must be comfortable with the procedure; otherwise, treatment integrity and generalization of treatment effects are likely to be compromised.

Extinction-based procedures have been documented to evoke what Ahearn (2002) describes as interfering corollary behaviors including negative vocalizations, disruption of the bite presentation, and self-injurious behavior. Whereas the occurrence of such behavior typically decreases in frequency and duration as compliance increases, it can be distressing for both the child and parent. The likelihood and range in severity of emotional responses, as well as the potential for extinction bursts, should be explained to caregivers prior to intervening so that their consent to implement such an intervention is fully informed. This is especially important, as the application of extinction must be consistent to avoid unintentional intermittent reinforcement. A single instance of reinforcement for a previously extinguished behavior may make it difficult for the child to discriminate whether reinforcement will continue to be available in the future, contributing to a resistance to extinction (i.e., strengthening the problem behavior against extinction in the future; Cooper et al., 2007, p. 463–465). If there are concerns about whether procedures would be implemented with fidelity, it might be more efficacious to postpone using extinction-based procedures, or exclude them altogether, until additional training produces the high treatment fidelity necessary for such treatments to be successful.

Parent Training

Parent training is a critical component in the success of a feeding intervention especially considering caregivers will ultimately be the ones presenting meals and feeding their child following the identification and, often, implementation of effective treatments. Although it is often the case that parents are not used as the initial behavior-change agents during intervention, their training is crucial in the continued success of their child's progress following treatment.

Some research has incorporated caregivers within the assessment process by having them serve as therapists when conducting functional analysis of inappropriate mealtime behavior (e.g., Najdowski et al., 2008). One advantage to having caregivers serve as therapists during the assessment process is that they are the primary individuals that serve as feeders within the home and have acquired the most history with respect to the feeding process relative to a novel therapist in the clinic. However, research has yet to be conducted on examining the differences in outcomes between caregiver-conducted and therapist-conducted functional analyses with respect to inappropriate mealtime behavior, so it remains tentative on whether starting with caregivers as feeders produces better outcomes. Given the published literature on functional analysis of inappropriate mealtime behavior producing clear outcomes across studies thus far, the presence of a caregiver or a therapist currently seems unsupported. In addition, given that most individuals engage in inappropriate mealtime behavior as a function to terminate the bite requirement, it is likely that it does not matter in terms of who is presenting the non-preferred food during sessions.

One of the most empirically researched procedures on improving parent-implemented interventions is behavioral skills training (BST; e.g., Marcus, Swanson, & Vollmer, 2001). BST is a treatment package in which instructions, modeling, rehearsal or role-play, as well as feedback are implemented to increase treatment integrity. Sometimes these components are implemented as a package (e.g., Seiverling, Williams, Sturmey, & Hart, 2012), whereas other times the components are implemented one at a time to determine the necessary resources for training caregivers to implement intervention (e.g., Mueller et al., 2004). However, parent and child behavior is not always measured and reported together regardless of method used to increase caregiver skills. For example, Mueller et al. measured parent implementation of differential reinforcement with nonremoval of the spoon or noncontingent reinforcement with nonremoval of the spoon procedures, yet to what extent the caregiver's level of implementation and treatment integrity impacted their child's behavior remains unknown because child behavior was not reported. Conversely, Anderson and McMillan (2001) measured and displayed child behavior (i.e., acceptance and inappropriate mealtime behavior) and demonstrated a therapeutic effect of differential reinforcement with nonremoval of the spoon on child behavior when caregivers implemented the intervention, yet the caregiver's implementation was not reported. Fluctuations on a session-by-session basis when both caregiver and child behaviors are measured and depicted can allow for careful scrutiny over what treatment variables are influencing child behavior and vice versa. For example, parents might not need to implement all of the treatment components for cases in which it is demonstrated that parents have poor treatment fidelity, yet consumption persists and inappropriate mealtime behavior remains low. However, additional components might be warranted even if a caregiver is implementing the protocol perfectly, yet their child's acceptance, consumption, problem behavior, or other targeted responses do not improve. Thus, measuring both parent and child behavior and analyzing their patterns together could serve as important stimuli in guiding the decision-making process when implementing behavioral interventions to address feeding problems.

Little work has been conducted examining caregiver or child preferences for treatments. One notable study conducted by Ahearn et al. (1996) compared physical guidance and a nonremoval of the spoon to treat food refusal in three children using an alternating treatments design. The experimenters showed both treatments resulted in similar increases in acceptance and decreases in expulsion. However, the physical guidance treatment was correlated with slightly lower levels of problem behavior than the nonremoval of the spoon procedure. When caregivers viewed graphs and video of sessions and were provided with a session-by-session description of their child's progress, they reported a preference for the physical guidance over the nonremoval of the spoon procedure. Ahearn et al. provided self-report statements from caregivers that implied caregiver preference for treatment might be influenced by the efficiency and effectiveness of the preferred intervention. Future work in caregiver and child preferences for different types of feeding treatments remains imperative as behavioral feeding procedures are disseminated to other fields and become selected for based on their perceived acceptability.

Conducting sessions via telehealth (e.g., Barretto, Wacker, Harding, Lee, & Berg, 2006) seems to be a cost-effective method in which specialized behavioral services can be implemented in the child's natural environment and when families live in remote areas relative to where those services are housed. One advantage of this training option is that caregivers serve as feeders in their home, where the child's meals typically take place. However, safety precautions prior to conducting clinical treatments via telehealth should be taken into consideration. Thus, currently this method of conducting sessions might be most useful as follow-up after initial treatments have already been validated and caregivers have been thoroughly trained as little research has been conducted on the types of feeding problems that might be addressed in this manner. For example, Peterson, Volkert, and Zeleny (2015) conducted sessions via telehealth with caregivers as therapists with one participant's sessions to increase self-feeding following a previous intervention to increase consumption. In another study, Wilkins et al. (2014) taught a child to close her mouth around a spoon using a three-step prompting procedure via telehealth as a follow-up procedure after an inpatient clinical evaluation of those procedures. Thus, future research remains warranted in evaluating the components needed to assess for the prerequisite skills necessary to conduct protocols with high fidelity and increase those skills if they are not sufficient via telehealth while ensuring the safety of the children undergoing those protocols.

Programming for Generalization and Maintenance

Programming for generalization and maintenance is paramount to the success of any of the aforementioned interventions. Although measures of generalization and maintenance have not been commonly reported in the feeding literature, a number of study characteristics have been identified that are commensurate with strategies for promoting generalization and maintenance, including *reinforcing instances of generalization* (e.g., Anderson & McMillan, 2001; Cooper et al., 1995; Galensky, Miltenberger, Stricker, & Garlinghouse, 2001), *training skills that contact natural contingencies* (e.g., Galensky et al., 2001; Najdowski et al., 2003), *incorporating a variety of relevant stimulus situations in training* (e.g., Hoch et al., 2001; LaRue et al., 2011), and *incorporating common stimuli* (e.g., Najdowski et al.; Mueller et al., 2004).

In a notable study, Najdowski et al. (2010) specifically measured generalization and maintenance of participants' consumption following a treatment evaluation in which parents served as the primary behavior-change agents in their own homes. Results indicated that caregivers trained to implement a treatment package consisting of demand fading, differential reinforcement, and NRS successfully increased their child's consumption of both foods targeted during the intervention as well as untrained foods. Further, the schedule and magnitude of reinforcement were systematically thinned to mirror more natural contingencies of reinforcement, and behavior change was maintained over time. Some notable features of this study that map onto recommended strategies for the promotion of generalization and maintenance include *reinforcing instances of* *generalization* (providing training in the target situation and teaching parenting skills in the home), *training skills that contact natural contingencies* (systematically thinning the magnitude and schedule of reinforcement), and *incorporating common stimuli* (using parents as the primary behavior-change agents and foods regularly prepared at home).

When the provision of treatment cannot be carried out in the child's home (e.g., inpatient treatment), generalization strategies must be specifically incorporated into the treatment plan. Such strategies may include selecting foods to target what the child is likely to encounter in their natural environment and training skills likely to contact natural contingencies of reinforcement such as targeting snacks commonly provided at the child's school or focusing on age-appropriate purees for children who are selective with respect to the texture of foods (e.g., transitioning from jarred baby food to age-appropriate purees [yogurt, applesauce, mashed potatoes, etc.]). Attention should be given to contingencies in the natural environment that may need to be modified; for example, family members may need to be trained to not make negative comments about food or provide attention for inappropriate mealtime behaviors.

Consideration should also be given to the number of foods (exemplars) targeted. The number of foods targeted during a single treatment session has varied widely in the literature from a single food (Bachmeyer et al., 2009; Freeman & Piazza, 1998) to as many as three to five different foods (Hoch et al., 1994, 2001; LaRue et al., 2011). The total number of foods targeted during the span of treatment may be directly related to the likelihood of generalization as well as caregiver independence with treatment implementation. Findings from Ahearn (2002) suggest that selecting a single target food to present during sessions may increase the speed with which independent consumption of the food occurs, whereas selecting and presenting multiple foods may lead to more efficient rates of generalization. The child's generalization of previously acquired skills should also be considered in terms of the number of exemplars needed for response generalization. The nature of the child's feeding disorder could also serve as a factor in the decision to target a single food versus multiple foods. For example, if a child is engaging in total food refusal, it might be beneficial to establish consumption of a single food as an initial treatment goal to increase oral intake, whereas a child with several foods already included in their diet (albeit within restricted food categories) might benefit from more effective generalization programming.

Incorporating stimuli from the natural environment into the treatment setting may also promote generalization. For example, asking parents to bring their child's favorite plate and utensils, targeting foods parents bring from home, and arranging the treatment setting to resemble the mealtime setting at home as closely as possible. Lastly, stimuli from the treatment setting might also be incorporated in the child's natural environment (e.g., visual timers, mealtime rules), and in some situations self-generated mediators may be incorporated into the child's natural environment; for instance, if a child learned to pace their eating using a vibrating pager, the vibrating pager can transition with the child back to the mealtime setting at home.

Treatment Considerations and Recommendations

This chapter has reviewed several treatment options to remediate feeding disorders, including reinforcement-based interventions, antecedent interventions, interventions to address skill deficits, and escape extinction. We have also described assessment methods that can be used to inform the selection of variations within each of these treatment categories as well as other contextual factors that should be considered when designing an intervention. Some additional considerations germane to each of the aforementioned treatments are discussed below, namely, identification of target foods, identification of target behaviors, and the frequency and duration of treatment sessions.

