

Chapter 4

Early Start Denver Model

An Intervention for Young Children with Autism Spectrum Disorders

Dana Princiotta and Sam Goldstein

Introduction and Overview of Chapter

While an increasing number of children with Autism Spectrum Disorder (ASD) are being identified at younger ages, most early interventions are targeted at older preschoolers. The necessity for early interventions for toddlers has increased as the gap widens between age of identification and age of available intervention. Further, few studies or sources have compared the effectiveness of present interventions. Interventions including Applied Behavioral Analysis (ABA); the Lovaas Model; the Treatment and Education of Autistic and Related Communication-Handicapped Children (TEACCH); and Social Communication, Emotional Regulation, and Transactional Support (SCERTS[®]) have received support in the treatment of ASD. A promising intervention developed by Sally Rogers and Geraldine Dawson comprises elements of ABA and relationship-based approaches to target the younger children now being identified as having ASD as infants and toddlers (Rogers and Dawson 2010). With origins from the Denver Model of 1981, the Early Start Denver Model (ESDM) is the only early intervention model validated in a randomized clinical trial for children as young as 18 months (Dawson et al. 2010). A manualized treatment, ESDM has gained acceptance as an efficacious program (Rogers and Dawson 2010). Published in 2010, the ESDM will require further longer term follow-up studies and replications to demonstrate consistency of results over time.

D. Princiotta (✉) · S. Goldstein
Neurology, Learning and Behavior Center, School of Medicine, University of Utah,
230 South 500 East, Suite 100, Salt Lake City, UT 84102, USA
e-mail: dana@samgoldstein.com

S. Goldstein
e-mail: info@samgoldstein.com

Early Markers of ASDs

The emergence of early symptomology of an ASD plays an integral role in the early identification and treatment of children with developmental delays. Displayed in the early stages of life, social communication deficits can be observed between the ages of 12 and 24 months (Baranek 1999; Warren et al. 2011). More specifically, children may demonstrate lack or loss of skills, including, but not limited to, vocalization, pointing, playing with a variety of toys, and responses to contextual cues (CDC 2009; Ghaziuddin 2005). While symptomology in the domain of atypical behaviors may surface, including repetitive movements with objects or body parts, these behaviors typically emerge later than those within social and communicative functioning (Ghuman et al. 1998). Early indicators of an ASD may include: lack of pointing, sharing interest, response to name, coordinating gestures, vocalizations, or eye contact. These indicators may suggest the presence of an emerging pervasive developmental disorder (Ghuman et al. 1998).

The majority of children with ASD do not receive a formal diagnosis until 4–5 years of age (Stone et al. 2000). In alliance with this figure, most interventions are designed for these older preschoolers. This trend does not reflect current research studies suggesting an ASD diagnosis can be made prior to 2 years of age, possibly as early as 12–18 months of age (CDC 2009; Ghaziuddin 2005). Identifying deficits in social interaction has been validated in identifying young children with autism (Ghuman et al. 1998). Many parents of children with ASD detect signs of ASD within the first 12 months of age (Baranek 1999). Children identified at earlier stages have demonstrated deviance in social or language development when compared to typically developing peers (Baranek 1999). With recent trends suggesting earlier identification, the need for interventions for children recently diagnosed as infants or toddlers has increased.

Why Earlier Intervention?

The discord between age of identification and age of treatment creates an urgent search for efficacious treatments for these youngsters. If able to diagnose ASD earlier and earlier, it is imperative that efficacious treatment programs are available to utilize with children of all ages. Few published studies have discussed the efficacy of intervention models for children less than 2 years (Warren et al. 2011). Can interventions utilized with older preschoolers be modified for use with toddlers? Recent trends have provided some promising results, including psychosocial, pharmacological, and behavioral interventions. Interventions may take many forms and be directed to treat comorbid conditions as well. Few existing sources compare the effectiveness of behavioral treatment interventions. The consequences include clinicians and families choosing among interventions based on availability, insurance coverage, or affordability (Warren et al. 2011). Thus, fragmented interventions are being provided to young children with ASD (Warren et al. 2011).