Identifying Target Foods

When designing an intervention, target foods should be selected in consultation with caregivers. Including caregivers in this decision could increase caregiver compliance with treatment, as well as increase the likelihood that foods included in treatment will continue to be presented in the child's home environment following termination of the intervention. It might also be beneficial to collect several days of data regarding the child's existing diet, as initial target foods that more closely resemble the existing diet could increase the likelihood of success. Further, assessing the child's preference for foods caregivers would like to target in treatment may reveal some foods to be more preferred than initially reported by caregivers. Data collection could reveal that high rates of acceptance are occurring with foods that also have a low rate of presentation. Therefore, training caregivers to increase the presentation of certain foods might benefit the child in the absence of direct intervention. Measures of preference (approach responses, interaction with the foods presented [smelling, licking, etc.]) may also be used to identify relative preferences of non-preferred foods, from most to least disliked. Selecting those non-preferred foods that are the least aversive may be advantageous, though this remains an empirical question as previously noted.

In addition to caregiver preference for target foods, the types and textures should vary with respect to the child's dietary needs, restrictions, and oral motor skill set. For example, a child who consumes several fruits but no vegetables would benefit from targeting vegetables specifically. Continuing, special diets and food allergies may in contrast preclude interventions with specific types of foods. Lastly, children with structural abnormalities or delayed oral motor skills, specifically immature chewing and swallowing patterns, require intervention with less advanced textures (e.g., pureed or ground) while learning to chew and swallow, with the ultimate goal being to advance to tabletop textures or the texture deemed appropriate, which will be specific to each child.

Identifying Target Behaviors to Strengthen Through Differential Reinforcement

Differential reinforcement is typically provided both for *acceptance* and the behavior product of consumption, *mouth-clean*. Consideration should be given to the child's existing skill set and history of inappropriate mealtime behavior when selecting appropriate alternatives to refusal. For example, a child with a long history, absent of oral acceptance, might benefit from reinforcement of acceptance initially as opposed to mouth-clean, so as to bring the child into contact with reinforcement more consistently and efficiently. Regardless of the behavior selected to replace inappropriate mealtime behavior, the operational definition should reference with clarity the required volume, latency, and level of independence necessary to occasion reinforcement.

A reinforcement contingency for acceptance has been cited most frequently in the literature; however, the way in which *acceptance* has been operationally defined varies across publications. The most frequently reported definition of acceptance appears to have initially been provided by Hoch et al. (1994), "...only those instances in which the [participant] opened his mouth such that the food was deposited within 5 seconds of instructing him to do so…" (p. 110). It should be noted that reinforcement based on this definition has been documented to increase the persistent expulsion of target foods (Coe et al., 1997). Observed increases are possibly related to the provision of reinforcement prior to the emission of the terminal link in the behavior chain of consumption. In some studies, researchers have reinforced both *acceptance and retention* (Riordan et al., 1984) or have transitioned from reinforcement of *acceptance* to *swallowing* (Coe et al.). Continuing, bite re-presentation has been demonstrated to be an effective treatment component for addressing persistent expulsions that have resulted from reinforcement of acceptance alone (Coe et al.). In contrast, several studies have documented that the reinforcement of acceptance alone produces consumption

(Ahearn, 2002; Ahearn, Kerwin, et al., 2001; Cooper et al., 1995; Vaz et al., 2011). Thus, the child's learning history with each of the required behaviors in the behavior chain (e.g., accepting, retaining, chewing, swallowing) should be considered when selecting an alternative response for reinforcement (Patel, Piazza, Santana, et al., 2002).

Treatment Sessions

Repeated exposure is an inherent component of all feeding interventions, but particularly extinction-based feeding procedures. Multiple sessions are required over a period of time so that a sufficient number of learning opportunities occur to disrupt the preexisting contingency of escape from the non-preferred or novel foods being presented and establish a history of reinforcement for acceptance and consumption. The number of treatment sessions required will vary across children based on individual characteristics and efficacy of treatment.

Frequency Sessions may be held several times each day or as little as two to three times each week. Attempting to implement procedures for feeding with a frequency less than two to three times a week will not only increase the duration of treatment considerably, but it may not be sufficient for maintaining progress. The frequency of sessions should reflect the child's age and skill set, levels of satiation (i.e., latency of most recent meal), as well as treatment model (e.g., inpatient treatment will be more intense with a more frequent schedule of sessions). Furthermore, frequency of sessions will depend on the duration of each session and should negatively correspond with increases in duration. It may be beneficial to determine a maximum duration of time for a 24-h period and then break that down into the desired number of sessions so that sufficient breaks are provided in between treatments.

Duration There are several options for defining session durations when implementing feeding procedures. Some successful interventions have terminated session regardless of progress, once a predetermined session duration was reached (Allison et al., 2012; Coe et al., 1997; McCartney, Anderson, & English, 2005). Others have used either/or criteria in which session termination was contingent on the participant either consuming a specified number of bites or the session was terminated after a maximum duration was reached (Ahearn, Kerwin, et al., 2001; Cooper et al., 1995; Freeman & Piazza, 1998), whichever occurred first. Still others required that the session continue until the bite presented just prior to the end of the session was consumed. For example, Cooper et al. (1995) had a maximum duration of 20 min per session for two participants. Refusal to consume the bite presented just prior to the culmination of the session duration resulted in the continued presentation of that bite, regardless of the effects on duration of treatment, until consumption occurred. Following consumption of that particular bite, the session was terminated. The shortest and longest durations identified in the literature range from 5 min (Allison et al., 2012; Patel et al., 2002) to 60 min (Coe et al.; Patel et al., 2006). It should be noted that while session duration is best predetermined, in practice these durations can be altered throughout the course of treatment to suit the particular child's needs and progression of treatment, and the same is true of session frequency.

Concluding Remarks

When designing interventions to address feeding difficulties, the initial use of antecedent interventions and less intrusive consequence-based interventions is recommended. This is due to the ease with which such interventions might be faded, the ethical preference for least intrusive means of remediation, as well as the decreased likelihood of corollary problem behavior. That said, escape extinction remains the most empirically supported intervention for feeding disorders and thus should not be ruled out in spite of a myriad of factors to consider when designing a treatment package that includes an escape extinction component.

As previously noted, it can be difficult to determine when and when not to use particular interventions given the limited number of studies that have provided information on how contextual variables and participant characteristics may be correlated with positive (or negative) treatment outcomes (Silbaugh et al., 2016). However, using functional analysis logic, we can make informed treatment selections by conducting pretreatment assessments in which we quickly compare variations of treatment to determine differential effectiveness. Additionally, we should also consider parental preference and aptitude for implementing certain interventions. For example, a caregiver who has a long history of parental mismanagement (e.g., using bribery or threats as opposed to contingent reinforcement) may be more successful implementing noncontingent reinforcement as opposed to differential reinforcement. In short, practitioners should use all of the information at hand to determine the best treatment options, including relevant information from other disciplines that can be extremely informative when making decisions. This includes appropriate foods to target that are both safe for the child to consume and beneficial in terms of meeting nutritional requirements as well as the selection of the most appropriate utensils and cups to facilitate oral motor skill development. Provision of treatment in the context of a multidisciplinary team is ideal, and for those practitioners working outside of a multidisciplinary team, we recommend consultation with professionals from relevant disciplines to ensure the best possible care.

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Toilet Training: Behavioral and Medical Considerations

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Contents

Toilet Training: Behavioral and Medical Considerations

Toilet training is an area of human development where the research has not kept pace with the abundance of popular-culture information produced. This is for good reason; the vast majority of children learn this skill at some point without clinical intervention, largely negating the need for research. There is limited evidence to suggest that this might change. Despite the abundance of information related to toilet training, there is no universal data driven support for any one method nor has expert consensus established operational definitions such as toileting, toileting success, and toileting failure (Klassen et al., 2006; Kroeger & Sorensen-Burnworth, 2009). This limits efficacy based research as key metrics are not well defined; how many voidings constitute successful toileting and how many constitute failed toileting (Vermandel, Van Kampen, Van Gorp, & Wyndaele, 2008).

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Limits in expert consensus or even operational definitions have not hampered the teaching of toileting skills. Yet there are important challenges to the practical application of toileting information. Most families in developed countries agree that toileting is voiding in a commode and achieved when the learner voids independently although, those in developing countries agree that volitional control is the end point. Important differences like this have relevance on practical application such as when a learner is started in training or what is considered developmentally appropriate for the learner. Interestingly, several researchers suggest that when parents are searching for information regarding toilet training, they will seek advice from friends and family members, whereas professionals seek advice from books and research (Ritblatt, Obegi, Hammons, Ganger, & Ganger, 2003). Related to this, Schum et al. (2001), cautions that most toileting based information and advice is derived from theory and common experience rather than resulting from scientific knowledge. This calls attention to the difficulties families and clinicians have sorting through an abundance of information, as it is difficult to compare scientific studies or determine what is high quality evidenced based research.

What is agreed upon is that toileting competence is an important milestone in an individual's physical, emotional, and social development (Stadtler, Gorski, & Brazelton, 1999). Failure to learn successful continence affects daily functioning including the ability to live independently, to be included in community activities, and increases the risk of abuse (Cicero & Pfadt, 2002). Learning to maintain continence eases the need to purchase diapers, provides an opportunity for the individual to communicate about physical needs, and decreases hygiene risks associated with diaper use (Simon & Thompson, 2006). Furthermore, it is a skill that is routinely followed by pediatricians at wellness checkup since delaying toilet training increases the risk of the individual developing infection or lower urinary tract dysfunction (Barone, Jasutkar, & Schneider, 2009). In addition to the individual's risk of infection, family and community members are also at risk for communicable infections from the presence of feces (Miura, Watanabe, Takemoto, & Fukushi, 2016).

Researchers have studied toilet training and offer insight into the relevant factors related to the development of this skill. Yet there is variability for all learners of this skill for example, several researchers have studied when toilet training should start and found that accepted norms for toilet training is related more too cultural differences than scientific evidence (Kiddoo, 2012). Similarly, research as to the type of training to be used found that the type is influenced by social, economic, educational, and cultural considerations within the family (Brazelton et al., 1999). Thus, parents are unclear about teaching toileting or even when to initiate toilet training (Vermandel et al., 2008) however; researchers have demonstrated that the ideal age to initiate toilet training is unique to each individual and the family (Brazelton et al., 1999; Kiddoo, 2012). Since the variables to learning toileting skills are unique to each learner it is important to account for the relevant factors related to learning this skill, i.e., the behavioral and medical considerations related to toilet training.

Theories of Toilet Training

All individuals require training in order to acquire toileting skills and the method of training differs by individual. In 2006, Klassen and colleagues published an evidence-based report on toilet training for the Agency for Healthcare Research and Quality (AHRQ). Their objective was to evaluate the effectiveness of various toilet-training methods and the factors related to successful toileting. The AHRQ report was the first published systematic review of toilet training; unfortunately, meta-analysis and direct comparisons of the various toilet-training methods were not possible due to critical design differences. In the AHRQ report, four distinct toilet training methods were identified (Klassen et al., 2006). They were the child-centered methods of Brazelton (1962) and Spock (1946) and the parent-centered methods of Azrin and Foxx/Foxx and Azrin (1971, 1973, 1974) and the Early Elimination/Elimination Communication methods. Both the Brazelton and the Dr. Spock methods are designed to train typically developing children of about 2-years of age who demonstrate physiological and or psychological readiness. Brazelton posited that readiness was a vital part of training and that lasting problems can occur from poor experiences with toilet training. The focus on the parent-centered methods by Azrin and Foxx is on autonomous toileting.

The first three methods are expert derived training methods based on experience, practice, and research, while the final method, Early Elimination/Elimination Communication, is derived from cultural practices of countries with limited resources. Generally, these types of training are often categorized as child-centered or parent-centered approaches however; current person-centered norms suggest a need to identify these methods as "learner"-centered or "trainer"-centered approaches as adolescents or adults maybe learning these skills and other individuals maybe training these skills. Below is a brief description of each of these four district methods divided by the orientational focus on learner or trainer, aka child and parent, respectively.

Learner-Oriented Toilet Training Methods

The Brazelton Toilet Training Method

This learner-oriented approach is most associated with the work of pediatrician T. Berry Brazelton. The idea behind this method is that learning to use the toilet is an important developmental task where learner readiness best ensures mastery of toileting skills. Training starts when the learner is "ready" and progresses slowly to promote a negativity-free experience. Readiness on the part of the learner includes both physical and emotional maturation (Brazelton, 1962). Physically, the learner must possess some voluntary control over the sphincter as well as specific motor development (e.g., walking, have some autonomy regarding getting on and off the toilet, etc.). The main psychological readiness sign emphasized by Brazelton is impulse control. He argued that the motivation for this control is also influenced by the desire to please caregivers and to be like them, as well as the desire to achieve autonomy. Further, the learner must be able to understand some verbal instructions in order to follow the sequence of actions necessary for successful toilet use (Brazelton).

Training based on this method typically begins around 18 months of age, the average age of emergence of requisite readiness skills. Specifically, by this time voluntary control over bowel and bladder typically has emerged around 9 months, development of necessary motor skills such as walking begins to emerge around 18 months, and the learner's capacity to understand and follow directions related to training begins to occur between 18 and 24 months. In Brazelton's original study the average age at completion of daytime toilet training was 28.5 months, and the average age of all training was 33.3 months (Brazelton, 1962). The focus of learner-centered training is "autonomous achievement" by the learner, and Brazelton recommended that negativity be minimized, as a learner-oriented training may help individuals to avoid any negative emotions related to toileting challenges. This training denoted a shift away from earlier and more structure methods by focusing on physiological and psychological maturational processes, i.e., readiness, that must be present prior to training. By acknowledging that training should not commence until these prerequisite skills have been met, the trainer focuses more on the learner's abilities and allows for a more gradual training approach.

The Spock Toilet Training Method

The Spock Toilet Training Method is also a learner-centered toilet training method and is designed to train without force. This approach is based on pediatrician Benjamin Spock's (1946) book, *The Common Sense Book of Baby and Child Care*. In this method, training for most children begins at about 24–30 months and the goal is to provide optimal learning, which occurs when the learner is ready and trained without force. Here learning occurs later than the Brazelton method but has a similar objective: the training process is made relaxed and pleasant to avoid power struggles and negative emotions. Toileting is presented as a straightforward matter-of-fact/fact-of-life task that is not dirty, shameful, secretive, or mysterious. Training begins when the learner decides to gain control over bowel and bladder; the trainer must be patient and trust the learner's decision to learn. Once training begins, the trainer encourages and reinforces the learner, while avoiding criticism and anger if there is refusal or accidents (Spock).

Trainer-Centered Toilet Training Methods

Azrin and Foxx Toilet Training in Less Than a Day Method

The Azrin and Foxx "Toilet Training in Less Than a Day" method (1974) is designed to teach toileting without reminders or assistance. This is an operant learning method based on Drs. Azrin and Foxx's research with the toilet training of 34 institutionalized adults with intellectual disability (Azrin & Foxx, 1971). Later research with typically developing learners replicated the original findings with toilet training learned in an average of 3.9 h and has been successfully adapted for bowel control (Foxx & Azrin, 1973). This method is the most commonly researched protocol of all the toilet training methods (Polaha, Warzak, & Dittmer-McMahon, 2002).

Training begins at about 20 months of age and starts with an assessment of physiological readiness, which includes bladder control, physical development, and ability to follow instructions. The learner must have bladder control including the ability to empty the bladder fully without dribbling, and to stay dry for several hours. The learner must appear to be aware of the urge to urinate and communicate the urge verbally or behaviorally (e.g., facial expression or posture changes). The learner must be able to walk independently, pick up objects easily, and follow instructions (e.g., point to body parts, imitate simple tasks, or place one object inside another; Azrin & Foxx, 1974). This training method also includes a pre-training component, training supplies, and a particular training setup. Important to this training protocol are both positive reinforcement and punishment. Positive reinforcement is given in the form of verbal and edible praise for toileting behaviors. Punishment is used when accidents occur. Here a verbal reprimand is given, reinforcement is absent, and the learner preforms ten "positive practice" training repetitions. A verbal reprimand includes a statement of the fact (e.g., "You wet your pants," "your pants are wet,") and a statement of why the trainer is displeased (e.g., "Wetting is bad," "Mommy doesn't like wet pants"; Azrin & Foxx). An example of positive practice includes the learner observing a doll, capable of simulating urination, use the potty chair to urinate. Once the doll urinates, the learner will manually guide the doll through the toileting process of emptying the removable reservoir into the toilet, flushing, and returning the pot to the chair (Klassen et al., 2006). Additional researchers evaluating modified versions of this protocol have reported a substantial degree of success using this protocol (Ardic & Cavkaytar, 2014; Butler, 1976; Hanney, Jostad, LeBlanc, Carr, & Castile, 2012; Kroeger & Sorensen, 2010; LeBlanc, Carr, Crossett, Bennett, & Detweiler, 2005; Matson & Ollendick, 1977).

Early Elimination/Elimination Communication Toilet Training Method

The Early Elimination Toilet Training Method is also an operant learning trainer-centered method. It is designed to promote infant control of elimination by the age of 1 year. This method is distinct from the other methods in that volitional control is the endpoint and not functional independence as with the other methods. Independence would not be a reasonable goal due to the infant's limited neuromuscular development. Use of this method is typical in developing nations such as

China, Africa, India, and South and Central America (Vermandel et al., 2008). In North America, this method is commonly related to Elimination Communication. Choby and George (2008) note that this method has been developing an appeal in the United States since 2005. Proponents of this method cite the medical benefit of reduced or eliminated diaper rash and later in life urinary tract infections, financial benefits from no longer buying disposable undergarments, and ecological benefits of reduced energy consumption from washing as well as less, nonbiodegradable, disposable diapers in landfills (Kelley, 2005).

Training begins at birth with the trainer learning to identify the elimination patterns of the infant via body movement, muscle tension, facial gestures, and noises, e.g. grunts and cries. After elimination patterns are identified, at 2–3 weeks of age, the trainer will simultaneously begin training bowel and bladder control. Initially, the trainer will assume all responsibility by identifying the elimination patterns and placing the infant in the voiding position. In North America, the infant is placed over a sink, toilet, or potty-chair. In developing nations, the typical location for voiding is anywhere in the immediate area but outside of the home. If elimination occurs, then the infant is reinforced with feeding, physical comfort, or pleasurable activity. If no elimination occurs, then the infant is returned to his or her previous activity. Similar to the Dr. Spock method, infant toileting is not regarded as private or unclean therefore while the infant voids, social activity carries on. When accidents occur, a caregiver cleans the infant immediately and without comment. By 1 year, the infant is expected to eliminate away from all living areas: accidents that do occur in the living area are first given a warning, and later accidents are followed by a physical punishment (Klassen et al., 2006).

Toilet Training Comparison Table

Presented below is a comparison table and accompanying protocols (Tables 1 and 2).

Readiness Factors

Learner Readiness

In 2016, the American Academy of Pediatrics (AAP) published a guide to toilet training that outlined particular readiness factors and the ages at which they usually emerge. According to these guidelines, physical, cognitive, motor, emotional, and verbal skills are necessary to learning toilet skills. Specifically, the physiological and motor skill associated with the awareness of the need to eliminate and the motor milestone of walking typically emerges between 12 and 18 months of age. Followed by the ability for brief control of sphincter muscles, begins to develop around 18 months, and the skills necessary to manipulate clothing, around 24–36 months. Lastly, the maturation of the digestive system (and subsequently fewer toileting accidents) develop at 3 years and older (American Academy of Pediatrics, 2016).

Milestones in cognitive and verbal development are also relevant to training. Between birth and 12 month infants, begin to understand the relation between cause and effect. By 12–18 months, toddlers start to relate the feeling associated with the need to eliminate with the act of elimination. Verbal abilities also begin to emerge around this age. Goal-oriented behavior necessary for toilet training become more developed between 18 and 24 months, as does the ability to understand language and instructions. The AAP also mentions the role of improved memory at this age. By 36 months of age, children have an enhanced ability to focus and follow through on tasks without becoming sidetracked, which aids in their ability to complete the toileting process (American Academy of Pediatrics, 2016).