Multiple intervention approaches exist within various areas of child development. Children with ASD require intervention in the realms of communication and behavior, minimally (Warren et al. 2011). Communication interventions may include the assistance of speech/language pathologists in the form of enhancing social communication and interactions. Positive behavior support systems aim to identify environmental contingencies to focus on positive aspects of the environment and the child's behavior. This approach is particularly helpful in the development of adaptive skills (Warren et al. 2011). While pharmacological and medical interventions exist for ASD, the focus will be placed upon behavioral interventions for purposes of this review.

In recent years, ABA, TEACCH, and SCERTS[®] demonstrated efficacy in the treatment of ASD. While these models and others have gained acceptance in the field of autism, challenges remain in the early intervention of ASD. One of the greatest difficulties in the field of autism involves the varying range of possible outcomes for diverse children receiving “identical” interventions (Howlin et al. 2009). Reviews of early interventions for autism highlight concerns of limitations. Howlin et al. (2009) conducted a systematic review of controlled studies of early intensive behavioral interventions (EIBIs) for young children with ASD. Through inclusion criteria, 11 studies were included. When examining group changes, EIBI yielded improvements in IQ scores when compared to comparison groups; yet at the individual level, a high level of variability was present (Howlin et al. 2009).

Current Intervention Programs

Methods in ABA have been utilized with children with ASD since the early 1960s. In 1987, Ivar Lovaas published findings for a group of children demonstrating improvements in both cognitive abilities and educational placement in response to intensive interventions (Warren et al. 2011). ABA is widely recognized as a helpful treatment for autism. Interventionists teach children with ASD by breaking a target skill into smaller components, performing each part in isolation. Once criterion is reached for components, teachers gradually add the components together to build a complex behavior (Warren et al. 2011).

Other supported interventions include the TEACCH program and the SCERTS[®] Model. Through Structured Teaching, the TEACCH model emphasizes building new skills as well as creating strategies to compensate for difficulties (Van Bourgondien and Coonrod 2012). TEACCH is based on the following general components: physical organization/structure, daily schedules, work systems, and task structure (Van Bourgondien and Coonrod 2012). Research studies utilizing the TEACCH program suggest children in the TEACCH program demonstrated greater improvements in development of cognitive, motor, and imitation skills (Van Bourgondien and Coonrod 2012).

The SCERTS[®] Model incorporates a focus upon SCERTS[®] (Rubin et al. 2012). The SCERTS[®] Model states it is implemented across a wider breadth of settings and “teachers” than other programs (e.g., family members, peers, teachers). The highlighted goal of the SCERTS[®] Model is in shifting the focal point to improving

the quality of life for individuals with ASD over time that are predictable of long-term positive outcomes (Rubin et al. 2012). The SCERTS® Model supports child-initiated communication in “everyday” activities, differentiating it from a model of ABA (Rubin et al. 2012).

Trends in Interventions

While medical interventions of risperidone and aripiprazole have demonstrated decrease in problematic behaviors for some children, side effects are often considerable (Warren et al. 2011). Behavioral interventions attempt to elicit positive responses from children as they develop skill sets. Warren et al. (2011) identified 78 early behavioral interventions for ASD in a systematic review. The systematic review uncovered few studies of “adequate” quality. Most studies utilize small sample sizes and varying duration/frequencies of administration (Warren et al. 2011). At the present time, a dearth of studies exists directly comparing different treatment modality outcomes (Warren et al. 2011).