Finally, emotional and social factors have been posited as relevant to successful training. Young infants begin to enjoy social praise, and after 12 months, their ability to mimic the behavior of others improves. At 18–24 months, toddlers begin to desire “self-mastery” and further develop the desire to receive praise and appreciation from their parents. Toddlers age 24–36 are more internally motivated by competency and autonomy, and by 36 months become more moti-

Table 1 Toilet training comparisons

Method	Learner-centered toilet training		Trainer-centered toilet training	
	Brazelton	Spock	Azrin and Foxx	Early elimination/ elimination communication
Features	Prevent problems for learner	Relaxed and pleasant with fewer power struggles	Toilet without reminders or assistance	Controlled elimination
	Learning control	Toileting is a straight forward fact of life		Competence in communicating the need to void and assuming position to void by 4–5 months
	Proper timing	Toileting is not dirty, shameful, secret, or mysterious		When able to walk, learner is expected to independently eliminate away from the living areas
	Training slowly	Avoid negative comments to avoid learner feeling criticized		
	Allow for periods of negativity			
	If challenges, stop and reassure, but wait till ready			
Goal	Readiness	Train without force	Autonomous toileting	Early controlled elimination
Age of learner	Around 18 months	Around 24–30 months	Around 20 months	Around 2–3 weeks
Duration of training	About 9 months	About 9 months	About 4 h	About 4–6 months
Learner physiological readiness skills	Able to sit and walk	N/A	Walks without assistance	N/A
	Understand some verbal commands		External sphincter control	
	External sphincter control		Can follow 10 instructions	
			Picks up objects easily	
			Can urinate all at once (not dribbling)	
			Stay dry for several hours	
			Appears to know when they are about to void	
Learner psychological readiness skills	Desire to develop autonomy and self-mastery	Desires to gain control of bowel and bladder	N/A	N/A
	Feels secure with parent figures and desire to please them			
	A wish to identify with and imitate important role-models			

(continued)

Table 1 (continued)

Method	Learner-centered toilet training		Trainer-centered toilet training	
	Brazelton	Spock	Azrin and Foxx	Early elimination/ elimination communication
Trainer readiness	Ready to deal with outside pressures and anxieties Aiming for a relaxed pressure free approach	Must trust the learner's desire to learn continence	N/A	Parent senses the learner needs to eliminate by movements, muscle tension, and vocalizations Regards elimination as not private or unclean
Reinforcement/ punishment method	Positive reinforcement	Positive reinforcement	Positive reinforcement Positive punishment (verbal reprimand) Negative punishment (withhold praise or preferred items/ activities)	Positive reinforcement Positive punishment
Modeling by other	No	Yes	No	Yes
Empty diaper in toilet	Yes	No	Yes	N/A
Address accidents diurnal/nocturnal	Later, if not spontaneous during day training	No	Yes	Yes
Separate bowel and bladder training	Yes, for males	No	Yes	No

vated by peer approval (American Academy of Pediatrics, 2016).

Many of the specific readiness signs and associated age ranges described by the AAP are also consistent with those suggested by Brazelton (1962), Azrin and Foxx (1974), and other researchers. In studies review by Berk and Friman (1990), there was some evidence that prior to 18 months of age, children are not able to delay urination, and that they may not be able to delay for long periods of time until later ages. The age at which children begin to report the need to urinate was estimated to be around 24 months. Other researchers have investigated more specific readiness abilities. For example, Schum et al. (2002) considered readiness factors such as; "understands potty words, shows an interest, tells during or after having a bowel movement, stays dry for two hours, and indicates a physical need to go." Kaerts, Van Hal, Vermandel, and Wyndaele (2012) described similar signs often discussed in the literature, such as the ability to imitate behavior, sit independently, pick up small objects, control sphincter muscles, understand and respond to directions, understand potty words, and shows interest in toilet training, among others.

Overall, the AAP estimates that, on average, children in the United States usually become toilet trained between 24 and 36 months. As previously mentioned, the average age at daytime toilet training found by Brazelton (1962) was 27.7 months, which is consistent with Bloom, Seeley, Ritchey, and McGuide' (1993) finding of 28 months. Although the age at which different readiness skills are achieved varies from child to child, there seems to be a consensus that certain physiological and psychological milestones are important precursors to toilet training.

Table 2 Protocols summaries

Summary of training protocols
Brazelton protocol
Materials: potty chair
Pre-training: N/A
Training set up: place learner's potty-chair in vicinity of the trainer's potty
Procedure:
1. Introduce learner to their potty chair
2. Pair association of learner's potty chair with trainer's commode
3. Implement daily clothed potty sits when trainer uses toilet
Praise learner during sits
4. After 1–2 weeks remove bottom clothes during sits
5. Empty diaper contents into potty demonstrating to learners where urine/feces go
6. Introduce scheduled guided potty sits throughout the day
Base this schedule upon times learners soils diaper
Praise potty use
7. After successful guided potty sits, encourage independent use by providing verbal prompts using the previous schedule to go sit on the potty
Praise compliance with sits
For males, if desired, once bowel/bladder control is demonstrated to be successful an appropriate male model should demonstrate standing to urinateAdapted from Brazelton (1962) and Brazelton et al. (1999)
Spock protocol
Materials: potty chair, step stool, hand soap (for washing hands), and preferred items available near potty
Pre-training: watches others with no expectation to imitate, teach to wash hands, teach the toileting words (potty, toilet, urine, feces, pee-pee, poo-poo, etc.)
Training set up: N/A
Procedure:
1. Learner sits on the potty fully clothed and chooses when to get up
2. Once the learner accepts the seat, suggest to use it for bowel movements like role models
3. Allow learner to leave potty chair anytime
4. Do not urge or pressure the learner if unwilling
5. Once interest is shown take the learner to the potty 2–3 times per day or when signals are present
6. Praise for being dry like role-model but do not over praise
7. When ready to be more independent, remove all lower clothing and place the potty nearby
8. Explain that the toilet can be used by self and may give occasional reminders
9. If accident, show how to put in the potty and explain this is where they should void
Do not flush while the learner is watching
Put the learner back in diapers
Do not scold the learner
Once control is achieved teach wiping Adapted from Spock (1946)
Azrin and Foxx protocol
Materials: potty chair, preferred items including snacks, doll model that wets, list of persons (real or fictional) the learner admires, at least 8 pairs of training pants, clothing that will not interfere with training pants and toileting, and training reminder sheet
Pre-training: teach learner to assist in his/her own dressing and undressing, model toileting and explain the steps, teach the toileting words, and teach compliance when given instructions
Training set up: conduct training in one room and remove any distracting items
Procedure:
1. Learner wears regular underpants
2. Tell learner how happy (role-model) will be that the learner is learning to use the potty and to keep pants dry

(continued)

Table 2 (continued)

3. Take learner to bathroom in intervals
4. Only give reinforcement for correct toileting skills
5. Do not reinforce non-toileting acts
6. For accidents, deliver verbal reprimand, omit reinforcement, have learner change wet clothes by self, and deliver positive practice
7. Use doll that wets to imitate the processes of toileting
8. Teach specific steps; manually guide learner, then learner guides the doll through the steps
9. When doll urinates in potty, learner will empty potty into the toilet, flush and return the potty to the chair
10. Once this is learned begin training learner
11. Teach to check for dry pants
12. Reward/praise dry pants
13. Check pants every 3–5 min using a training reminder sheet
14. Give as much to drink as desired to create an urge to urinate
15. Every 15 min learner walks to potty, lower pants, sit down for 10 min, stand up, and raise pants
If urination begins, then praise/reward immediately
Learner wipes self and empties potty
16. Decrease frequency of potty visits as learner acquires skill
17. Learner and parent check for "dry pants" every 5 min
18. Gradually change from directing "go potty" to asking "go potty?" to "are your pants dry?"
19. As steps are successful, only reinforce at the end of the routine
20. Fade to praising only dry pants
21. Do checks at meals, naps, bedtimes, and praise dry pants
22. No reminders to toilet are given
If there is an accident, learner is reprimanded, changes by self and performs positive practice sessionsAdapted from Azrin and Foxx/Foxx and Azrin (1971, 1973, & 1974)
Early elimination communication (EEC)
Materials: none
Pre-training: none
Training set up: none
Procedure:
1. Urination and defecation are trained separately
2. Urination
a. After feeding and waking infant sits on trainer's legs facing away from trainer
b. Trainer makes "shuss" sound
c. Do frequently over 24 h
d. When successful provide reinforcement
3. Defecation
a. Infant sits on trainers feet, facing trainer, leaning on trainer's shins
b. No prompts or sounds given
c. When signaled, the trainer may gently pat the buttocks to relax the sphincter reflex
d. When successful provide reinforcement
e. When not successful return learner back to activity with minimal attention
f. At 3–5 months female family members, 5–12 years old, participate in identifying the infants signals to void and models the elimination position
i. If accident, warn first, subsequent accidents use physical punishmentAdapted from deVries and deVries (1977) and Gross-Loh, (2007)

Trainer Readiness

Trainer readiness is also a necessary factor to successful toilet training. This is especially applicable for trainers using a trainer-centered approach that requires significant trainer involvement (i.e., teaching a learner prior to interest and aptitude being evidenced; Vermandel et al., 2008). Parental readiness for North American parents is important because in despite of the increased prominence of childcare providers teaching this skill, parents and mostly mothers still play a role in training their child toileting skills (Klassen et al., 2006). Typically, the focus of readiness is on the learner and the trainer's readiness is assumed. This is not typically a problem because when toilet training goes well, the parent trainer is not met with overwhelming challenges and they are able to persist to success. Unfortunately, when challenges do occur and things do not go smoothly, readiness bears a considerable portion of the fault.

Readiness for parents is specifically related to the timing of training and the competence of the trainers. The timing of training is important and is affected by the trainers' familial and extrafamilial obligations. A significant determinant of parental readiness is determining when it is a good time in the family's life to begin training. Generally, stable and low stress periods of the family's life are ideal. It is not recommended that training begin while the family is experiencing a major life stressor such as new sibling, new home, new school, divorce, poor health, or financial stress. Likewise, readiness is influenced by the competence of the trainer. A significant determinant of parental readiness and thus competence is knowledge and confidence. Often these are assumed, however there is a great deal of information related to toilet training with little direction to help the trainer to choose a method given that there is no universal data driven support for any one method (Klassen et al., 2006; Kroeger & Sorensen-Burnworth, 2009). This leaves families susceptible to confusion and frustration from the conflicting advice of friends, relatives, and popular media (Vermandel et al., 2008).

A ready trainer will need competence and will need to feel confident in their ability to train toileting skills, as the outcome in children's growth and development is dependent on parent knowledge and confidence (Coleman & Karraker, 1998). For parents, knowledge and confidence are important determinants of their likelihood to undertake new actions, their ideas about the kinds of activities they might undertake, and their motivation to engage in new activities (Green, Walker, Hoover-Dempsey, & Sandler, 2007). Researchers have linked parental self-efficacy or confidence to child developmental outcomes (Coleman & Karraker; De Montigny & Lacharité, 2005; Jones & Prinz, 2005). Bandura (1993) reported that parents with a strong perception of self-efficacy put much effort, perseverance, and persistence into the tasks associated with parenting their children. In turn, parents who are responsive to communicative behavior, provide enriched environments, support the child's freedom for exploration, and facilitate varied mastery experiences help the development of their child's sense of self-efficacy (Bandura, 1993).