Currently, ABA coupled with TEACCH approaches is recommended as a service delivery model in which significant results can be gained (Van Bourgondien and Coonrod 2012). According to Warren’s 2011 review, Lovaas-based interventions reported improvements in language, adaptive behavior, and cognitive skills in comparison to “eclectic” treatments found in the community (Warren et al. 2011). While some evidence exists that suggests change in IQ in Lovaas-based interventions, it is not clear whether these changes predict long-term consequences. Currently, the literature does not provide a wealth of information regarding baseline information of children to predict long-term outcomes (Warren et al. 2011).

A promising intervention developed by Sally Rogers and Geraldine Dawson joins elements of ABA and “relationship-based approaches” to target children identified with ASD as infants and toddlers (Dawson et al. 2010). With origins from the Denver Model, the ESDM was created to be implemented with children as young as 18 months (Dawson et al. 2010). With similarities and differences between ESDM and other models, the model possesses characteristics akin to SCERTS® (Rubin et al. 2012), Relationship Development Intervention (Gutstein 2005), Pivotal Response Training (PRT), and Developmental Individual-difference Relationship (DIR)/Floortime (Rogers and Dawson 2010; Greenspan and Wieder 2005). The authors claim that the model is differentiated from aforementioned models due to explicit behavioral lessons, the incorporation of data, and the incorporation of “all developmental domains” (Rogers and Dawson 2010, p. 33). This promising new model may respond to the need for earlier interventions reflecting age of identification in the field of ASD.

Introduction to the ESDM

Can researchers determine if intervention earlier than 24 months is effective for children in reducing or eradicating language impairments and social deficits associated with ASD? A promising intervention program developed by principal investigators,

Sally Rogers and Geraldine Dawson, targets infants, toddlers, and preschoolers with ASD. Developed through collaborators at the University of Washington, the M.I.N.D. Institute, and University of Colorado Health Sciences Center, the ESDM is based on ABA techniques coupled with a more naturalistic, relationship-based approach that highlights decades of research on typical child development. ESDM integrates social-communicative development, imitation skills, social motivation, and naturalistic behavioral intervention approach (Rogers and Dawson 2010).

ESDM utilizes play therapy and positive reciprocal interactions to integrate a developmental curriculum designed for individuals based on current abilities and interests. Utilizing knowledge of typical development in infants, Rogers and Dawson created a model to accommodate this developmental trajectory in children at risk for ASD (Rogers and Dawson 2010). In practice, toddlers may be instructed in speech via nonverbal communication of smiles, gestures, and eye contact (i.e., skills that typically precede speech in typical children but which toddlers with ASD have not practiced). At the current time, ESDM is the only early intervention model validated in a randomized clinical trial for use with children with ASD as young as 18 months of age (Dawson et al. 2010). It has been found to be effective for children with ASD across an array of learning abilities. The ESDM couples the two modalities of autism intervention with the majority of research support. Results suggested that children possessing more significant learning challenges benefited from the model as much as children without great learning challenges (Rogers and Dawson 2010).

Origins

ESDM stems from the original Denver Model of 1981, Rogers and Pennington's 1991 model of interpersonal development, pivotal response training, and the model of social motivation of Dawson et al. 2010. Components of the original Denver Model have been implemented into the ESDM, including: (1) child's choice of activities, (2) positive affect toward the child, (3) turn taking and reciprocity, (4) empathic response toward the child, (5) fostering of communicative opportunities, (6) flexible variation in activities, (7) developmentally appropriate verbal and nonverbal language, and (8) scaffolding interests and behaviors through transitions (Rogers and Dawson 2010). The original Denver Model was deemed efficacious in peer-reviewed journals in 1989 as Rogers and Lewis reported gains in symbolic play and social communication (Rogers and Dawson 2010).

Those Serviced Under the ESDM

Unique to the ESDM, the model is an intensive intervention for toddlers with ASD coupling relationship-based approaches with ABA. ESDM is targeted at children aged 12–36 months with ASD. While the model targets toddlers, the programming

continues through ages 48–60 months in refining skills. Originally, the program was developed with preschoolers aged 24–60 months in mind. However, recent changes in early identification of ASDs warranted a program to be utilized with recently screened and identified toddlers (Rogers and Dawson 2010). ESDM is not intended for children older than 60 months of age or younger than 9 months of age. Prerequisites for the development of programming include an interest in object use and combining two objects in play. Children that meet these prerequisites can receive interventions from the ESDM. For children that are functioning at the level of 48 months, interventionists may need to develop an advanced curriculum, as the ESDM curriculum may not capture deficits or appropriate interventions (Rogers and Dawson 2010).

Implementation

This model can be implemented by early childhood professionals in areas of psychology, education, speech/language, Occupational Therapy (OT), and ABA (Rogers and Dawson 2010). The model is delivered by supervised interventionists focusing on treatment fidelity, as incorporated into the program's philosophy. Notably, the program includes a Teaching Fidelity Rating System to assess the interventionist's mastery of the practices included in the manualized treatment model. Using a Likert Scale allows interventionists to be assessed for competence. The marker for competence here is defined as 85 % or higher in each activity (Rogers and Dawson 2010).

In addition to interventionists, family members can receive training to implement teaching strategies in the home environment. Parents are instructed on therapeutic techniques for 1–2 h per week and incorporate learning into the “natural” home environment (Rogers and Dawson 2010). It is anticipated that parents will gain greater expertise into their child's current functioning as well as their child's remaining needs for areas of further growth. Children can eventually be transitioned out of the ESDM with the availability of community support transition services (Rogers and Dawson 2010).

Getting Started

The first step in the ESDM program entails an assessment utilizing the “Curriculum Checklist” located in the Appendix of the manual. Two or three short-term objectives are created for the child in each developmental domain. Developmental domains include: receptive communication, expressive communication, social skills, and fine and gross motor skills (Rogers and Dawson 2010). Based on results of the Curriculum Checklist assessment, the team leader creates the quarterly objectives, the task analysis for each objective, data collection system, and ensuing activities (Rogers and Dawson 2010). The checklist provides a comprehensive set of targeted goals for each child. A 12-week individualized plan is devised including specific

learning objectives. This process is repeated at the termination of the 12-week period, with new initiatives formulated (Rogers and Dawson 2010).

Short-Term Objectives

The Curriculum Checklist is organized into four skill levels which correspond with developmental age periods: (1) 12–18 months, (2) 18–24 months (3) 24–36 months, and (4) 36–48 months (Rogers and Dawson 2010). Skills focus more heavily on communication and social items, in comparison to typically developing peers (Rogers and Dawson 2010). The checklist is administered in a play-based interactive style, examining components of social and communication components. The assessment can be administered within one play session typically lasting 1–2 h. The conglomeration of the developmental curriculum, teaching strategies, and social interactions foster measurable treatment goals. The ESDM proposes the balancing of objectives from all domains rather than emphasizing one domain over all others. Placing too much emphasis on areas of weakness may lead to frustration for the child, whereas too much emphasis placed on strengths may yield uneven pattern of strength versus weaknesses—already present in many children with ASD (Rogers and Dawson 2010).

The authors recommend two to three objectives for each domain, developing 20 or more objectives per child. Typically, each goal includes four to six steps to be measured. In developing four to six steps, the interventionist may use a technique called “from the ends to the middle (Rogers and Dawson 2010, p. 81).” This entails beginning with the child’s baseline performance in step one with the last step describing the general criterion of the objective (Rogers and Dawson 2010). If an interventionist is not confident whether the child will be able to pass an objective in 12 weeks, the interventionist can write fewer objectives in that particular domain or break an item into smaller components (Rogers and Dawson 2010). Criterion of mastery entails an appropriate level of difficulty that is dependent on the knowledge of the child’s developmental rate.