De De Montigny and Lacharité (2005) identified factors that influence parent trainer self-efficacy. In their review of the literature, they found that parent trainer's self-efficacy is affected by; (1) previous childcare experiences prior to parenting, (2) opportunities for observation and modeling of experts via parent training programs, and (3) meaningful social support with positive reinforcement. Parent trainer self-efficacy can also be diminished. Factors that disrupt parent trainer's sense of self-efficacy or confidence during toilet training include both personality traits and behaviors as well as factors related to the learner such as illness, personality trait, idiosyncratic behaviors, and disability. Gross and Fogg (2001) add that parent trainer self-efficacy can be developed by training opportunities such as providing information, verbal support, reinforcement, and vicarious learning i.e., watching others and discussing what was observed. De Montigny and Lacharité also recommended that future study should focus on enhancing parent trainer self-efficacy by providing anticipatory guidance, offering training program on parenting roles, offering opportunities to model, role-play, and practice skills.

Training Challenges

Much of the literature on toilet training assumes the learner will have typical development with only minor behavior challenges. Of course, these are not the learners mental health professionals encounter. Trainers may seek professional guidance when the learner has physical and or developmental challenges. For example, neurological, gastrointestinal, or urological difficulties such as constipation, diarrhea, enuresis, encopresis, among others, may interfere with training (Issenman, Filmer, & Gorski, 1999). Other learners may have behavior challenges such as noncompliance, aggression, or even self-injury. Individuals with intellectual disability and developmental disability (ID/DD) may have cognitive, motor, or sensory impairments that make attainment of readiness skills challenging and therefore subsequent toileting success challenging.

Learners with Sensory and Behavioral Challenges

Persons with sensory perception deficits or behavioral challenges may have difficulties with successful toilet training. Most problematic is failure to register or process the urge to urinate or defecate in a timely manner. Such sensory challenges have been most commonly reported in individuals with ASD. Luiselli (1997), suggested that fear and anxiety is associated with voiding in the toilet. However, Keen, Brannigan, and Cuskelly (2007), explain that some learners with ASD may not understand the sensory input of the urge to void and this leads to delays or failure to acquire toileting skills. Others with ASD can be more sensitive to touch, uncomfortable with the physical proximity of the trainer, or simply resist the frequently donning and doffing of clothing required for training. Additional challenges for this population include impaired communication skills, reduced ability for mobility, and difficulty with changes in routine, or introduction to unfamiliar surroundings (i.e. the bathroom). Klassen et al. (2006) cite communication delays, sensory process difficulties, sensitivity to stimulation, limited ability to imitate, compromised motor planning, and preference for routine.

Behavioral challenges can create difficulty when toilet training. As with autism spectrum disorder (ASD), sometimes behavioral challenges are present when the learner has other disorders such as fetal alcohol syndrome (FAS), oppositional defiant disorder (ODD) or attention deficit hyperactivity disorder (ADHD). Wolraich (2016), explains that individuals with these disorders may present with poor motivation or poor ability to respond to the reinforcements that help the majority of learners to tolerate raining activities such as frequent doffing clothing. The physical closeness of the trainer can be problematic for some of these individuals. Additionally, learners with behavioral challenges may have problems related to the limited understanding of the abstract concept of using the commode, the benefits of using the commode, and or difficulty imitating the trainer.

The vast majority of individuals do learn continence; this even includes individuals with ID/DD. Schonwald, Sherritt, Stadtler, and Bridgemohan (2004) point out that individuals with ID/DD are capable of acquiring skills that others do, just at a slower rate. Most individuals with physical disability also achieve continence. Those who have disabilities that directly affect their physical ability to independently toilet may require occupational therapy and toilet modifications. Still, professionals will encounter some individuals who have the potential for mastery but encounter challenges with learning this skill set. Yet, the diagnosis of disability does not necessarily include deficits in toileting. It merely leaves individuals exposed to this skill deficit. Despite these challenges common for individuals with, which can accompany disorder like, ID/DD, ASD, FAS, ODD, and ADHD training can usually be accomplished.

Toilet Training Techniques

Pre-training Requirements

As previously discussed, certain prerequisite skills are required before, toilet training can be effective. Azrin and Foxx (1971) indicated that some bladder control is necessary for training toileting skills as it includes both the ability to recognize the need for voiding and the ability to maintain continence to some degree. Lott and Kroeger (2004) state that the individuals must be able to recognize the sensation to eliminate before they can accomplish the entire chain of toileting behaviors. Similarly, Schonwald et al. (2004) suggested that the learner must be (1) aware of the urge to void, (2) have the ability to maintain continence, (3) communicate the need to void when assistance is needed, (4) relax the appropriate muscle groups while sitting on the toilet, (5) be aware of when the bowel or bladder is empty, in addition to (6) knowing how to don and doff pants and appropriate hygiene.

Empirically Driven Techniques

Researchers and clinicians have advanced several techniques for teaching toileting. Kroeger and Sorensen-Burnworth (2009) reviewed the literature of training protocols modeled after the original Foxx and Azrin method and report on nine techniques most used with individuals with ID/DD and ASD, the first seven are based on Azrin and Foxx; (1) graduated guidance, (2) reinforcement-based training, (3) punishment procedures, (4) scheduled sittings, (5) elimination schedules, (6) hydration, (7) nighttime training for diurnal continence, (8) priming and video modeling, and (9) manipulation of stimulus control. Graduated guidance is hierarchal prompting and is among the most commonly used techniques in toilet training protocols. The Azrin and Foxx method is an oft cited reference to this behavioral shaping technique and most training protocols use a combination of prompting hierarchies, least restrictive prompts, and rapid fading of prompts to sustain independent voiding (Kroeger & Sorensen-Burnworth). Reinforcement-based training is also used frequently. Positive reinforcement was an integral part of the original Foxx and Azrin studies (Azrin & Foxx, 1971; Foxx & Azrin, 1973). Presently, researchers are beginning to use negative reinforcement as an alternative to punishment procedures such as restitutional overcorrection. One such technique is response restriction or response deprivation (see Ardic & Cavkaytar, 2014; van Oorsouw, Duker, Melein, & Averink, 2009). Here the individual is permitted to perform only one behavior, such as sitting on the toilet, and all other behaviors are blocked. Punishment procedures are also used and the most common punishment procedure used with toilet training is overcorrection, i.e., positive practice and restitutional overcorrection. These include either practicing toileting behaviors in sequence or cleaning after each accident or inappropriate voiding. However, several researchers have questioned the utility of physical punishment versus verbal punishment such as reprimands (e.g., Cicero & Pfadt, 2002). Kroeger and Sorensen-Burnworth make the point that some current researchers report verbal reprimands as “corrective feedback” and are not classifying these reprimands as punishment. Scheduled sits are used as either predetermined schedules for sitting on the toilet based on the likelihood of voiding or regular intervals where the learner sits on the toilet followed by positive reinforcement if voiding occurs which completes the scheduled sit (e.g., Bainbridge & Myles, 1999; Kroeger & Sorensen, 2010; LeBlanc et al., 2005). Elimination schedules are another technique promoted by Azrin and Foxx designed to predict when the learner will void so that timely training can occur. This is achieved by either a mechanical or manual detection method using a moister detection device or manual dryness check (e.g., LeBlanc et al., 2005; Luiselli, 1994). Hydration and increasing fluid intake is a technique also used by Azrin and Foxx and is used to increase the likelihood the learner will void (Azrin & Foxx, 1971; Cicero & Pfadt, 2002). An important caveat that Kroeger and Sorensen-Burnworth cite is the risk of water toxicity where excessive water intake can lead to hyponatremia, an imbalance of electrolytes, and more importantly, they indicate a need to consider medical contraindications. Lastly, Kroeger and Sorensen-Burnworth included a reference to nighttime training for diurnal continence based on the Saloviita (2000) case report of spontaneous generalization from nocturnal to diurnal training. Saloviita attempted to treat nocturnal enuresis for a woman with profound ID using the Azrin, Sneed, and Foxx (1973) Dry Bed protocol. While this was ineffective for nocturnal enuresis, diurnal continence was gained. As an explanation, Saloviita noted that Dry Bed training included training for independent use of the toilet, practice for prolonged continence, and punishment for accidents, which is believed to have generalized to daytime dryness. In all, no other researchers have influenced the field of toilet training as much as the Foxx and Azrin studies (Azrin & Foxx, 1971; Foxx & Azrin, 1973).

Priming and video modeling and manipulation of stimulus control are two additional techniques that Kroeger and Sorensen-Burnworth (2009) included in their review. Priming and video modeling is described as an empirically evidenced cognitive-behavioral method of priming behavior. Bainbridge and Myles (1999) are among the first to use video for toilet training and report increased initiation, successful voids in the toilet, along with decreased incontinence. Later researchers report that custom-made videos are more effective than commercial made videos (Palechka & McDonald, 2010; Rosenberg, Schwartz, & Davis, 2010). The model demonstrating the task to be imitated can be adult models, peer models, a self-model, a point-of-view perspective (McLay, Carnett, van der Meer, & Lang, 2015), or animated models (Drysdale, Lee, Anderson, & Moore, 2015). Manipulation of stimulus control is a technique used in conjunction with traditional protocols, e.g., graduated guidance, scheduled sitting, and reinforcement for appropriate voiding where toileting skill is trained by first changing the reinforced stimulus to be one related to successful toileting. Specifically, Taylor, Cipani, and Clardy (1994) explain that disposable undergarments develop stimulus control over the elimination urge and commodes inhibit voiding because of its dissimilar stimulus attributes. Manipulation or transfer of control from the disposable undergarments to the commodes is made via use of behavioral techniques, i.e. shaping, fading, response prevention, and negative reinforcement. Kroeger and Sorensen-Burnworth cite that since the original work by Azrin and Foxx/Foxx and Azrin more recent literature focuses on intervention designs that include both the core basics of the their protocols and additional or varied training components (see Dalrymple & Angrist, 1988; Hagopian, Fisher, Piazza, & Wierzbicki, 1993; Luiselli, 1997; Taylor et al., 1994).