Measuring Progress

ESDM achieves individuation of goals through incorporating family and child preferences/interests into teaching—a hallmark of the ESDM (Rogers and Dawson 2010). In cases where a child is struggling in progression of goals, a decision tree may be utilized in creating changes in teaching protocols if progress slows down or halts (Rogers and Dawson 2010). Under continual data review, the child’s performance is evaluated in an effort to minimize child frustration resulting from activities that may prove to be too difficult.

Under the ESDM, progress is measured under rules of criterion. Criterion measurements may be measured by number of skills learned, latency of response, percent

correct, or temporal duration (e.g., independent play in the absence of adult prompts) (Rogers and Dawson 2010). A word of caution is provided by the authors in the overutilization of percentage statements in dealing with criterion measurements. Percentages are most effective when the objective involves multiple behaviors over a period of time (Rogers and Dawson 2010). Well-written objectives allow for better operational definition of teaching effectiveness.

Tracking progress can be accomplished by examining the start date and the date passed for each objective. Employing a summary sheet for sessions 1 through 12, daily sheets summarize interval recordings of performance and cue the interventionist to skills and steps to be targeted (Rogers and Dawson 2010). At the end of a session, data should be acquired on performance of the maintenance and acquisition of each objective taught. If an objective is not covered in the current session, it can be the first to be covered in the following session (Rogers and Dawson 2010). Utilizing principles of ABA, ESDM promotes ongoing data collection and interpretation.

Topography of the ESDM

It is important while working with young children with ASD to appraise the physical environment since these children may be highly motivated to obtain favored objects. Materials that intrigue young children with ASD are, therefore, necessary in teaching sessions and eliciting positive responses (Rogers and Dawson 2010). The authors recommend an initial interaction in treatment as the imitation of the child by the interventionist. Through parallel play, young children may demonstrate positive responses to being imitated, while others may wish to control materials in the physical environment, allowing for interaction of the child and interventionist (Rogers and Dawson 2010). Once this interaction has materialized, the interventionist can become more active within the interaction. Depending on the child, the level of activity of the interventionist will vary in early sessions of intervention (Rogers and Dawson 2010).

Joint activities are an integral component of teaching within the ESDM. Joint activities encompass cooperative activity, playing together, and attending to the same stimulus (Rogers and Dawson 2010). At this point of implementation, social elements are being nurtured in the child. The joint activity allows teaching at three intervals: (1) adult response to child initiation, (2) prompts, and (3) delivery of positive consequences to child's response (Rogers and Dawson 2010). Teaching is then fostered when the child initiates an activity with the adult. A typical session involves a series of joint activities, lasting approximately 2–5 min each. With further success, activities increase in duration and may last up to 10 min (Rogers and Dawson 2010).

Outside of the intervals included in the ESDM, transitions are utilized as time periods in which learning may continue. The insertion of a cleanup routine allows children to shift from one activity to the next with a transition (Rogers and Dawson 2010). Ideally, children will learn to shift from one place to another independently. The interventionist needs to be cognizant of transitions and gauge whether the child

is independently engaged in the transition or if the child is being physically prompted (Rogers and Dawson 2010). Similarly, if a child does not want to make a transition from one activity to the next due to increased repetition of a preferred activity, a transition should not be avoided unless there are further opportunities for learning and engagement in this repetitive activity. A child's acquisition of shifting attention, when asked, will be a vital skill for children with ASD to acquire (Rogers and Dawson 2010).

Problem Solving

During the course of any teaching objectives, children may become defiant, engaging in a myriad of unwanted behaviors. Within the model, unwanted behaviors are identified and frequency data are subsequently collected (Rogers and Dawson 2010). Functional behavioral assessments are utilized in this application and the focus may be placed on a positive behavior management plan as well as parent coaching to use in the home environment (Rogers and Dawson 2010).

What happens when children are not progressing in the program? The authors appreciate that not one teaching approach can be utilized for all children. Therefore, a decision making tree is offered in these situations to guide the interventionist in helping the child best (Rogers and Dawson 2010). Teaching approaches are modified to accommodate learning. Progress can typically be measured in 3–5 days for children receiving 20 h or more of individual teaching. The authors suggest that more than a few weeks should not pass without modifying a teaching plan for an objective that is not fruitful (Rogers and Dawson 2010). Instruction may be adjusted by modifying reinforcement strength, adding structure, or adding visual aids (Rogers and Dawson 2010). Furthermore, it may be necessary to identify highly motivating natural reinforcers to stimulate the child.

ESDM Within Group Settings

While one-on-one interactions with children have been described thus far, ESDM can also be implemented within group settings, including early childhood programs. Individual learning within the group setting entails the broad development of goals with individual instructional periods (Rogers and Dawson 2010). Interventions with peers predominantly target areas that provide strong social rewards from each other. The areas include imitating other children, observing others, sharing with another child, turn taking, and requesting objects (Rogers and Dawson 2010). Advantages of group settings include the allowance of further interaction with same age peers.

This group model requires precision in planning and communication between team members. Typically, daily group schedules will be posted in the classroom for all members to view and access (Rogers and Dawson 2010). For optimal results,

the authors recommend individual learning interactions approximately every 30 s. Likewise, successful group experiences incorporate short (10 min) interactions with enjoyable activities in which all children are capable of being active members (Rogers and Dawson 2010). Notably, verbal scripts are utilized in these interactions to facilitate play interactions with other children. Here, the adult scaffolds the interactions between two children with basic skills called “play dates (Rogers and Dawson 2010, p. 203).” Although it is challenging to coordinate between teachers and children in a group setting, this modality can yield copious benefits.

Transitions to Kindergarten

As stated by ESDM authors, the optimal end result for children in the program is the transitioning to environments in which children can further succeed. When the child transitions from preschool to kindergarten, this provides an opportunity for a “real-life” transition. Along with this opportunity comes the fear that the transition may result in loss of the child’s developed skills when joining the new environment (Rogers and Dawson 2010). The communication of information from one educator to the next should begin as soon as possible prior to the transition. Particular materials, such as picture schedules, may be adapted to the new setting prior to the transition occurring (Rogers and Dawson 2010).

Evidence of Effectiveness

In the last decade, ASD were rarely identified prior to age 3 or 4 years. With endorsements from the American Academy of Pediatrics, children are now identified as toddlers; yet little research exists on how to intervene effectively for toddlers (Vismara et al. 2010). Few randomized controlled trials (RCTs) of early intensive intervention in ASD have been recognized (Cook 2010). RCTs of early intervention typically begin with children aged 40 months, despite the fact that the American Pediatric Association recommends screening prior to 18 months (Dawson et al. 2010). According to some researchers, the ESDM has established itself through rigorous empirical support and developmental sensitivity (Warren et al. 2011). Disparate from other modalities, the ESDM authors disseminate data regarding efficacy prior to publishing the program (Paul 2011; Warren et al. 2011).

The ESDM has gained acceptance as an efficacious program through various studies. In the first review, 48 children diagnosed with ASD ages 18–30 months were randomly assigned to either: (1) 2 years of ESDM intervention or (2) referral to commonly available interventions in the community (Dawson et al. 2010). Children receiving the ESDM intervention demonstrated significant improvements in adaptive behavior, IQ, and diagnosis of autism, compared to community-intervention counterparts. Selected few children in the ESDM treatment group received a change

in diagnosis from Autistic Disorder to Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), more so than the comparison group (Dawson et al. 2010). Relative to baseline scores, the 2-year study yielded an average improvement of 17.6 standard score points for those in the treatment group compared to just 7.0 points in the comparison group (Dawson et al. 2010). Similarly, the ESDM group maintained its rate of growth in the realm of adaptive behavior when compared with a normative sample of typically developing children (Cook 2010). While the ESDM group excelled over the 2-year period, the comparison group demonstrated delays in adaptive behavior (Dawson et al. 2010). According to Dawson et al. (2010) this is the first randomized controlled trial to demonstrate efficacy as a behavioral intervention for toddlers with ASD, improving cognitive and adaptive behavior coupled with reducing the severity of ASD diagnosis (Warren et al. 2011).