Punishment Procedures

As mentioned above, there is growing concern with the use of punishment procedures. While these procedures have been shown to be effective the current philosophical zeitgeist, research, and practice for ID/DD populations focuses on positive behavioral interventions and consequently, overcorrection and punishment procedures have fallen out of use (Kroeger & Sorensen-Burnworth, 2009). Several researchers have indicated punishment procedures such as restitutional overcorrection are difficult for caregivers to implement effectively (Cicero & Pfadt, 2002; Kırcaali-İftar, Ülke-Kürkçüoğlu, Çetin, & Ünlü, 2009; Post & Kirkpatrick, 2004). Brazelton et al. (1999) suggest that because punishment is contingent on a toileting accident and the delivery of a consequence to the learner there is a potential for physical abuse to the learner if the amateur trainer is unsupervised. For this reason, research has been conducted using modified procedures with greater social validity such as removing overcorrection (Cicero & Pfadt; Kroeger & Sorensen, 2010), including fading procedures (Cicero & Pfadt, 2002), priming and video modeling (Bainbridge & Myles, 1999), and manipulation of stimulus control (Taylor et al., 1994).

Diaper and Disposable-Undergarments Use

Families and providers of care to adults rely on freedom of diapers and disposable-undergarments to facilitate daily functioning, mobility, and participation in social activities (Simon & Thompson, 2006). However, clinicians cite several adverse effects to long-term diaper and disposable-undergarment usage for all individuals including foregoing toilet training, extending the use of diapers or disposable-undergarments, diminishing personal hygiene, decreasing self-confidence, weakening bladder control, as well as increasing physical discomfort, stigmatism, and creating a barrier to participating in community life (Cicero & Pfadt, 2002; Joinson et al., 2009; Kroeger & Sorensen-Burnworth, 2009; Tarbox, Williams, & Friman, 2004). For individuals with extended diaper and disposable-undergarment usage, there is the concern that the diaper or disposable-undergarments will become a discriminative stimulus for urination and may create toilet training resistance. Researchers have found that individuals with ASD are at risk for the diaper and disposable-undergarment gaining stimulus control over the urge to urinate (Tarbox et al., 2004). This interferes with training as the learner with ASD may avoid using a toilet in favor of waiting to don the diaper or disposable-undergarment in order to void.

Assessment of Toilet Training Concerns

Research on toileting training assessments for individuals with developmental disabilities is needed, yet lacking (Matson, Horovitz, & Sipes, 2011). The need to address toileting concerns for individuals with disabilities has been established without question. Individuals with disabilities may experience challenges with toileting and incontinence into their adult years (Matson & LoVullo, 2009). Additionally, individuals with greater developmental challenges have significantly more voiding related challenges (Belva, Matson, Barker, Shoemaker, & Mahan, 2011). Clearly, there is a need to provide services for individuals with disabilities who are not able to void in a commode. The typical means of following up on toileting concerns use frequency counts, ratings of stool consistency, and medical referral when the concern becomes a serious medical condition. A formalized assessment may be attempted with the Adaptive Behavior Scales, 2nd edition (VABS-II; Sparrow, Cicchetti, & Balla, 2005), using the four items related to toileting contained in the larger section of personal self-help. However, no normative information can be provided about an individual's toileting behavior using this method.

To provide a formalized assessment Matson, Dempsey, and Fodstad (2010) developed the Profile of Toileting Issues (POTI). The POTI is a 56-item checklist used for three goals. To screen for toileting issues, to identify potential functions of toileting challenges, and to help target treatment in populations of individuals with ID from age 4 years through adulthood. It allows the caregiver to report on the diagnostic criteria for enuresis and encopresis as well as potential functions for toileting accidents, toileting consistency, and related challenging behaviors (i.e., pain, avoidance, social difficulties, non-compliance, internal cues, shame/deception, peer rejection, aversive parenting, and medical problems). Higher scores on this checklist indicate greater toileting challenges. Examining the utility of the POTI, Matson, Neal, Hess, and Kozlowski (2011) found that individuals who used no verbal communication scored significantly higher POTI scores than those who used verbal skills. Similarly, Belva et al. (2011) found that toileting challenge and adaptive function are inversely related for individuals with ID. Specifically, comparing scores on the VABS-II, they concluded that higher adaptive functioning is associated with significantly fewer toileting problems. Matson, Neal, et al. (2011) reported that the POTI checklist has sound internal consistency and reliability, with a Cronbach alpha coefficient of 0.83 and interrater reliability of $r = 0.44$. Matson et al. (2010) have been the first researchers to systematically identify toileting skill deficits in this population and urge further research in this area.

Medical Considerations

Medical Consultation

Toilet training may be complicated by medical conditions (Brazelton et al., 1999; von Gontard, 2013). While basic toilet-readiness guidelines are universal, persons with congenital or acquired physical anomalies, neurological conditions, sensory issues, or chronic illness may require individualized training strategies and/or environmental accommodations to master toilet training. Increased incidence of incontinence is common in many genetic disorders, including Rett, Angelman, Fragile-X, Prader-Willi, Noonan, and Williams syndromes (von Gontard et al., 2016). Successful toilet training requires goals informed by realistic expectations that consider developmental and physical needs. Consultation with primary care providers and medical specialists may be necessary to evaluate fully the toilet-readiness of persons with medical conditions. Occupational and physical therapists may offer valuable direction for specific accommodations (AAP, 2016).

The etiology of an individual's developmental disability may alert the trainer to specific training challenges. With prenatal screening, newborn assessments and well-child pediatric evaluations many children with developmental disabilities will have undergone assessment before they reach the age of 2–3; the average age of toilet training in the United States (Wolraich & American Academy of Pediatrics, 2016). Cerebral palsy, urinary tract birth defects, and gastrointestinal defects are often identified in infancy. Urinary tract birth defects occur in approximately 1% of newborns and may involve the kidney, ureters, bladder, and external genitalia (Rasouly & Lu, 2013). Such defects are more common in persons with developmental disorders. For example, persons with Down's syndrome are at increased risk for urogenital defects leading to dysfunctional voiding and urinary retention (Mercer et al., 2004). In a study of the most common congenital defect of the penis, hypospadias, 5.9% of children were found to have developmental delay (Wu, Chuang, Ting, Lee, & Hsieh, 2002). Persons with genetic disorders have increased risk of gastrointestinal defects including anorectal malformations (ARM) and Hirschsprung's Disease (Gariepy, 2004). The ARMs are associated with high rates of constipation and fecal incontinence, and to a lesser degree urinary incontinence (Springford, Connor, Jones, Kapetanakis, & Giuliani, 2016). Hamid and colleagues reported 44% of persons with anorectal defects had a urological anomaly and post-repair 66% experienced soiling and 30% urinary incontinence (Hamid, Holland, & Martin, 2007). These examples highlight the importance of medical consultation.

Seeking Medical Consultation

Challenges with toilet training or the loss of skills in persons who have mastered toileting may prompt a medical referral. Painful urination, incontinence during laughter, incontinence while running to the toilet, and persistently damp underwear may all be signs that a medical cause is present. In addition, diarrhea and/or constipation during toilet training should be worked up in the medical setting (Schmitt, 2004). Between 2% and 3% of children have problems with toilet training and this difficulty is associated with certain traits. Children with training difficulties are often "less adaptable, have a more negative mood, and are less persistent than easy-to-train children" (Choby & George, 2008). Trainers should document specific details of challenges including the longest period of bladder and bowel continence during wake and sleep, all medical conditions and sensory issues, family history of illness and toileting challenges, and interventions attempted. A bathroom journal documenting frequency of urination and bowel movements as well as associated pain or behavioral issues before, during, and/or after will be valuable to medical caregivers (Wolraich & American Academy of Pediatrics, 2016). A description of the volume, color, and odor of urine and feces should be included as well. Lastly, toilet trainers should attend medical appointments if possible in order to communicate details of training methods and challenges.

The Initial Medical Evaluation

The initial medical evaluation of toileting challenges includes a detailed history and physical examination. For many children with developmental disabilities treatment history will include surgeries, chronic disease management, genetic consultation, and psychological assessment as well as speech, occupational and physical therapies. Based on the history and physical findings, blood tests, urinalysis, stool analysis, and imaging studies may be ordered. Trainers should prepare learners for the physical examination and tests. For example, the medical caregiver will visually inspect and touch the perineal area, palpate the abdomen, and if indicated perform a rectal examination. Urinalysis may require catheterization. Trainers and medical caregivers may need to consider the possibility that some learners may not be able to tolerate the examination and will require sedation for a successful physical examination. After the initial evaluation, referral for specialty evaluations may be considered.

Medical Specialty Evaluations

Learners with neurological, gastrointestinal, or urological conditions identified in infancy may have an established relationship with a medical specialist prior to toilet training. If this is not the case, a referral from the primary medical caregiver will be necessary. A release should be signed to provide the specialist with the records of previous assessments, laboratory studies, and imaging studies. Trainers should provide the bathroom journal along with a list of questions to the specialist prior to the appointment. As with the initial evaluation, the trainer should prepare the learner for the appointment and attend if possible. Trainers will find that the vocabulary of medical specialists extends far beyond the "enuresis" and "encopresis" of the DSM5 (American Psychiatric Association, 2013). While clearly not exhaustive, an introduction medical specialty evaluation is offered below.

Medical Specialty Consideration: Urology

As a learner matures from infancy into childhood, voluntary bladder control and urinary continence is slowly achieved. Daytime urinary continence is usually achieved by age 4 and nighttime continence is usually achieved between the ages of 5 and 7 (Jansson, Hanson, Sillen, & Hellstrom, 2005). A problem with the filling and/or emptying of the bladder after the age of five is referred to as lower urinary tract dysfunction (Austin et al., 2014) and can be a challenge to toilet training or to a previously toilet trained individual. Lower urinary tract dysfunction symptoms are a common problem in childhood, accounting for up to 40% of outpatient urological visits (Farhat et al., 2000). Bladder and bowel dysfunction (BBD) is a term used to describe a combined problem in bowel and bladder function. The International Children's Continence Society (ICCS), an international organization of leading experts in the treatment of BBD, have subcategorized BBD into lower urinary tract dysfunction and bowel dysfunction (Austin et al.).

The ICCS has specifically defined several symptoms associated with lower urinary tract dysfunction encompassing frequency and temporal parameters as well as effort and sensation (Austin et al., 2014). For example, according to the ICCS, urinary incontinence refers to the involuntary leakage of urine and the ICCS has further classified urinary incontinence into the major categories of daytime incontinence and nighttime incontinence or enuresis (Austin et al.). Awareness of ICCS terminology will allow the trainers to communicate more effectively with medical specialists. For reference, common terminologies are summarized in the chart below (Table 3).