Cook (2010) reviewed the ESDM via use of the treatment manual and a trained university-based clinical research team. The ESDM team implemented 2-h sessions on weekdays for 24 months. Parents also implemented interventions at home for approximately 16 h per week (Dawson et al. 2010; Cook 2010). Improvements from mean standard Mullen Scales of Early Learning (MSEL) Early Learning Composite standard scores were reported: 61–79 for the ESDM group; 59–66 for the control group (Warren et al. 2011). On the Vineland Adaptive Behavior Scales (VABS) adaptive behavior composite: 70–69 in the ESDM group and 70–59 in the control group (Dawson et al. 2010). Changed diagnoses from Autistic Disorder to PDD-NOS were noted for treatment group members compared to controls (Dawson et al. 2010). While the children in the study were not “cured” of autism, improvements in ability to handle everyday tasks necessary for child functioning were observed (Cook 2010).

Further research including work by Rogers and Vismara (2008) lends support to the ESDM. A 9-month-old infant identified with a behavioral profile consistent with autistic disorder was provided with interventions from the ESDM. The infant received 12 weeks of individualized parent–child education (1.5 h per week). Results suggested that parents acquired numerous strategies related to the development of social communication behaviors within their infant (Vismara and Rogers 2010). Similarly, the severity of behavioral problems associated with ASD decreased.

Vismara et al. (2010) reviewed the efficacy of application of the ESDM. Vismara et al. (2010) focused on deficits in attention, communication, imitation, and play skills in young children with ASD as toddlers. Providing a 12-week program to eight newly diagnosed toddlers, this study allocated 1 h per week of individualized education to parents (Vismara et al. 2010). Parents employed “naturalistic therapeutic techniques” from ESDM with results suggestive of acquired parental strategies by the 6-week mark. At the midpoint of the 12 weeks, children exhibited sustained change in social communication (Vismara et al. 2010; Warren et al. 2011).

In the context of other early interventions for young children with ASD, Warren et al. (2011) systematically reviewed evidence of interventions for children aged 2 to 12. Studies between January 2000 and May 2010 were included in this review. Out of the 34 studies reviewed by these researchers, 1 study was rated as good quality, 10 as fair quality, and 23 as poor quality. Along with Lovaas–based interventions, the ESDM reported some improvements in cognitive performance, language skills, and adaptive behavior skills (Warren et al. 2011).

Suggested Weaknesses of ESDM

While specific studies comparing the ESDM to other approaches are not available at the current time, the authors of the ESDM point out that there is no “one best approach” for all children (Rogers and Dawson 2010, p. 33). Professionals working with children with ASD agree that early intervention is critical and they also agree on central aspects of this treatment (e.g., intensity, family involvement, and focus on generalization) (Corsello 2005). Difference in philosophy coupled with a lack of RCTs further exacerbates difficulties in comparing programs of early intervention for children with ASD (Rogers and Dawson 2010).

Although gains in cognition and language have been noted through utilization of the ESDM, it should be noted that these changes were not accompanied by improvements in social skills or repetitive behaviors (Dawson et al. 2010). One hypothesis suggests gains in social skills may take longer to develop than language or IQ (Warren et al. 2011). Warren et al. (2011) also add that it is difficult to parse out the effect of the total number of therapy hours on conclusions as control children received half the hours of intervention as treatment children received. As described by other researchers in the field of autism, significant variability exists as to how children will respond to interventions in general (Rogers and Vismara 2008). When averaging improvements in the treatment group, this average stems from a group of children making tremendous gains with others making little-to-no improvement (Corsello 2005; Warren et al. 2011).