Urology and Developmental Disability

Daytime urinary incontinence and enuresis are common bladder dysfunctions among individuals with severe intellectual or motor disability and

Table 3 ICCS common voiding terminology

ICCS voiding terminology	
Term	Definition
Increased daytime frequency	Voiding eight or more times per day
Decreased voiding frequency	Voiding three times or less per day
Nocturia	Waking up at night to void
Urgency	The need to void suddenly and unexpectedly
Hesitancy	A problem initiating the process of voiding
Straining	The need to increase intra-abdominal pressure in order to initiate or maintain the voiding process
Weak stream	When the stream of urine is of low force during voiding
Intermittency	The process of voiding when it occurs in discrete bursts rather than a continuous flow of urine
Dysuria	A sensation of burning or discomfort during voiding
Holding maneuvers	Observable physical posturing behaviors used in order to postpone voiding or to suppress urgency
Post-micturition dribble	The involuntary leakage of urine after completion of voiding
Urinary retention	The sensation of being unable to void despite a feeling of a full bladder or a feeling of incomplete emptying with the sensation that the bladder does not feel empty despite completion of voiding
Spraying/splitting of the urinary stream	When urine flow sprays or splits during voiding, rather than flowing in a discrete stream

Adapted from Austin et al. (2014)

are often associated with small bladder capacity (Laecke et al., 2001). Inadequate fluid intake is associated with poor bladder capacity and constipation and therefore, proper fluid intake is an important consideration for learners with developmental disability experiencing urinary incontinence (Laecke, Raes, Walle, & Hoebeke, 2009). It is also theorized that the pathophysiology of daytime incontinence and enuresis may be linked to detrusor over activity, which can be very common among individuals with an intellectual disability (Laecke et al.). In a study by Hicks, Carson, and Malone (2007) it was found that bladder dysfunction was present in 77% of study subjects with Down syndrome. In another study about toilet training and voiding habits among children with Down syndrome, it was found that learners with Down syndrome tend to have an increased prevalence of incontinence after toilet training when compared with a control group (Powers et al., 2015). In those with developmental disability, urinary incontinence is associated with medical complications so it is essential that bladder dysfunction be properly addressed and treated and efforts to achieve successful toileting continence (Laecke et al.).

While persons with birth defects or metabolic disorders may be referred for urological evaluation prior to toilet training, referrals for bladder dysfunction are considered when a school age child has daytime urinary incontinence or other persistent urinary symptoms or when these symptoms occur in a previously toilet trained individual. In addition to the previously described symptoms of bladder dysfunction, which can be associated with urinary incontinence, several medical conditions can cause daytime incontinence, including overactive bladder, underactive bladder, voiding postponement and dysfunctional voiding (Austin et al., 2014).

Common Urological Dysfunction

Overactive bladder (OAB) is a common bladder dysfunction disorder resulting from abnormal bladder contraction while the bladder is filling. OAB is especially associated with the symptom of urgency and also characterized by incontinence, frequency and holding maneuvers (Austin et al., 2014). Underactive bladder is associated with a low frequency of voiding and straining during voiding (Nevéus et al., 2006). Voiding postponement is used to describe the behavior of intentionally delaying voiding and holding maneuvers are commonly observed. Postponement of voiding can result in overflow incontinence due to an overly distended bladder (Austin et al.). Dysfunctional voiding refers to an abnormality during the voiding process that can cause problems with urinary flow and may be associated with incomplete bladder emptying and urinary tract infection (Chase, Austin, Hoebeke, & Mckenna, 2010).

Vaginal reflux occurs when urine is temporarily retained in the vagina during the process of voiding and can result in urine leakage as well as irritation of skin (Nevéus et al., 2006). Treatment typically consists of altering leg placement and posture during voiding and an estrogen cream can be used to treat labial adhesions (Bernasconi et al., 2009).

Urologists will identify the underlying abnormality causing bladder dysfunction and initiate proper treatment. While trainers may seek an end to urinary incontinence, the urologist evaluates the potential for bladder dysfunction to cause kidney damage (Hicks et al., 2007). Routine laboratory work may include urinalysis and urine culture. Urologic imaging studies (ultrasound, MRI, and or voiding cystourethrogram) may be ordered to detect possible anatomic and neurological abnormalities (Hoebeke, Bower, Combs, Jong, & Yang, 2010; Wraige, 2002). In addition, the urologist may order urinary flow measurements and urodynamic studies (Nevéus et al., 2006). Trainers should alert the urologist to trainee characteristics that may interfere with the evaluation.

Urology and Conservative Measures

The management of bladder dysfunction aims to improve symptoms and prevent damage to kidneys. With the goal of achieving normal voiding habits, management typically begins with conservative measures and behavioral modification (Thom, Campigotto, Vemulakonda, Coplen, & Austin, 2012) and progresses as warranted to more directed approaches such as pharmacologic intervention and biofeedback therapy.

Voiding behavior modification is a conservative approach that focuses on trainee and family education on normal voiding while also facilitating behavioral interventions to improve voiding habits. In one study, utilizing a voiding schedule with fixed voiding times was found to be effective in reducing daytime incontinence in 45% of study participants (Allen, Austin, Boyt, Hawtrey, & Cooper, 2007). Another study that utilized conservative measures such as timed voiding, regulation of fluid intake, pelvic floor exercises, and positive reinforcement in treating daytime urinary incontinence found that 74% of participants had improvement of symptoms in the first year after therapy and over the long term, 59.4% had improved daytime urinary control (Wiener et al., 2000). Education about ideal voiding posture, discouragement of holding maneuvers, maintaining a bathroom journal, and utilizing a reward system for the trainee are all-important components of voiding behavior modification. This approach may be more effective for older children between the ages of 9 and 12 whom are more receptive to instruction and more acutely aware of social stigma associated with urinary incontinence (Heilenkötter et al., 2006). In learners with developmental disability, proper fluid intake, healthy diet, and environmental supports take on added significance when implementing behavioral modifications. Learners who have developmental disabilities may have a delayed response to sensory stimuli like the sensation of full bladder so environmental supports such as access to the toilet as well as adaptations that aid stable positioning on the toilet are important factors in the achievement of continence (Laecke et al., 2009).

Urology and Constipation

Considering the strong association between bladder and bowel function, an important consideration in addressing bladder dysfunction is the treatment of constipation. One particular study found that constipation was present in 30% of individuals with symptoms of bladder dysfunction (Schulman, Quinn, Plachter, & Kodman-Jones, 1999). Another study showed an 89% improvement of daytime incontinence after treatment of constipation (Chase et al., 2010). Additionally, in a study of urinary incontinence experienced by individuals with developmental disability it was found that 27% of participants also had constipation (Laecke et al., 2009). Laxative use has been found to be helpful in the treatment of constipation and in one particular study of individuals with BBD, treatment with polyethylene glycol resulted in improvement of constipation and daytime urinary continence (Pashankar & Bishop, 2001). However, the use of laxatives, enemas, or suppositories should not be initiated without medical consultation. Hygiene education is also helpful in preventing bladder infections that can contribute to toileting challenges. Trainers should consider dietary contribution to toileting challenges. Avoidance of foods that can increase bladder activity like caffeine, orange juice, tomato, and spicy foods may be considered (Herndon & Joseph, 2006).

Biofeedback therapy is an alternate treatment that may be effective in the treatment of bladder dysfunction and is used to help a trainee gain better control of pelvic floor musculature in order to achieve bladder control. Biofeedback therapy involves noninvasive monitoring to give real-time visual or audio feedback about bladder function (Schulman, 2004).

Urology and Pharmacology

When other methods are unsuccessful, anticholinergic medication may be considered (Allen et al., 2007). There is evidence of the effectiveness of anticholinergics in treating the urinary symptoms associated with bladder dysfunction (Arendonk, Austin, Boyt, & Cooper, 2006). Anticholinergic agents aid the proper filling of the bladder by decreasing the frequency of detrusor muscle contraction (Finney, Andersson, Gillespie, & Stewart, 2006). Oxybutynin is a commonly used anticholinergic agent that is FDA approved to treat bladder disorders in children (Lazarus, 2009). The most common side effects of oxybutynin include constipation, dry mouth, flushing, and heat intolerance. In one particular study of the management of bladder dysfunction, 45% of participants did not respond to first-line measures and of these individuals, 80% improved after being started on medication (Thom et al., 2012). Alpha-adrenergic receptor antagonists are also used to treat bladder dysfunction in children and although there is data to suggest their efficacy (Thom et al.). However, these agents are not currently FDA approved to treat bladder dysfunction in children.

Nocturnal Enuresis

Enuresis is a common problem in childhood and is defined as episodic urinary incontinence during sleep in an individual aged 5 or older (Franco, von Gontard, & Gennaro, 2013). As mentioned above, when compared to individuals without special needs, those with developmental disability have higher rates of both daytime urinary incontinence and enuresis. Furthermore, there is a greater likelihood for incontinence to persist into adulthood for individuals with developmental disability when compared with those without special needs (von Gontard, 2013).

Enuresis in children without any history of other bladder dysfunction or major lower urinary tract symptoms is known as monosymptomatic enuresis (Neveus et al., 2010). Monosymptomatic enuresis is further divided into primary enuresis and secondary enuresis. Primary enuresis is more common and refers to individuals who have never achieved nighttime urinary continence (Nevéus et al., 2006). Secondary enuresis is less common and refers to individuals who previously achieved nighttime urinary continence for at least 6 months before the onset of nighttime urinary incontinence (von Gontard, Mauer-Mucke, Pluck, Berner, & Lehmkuhl, 1999). Secondary enuresis is also more likely to be associated with a major life stressor or psychiatric comorbidity than primary enuresis.

It has been suggested that maturational delay may play a role in monosymptomatic enuresis because most cases tend to resolve on their own over time (Neveus et al., 2010). There is also evidence that genetic, neurobiological, and psychological factors may influence the development of enuresis (Joinson, Sullivan, von Gontard, & Heron, 2016). One study found that identical twins have approximately double the rate of concordance for enuresis as fraternal twins and suggests that genetics may play a significant role in enuresis (Bakwin, 1971). Low self-esteem, sleep disturbance (Nevéus, 2009), and high stress levels (Joinson et al.) among learners are well associated with enuresis. There is also evidence that neuropsychiatric disorders such as ADHD may play a role in the development of enuresis (Neveus et al.; Baeyens et al., 2004; Mellon et al., 2013). A major risk factor for incontinence is intellectual disability and rates of incontinence increase with decreasing IQ (von Gontard, 2013). Additionally, a study by Joinson et al. (2007) found an association between nocturnal enuresis and lower IQ scores.

Medical management of enuresis involves a variety of treatment modalities including behavioral therapies, enuresis alarms, and pharmacotherapy (Neveus et al., 2010). Treatment initiation should consider both trainer and learner motivation, and is influenced by the degree to which the trainers and learner view enuresis as a problem. Enuresis alarms have shown long-term efficacy but require a high degree of motivation on the part of the trainer and learner. Pharmacotherapy with desmopressin has proven effective in the treatment of enuresis. Desmopressin is generally well tolerated and has few major side effects. Anticholinergic medications like Oxybutynin are sometimes considered in the treatment of enuresis when standard treatment is ineffective. Tricyclic antidepressant (TCA) pharmacotherapy may also be used to treat enuresis but due to a less favorable side effect profile, is considered only when other therapies have proven ineffective. Imipramine has been shown to be effective in treating enuresis and is the most commonly used TCA to treat enuresis (Neveus et al.).

Medical Specialty Consideration: Neurological

Neurological conditions that are commonly associated with toilet training difficulties often involve damage to the nervous system. The damage to the nervous system may impair sensory function, motor function, or both. As previously stated, toileting challenges lead to problems with hygiene, comfort, self-confidence, independence and socialization for the learner and stigma and stress for the trainer (Keen et al., 2007). Neurological symptoms may include but are not limited to seizures, fatigue, weakness, pain, sensory impairment, tremor, dystonia, gait disturbance, dizziness, speech or swallowing difficulties, and visual or auditory impairment (Stone, Carson, & Sharpe, 2005). Some neurological conditions may cause or exacerbate toileting challenges.

Primary medical caregivers may treat uncomplicated neurological disorders. However, complex or refractory disorders will be referred to a neurologist. Qualitative and quantitative information will be necessary to convey to the neurologist and a data collection system such as a bathroom journal will help. When preparing the bathroom journal, the neurological symptoms (seizures, fatigue, weakness, pain, sensory impairment, tremor, dystonia, gait disturbance, dizziness, speech or swallowing difficulties, and visual or auditory impairment) should be included, with special attention to note the onset, frequency, and progression of symptoms as well as associated behavioral issues. The neurological evaluation and subsequent imaging studies may include magnetic resonance imaging (MRI), computed tomography (CT), and or electroencephalogram (EEG), all require the cooperation of the individual being evaluated. For individuals likely to have sensory or behavioral concerns accommodations can be provided. This should be communicated to the neurologist prior to the evaluation as some instance may allow sedation to be used.

Central Nervous System Lesions

Lesions of the central nervous system (CNS) may impair motor function and result in lower urinary tract dysfunction, which may impair toilet training (Guerra, Leonard, & Castagnetti, 2014). Cerebral palsy (CP) and symptomatic neurogenic bladder (SNB) are conditions resulting from CNS lesions.

Cerebral palsy manifests as a motor dysfunction following damage to the central nervous system, often involving a hypoxic event (Guerra et al., 2014). Specific symptoms will be generalized to the area of the brain deprived of oxygen. Motor cortex injury may manifest as an inability to suppress the impulse to void. This may be complicated by injury to the frontal lobe, which may result in decreased executive functioning or temporal lobe with impaired ability to communicate (Wu, 2010). The treatment of cerebral palsy may include medications, surgery, and even deep brain stimulation to address the spasticity, clonus, and hyperreflexia. Botulinum toxin can be used in patients with increased detrusor muscle tone. Oral and intrathecal antispastic drugs may be helpful for spasticity (Patterson, 2016). Additionally, physical therapy and occupational therapy may be helpful in training.

Symptomatic Neurogenic Bladder (SNB) is bladder dysfunction that can be caused by a lesion at any level of the nervous system (Verpoorten & Buyse, 2008). This condition can also be present with other conditions including cerebral palsy. One large study identified a prevalence of SNB in 16.4% of individuals with cerebral palsy (Murphy, Boutin, & Ide, 2012). With SNB, the delay in voiding causes a strain on the bladder and causes uninhibited bladder contractions (Hodges, Richards, Gorbachinsky, & Krane, 2014). This condition may eventually result in decreased renal function in children who are found to have this condition (Guerra et al., 2014).

The goal in the treatment of SNB is typically to identify and intervene early before secondary damage to the upper urinary tract occurs. Catheterizations along with an anticholinergic medication (oxybutynin) are the standard in treatment for those with neurogenic bladder co-occurring with detrusor hyperactivity and/or detrusor sphincter dyssynergia. Although around 90% of patients can be treated with this gold-standard therapy, treatment can also include other bladder-relaxant medications or even injection of botulinum toxin into the detrusor muscle. As a treatment of final resort, augmentation cystoplasty (a type of surgery) can be considered when other treatments fail (Verpoorten & Buyse, 2008).

Medical Specialty Consideration: Gastroenterological

The terminology for failure to master bowel control varies across disciplines. Symptoms classified as primary encopresis by the DSM 5 may be called "fecal incontinence" by gastroenterologists (American Psychiatric Association, 2013). The gastroenterologist assesses fecal incontinence to determine if it is due to structural, metabolic, or functional abnormalities of the digestive system. Structural and metabolic abnormalities may be identified with traditional medical diagnostic testing. Structural malformations of the lower digestive tract are typically identified before toilet training begins. Some malformations may require corrective surgery, delaying toilet training and creating neurological or psychological barriers to toilet training. Metabolic abnormalities include inflammatory and malabsorption diseases of the bowel. Functional gastrointestinal disorders (FGIDs), those without biological markers, are diagnosed using the ROME IV protocols. The fourth generation of this classification system, the Rome IV criteria, was released in 2016. Rome IV separates disorders by age (neonate/toddler, child/adolescent, and adult) and by structure (esophagus, stomach/duodenum, bowel, and gallbladder). Neurogastroenterology, microenvironment, cultural and biopsychosocial aspects of gastrointestinal disorders are explored in Rome IV (Rome Foundation, Inc., 2016). The Rome Foundation publishes questionnaires for the evaluation of FGID's. Common FGIDs in persons with ASD include functional constipation, functional diarrhea, and functional pain. The ROME protocols utilize thorough but concrete interview questions to ensure that terminology and concepts discussed mean the same thing to both the clinician and the informant. In the absence of structural or biochemical GI abnormalities, the symptom of fecal incontinence would be categorized as a functional defecation disorder; further categorized as functional constipation and nonretentive fecal incontinence (Hyams et al., 2016). Expert consensus (Buie et al., 2010) recommends that the gastroenterological evaluation include (1) a medical history and physical examination, (2) an anal examination, assessment of the back and spine, (3) analysis of a stool specimen included an assessment for parasites, (4) enteric pathogens, stool guaiac, (5) electrolytes/osmolarity, (6) serum electrolytes, (7) liver function tests, (8) assessment of nutritional status, (9) an abdominal roentgenogram to assess bowel gas pattern and (10) the possible retention of stool.

Functional Constipation

In a notable study comparing parental reports of GI dysfunction relative to those by pediatric gastroenterologists, constipation was the most frequently occurring GI symptom at 85% (Gorrindo et al., 2012). Constipation is a frequent challenge for individuals who have poor nutrition and hydration. A recent meta-analysis by McElhanon, McCracken, Karpen, and Sharp (2014) found that constipation was three times more likely for individuals with ASD than their peers. In addition, Gorrindo et al. (2012) found that constipation was associated with younger age, increased social impairment, and limited expressive language. Prompted by these findings and the need to accurately identify GI dysfunction, researchers suggest that the expertise of a gastroenterologist is needed to determine the nature of the GI disorder, as parents tend to be poor at discriminating symptom variability, so practitioners must evaluate the efficacy of parent-child communication regarding toileting needs to help clarify the extent that limited expressive language contributes to constipation by thwarting appropriate toileting skills. The ROME IV criterion advises screening for "alarm features." Alarm features include severe abdominal distention, absent anal reflex, decreased lower extremity strength or tone, and physical abnormalities of the gluteal region (Hyams et al., 2016). Functional constipation is treated with education regarding toileting, diet, and bowel function in conjunction with implementing a toileting schedule and diary. In some cases, laxatives may be prescribed (Hyams et al.). Successful treatment of functional constipation is achieved for approximately 60% of children (Pijpers, Mej, Benninga, & Berger, 2010).

Recommendations

Clinical recommendations for toilet training challenges
Fully assess readiness
Trainee's readiness across multiple domains -physical, cognitive, motor, emotional, verbal- must be thoroughly assessed
Trainer's expectations and skill set should be evaluated
Use physiology to your advantage
Healthy diet and fluid intake is necessary for proper bowel and bladder functioning
Increasing fluids during the training period will increase opportunities for voiding
Consider the gastrocolic reflex, which stimulates the bowel approximately 15–30 min after the stomach is stretched, when scheduling toileting
Sometimes it takes a village
Psychological consultation will be necessary to implement an individualized training plan in complex situations
Occupational therapy consultation may assist with sensory training, skill building, and the use of adaptive equipment
Medical consultation may be necessary to fully assess toileting challenges and obtain orders for diapers, toileting orders for school or community settings, and/or orders for a personal care attendant to assist with training

Conclusion

The mastery of toileting skills is a developmental milestone eagerly awaited by parents. For most it is achieved with minimal effort; however, persons with intellectual or developmental disabilities, physical challenges or chronic medical conditions may require professional assistance. For example, individuals with ID/DD may have cognitive or motor deficits that hinder the acquisition of toilet training milestones. For these individuals, training procedures based on behavior analytic principles such as reinforcement and punishment may be effective in teaching appropriate toileting skills (Azrin & Foxx, 1971). Some children may also have medical concerns, such as enuresis, encopresis, neurological conditions, or gastrointestinal problems that impede the acquisition or maintenance of toileting skills. In these cases, behavior modification, medication, medical procedures, or dietary changes may improve the symptoms of medical conditions that are influencing toilet training (Hyams et al., 2016). Comprehensive behavioral and/or medical evaluations are warranted to identify the cause of any difficulties and to plan an appropriate and comprehensive treatment approach. Fortunately, trainers can draw upon scientific literature and national organizations for guidance regarding toilet training difficulties. The research of Azrin and Foxx, Brazelton, Spock and others highlights the importance of trainee/trainer readiness. The trainee's physical, cognitive, motor, emotional, and verbal development must be considered in conjunction with trainer's abilities. Trainers are also encouraged to consult with clinicians regarding toilet training difficulties in order to accurately identify and address any medical or behavioral considerations (Stadtler et al., 1999). When medical concerns are suspected, clinician expertise may be required to guide trainers and learners through unfamiliar medical specialty evaluations. The American Academy of Pediatrics, Autism Speaks, The Kennedy Krieger Institute and other national organizations offer additional valuable expertise should these challenges arise. With knowledge and perseverance, trainers can assist learners in the mastery of toileting skills.

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