The authors suggest that there are weaknesses within the model that are currently being addressed in replication studies (Dawson et al. 2010). One weakness lies within the delivery methodology of the program according to Vismara et al. (2010). As a clinic-based delivery method, the ESDM may limit access to parents. The addition of home delivery coupled with clinic delivery may enhance the program as natural and “artificial” settings would be accounted for (Vismara et al. 2010). In discussing the generalizability of skills learned in the clinical setting, training in the home setting would increase fidelity of skills learned in the natural setting (Vismara et al. 2010).

Regarding specific guidelines of the ESDM, critics argue that the manual is too prescribed or too technical for some audiences. For example, the manual proposes explicit arrangements for the therapy room (i.e., arranged to be empty with the exception of a table and chairs and a closed cabinet). While coined a “natural environment” by the authors of the ESDM manual, critics argue that this environment does not allow for natural, unmodified exploration of the environment by the child. Flexibility of the program comes into question by others when it is stated in the manual, “Our job is not to keep children happy; it is to teach them their objectives (Rogers and Dawson 2010).”

Some researchers have designated the ESDM as an “eclectic” intervention as it entails combining ABA- and non-ABA-based approaches. Strict behavior analysts claim that “eclectic” autism interventions are ineffective (Howard et al. 2005). The Association of Professional Behavior Analysts does not support eclectic approaches (Howard et al. 2005). Howard et al. (2005) compared intensive behavior analytic and

eclectic treatments for young children with autism (prior to the publication of the ESDM). Fourteen months following treatment, the researchers examined cognitive, language, and adaptive skills in young children. Although three groups (intensive ABA group, eclectic group, and nonintensive community intervention group) were similar on key variables at intake, the follow-up yielded higher mean standard scores in all skill domains for the intensive ABA group versus groups 2 and 3. Statistically significant differences were not found between the eclectic group versus the nonintensive community interventions group (Howard et al. 2005). Although this study was completed prior to the publication of the ESDM, it lends assistance in comprehending the suggested scrutiny toward eclectic approaches in autism interventions. Further research will be necessary in comparing ESDM to other “eclectic” approaches in the future.

Although authors lend support to the program through the RCT study, the design of the ESDM RCT has come into question just as the design of other RCTs come into question (Warren et al. 2011). As with most interventions, exclusion criteria were applied in this trial. Children with severe or profound intellectual disability were excluded from review. Parents reported approximately 15 h per week of home interventions along with 5 h of non-ESDM interventions (Warren et al. 2011). Although the RCT includes more children than other trials of autism interventions, the trial sample size remains small. Additionally, the description of the control group does not allow for elaboration or understanding of the group makeup. Similarly, blinding is extremely difficult in RCTs. Although evaluators are purported to be naïve regarding the intervention status of a child, they are not described as being blind to the purpose of the study or of ESDM (Warren et al. 2011).

Conclusion and Future Directions

The ESDM has gained acceptance as an efficacious program through various studies for rigorous empirical support and developmental sensitivity (Rogers and Dawson 2010; Warren et al. 2011). This promising new model responds to the need for earlier interventions reflecting identification of children with ASD in the toddler years. At the current time, ESDM is the only early intervention model validated in a randomized clinical trial for use with children with ASD as young as 18 months of age (Dawson et al. 2010). Disparate from other modalities, the ESDM authors disseminate data regarding efficacy prior to publishing the program (Paul 2011).

According to the ESDM authors, the ESDM will allow for the provision of an individualized curriculum with a predictable routine for children and adults (Rogers and Dawson 2010). Coupling focused interactions with play-oriented and relationship-based approaches, a high level of structure can be provided with ongoing data collection and interpretation (Rogers and Dawson 2010). Similarly, the model maintains a focus on treatment fidelity to assess the application of the model and mastery of the practices included in the treatment manual. In application to various environments, “A classroom using the ESDM emphasizes children’s development of

independence, encouragement of social relationships and interactions, and the development of more and more sophisticated communication skills (Rogers and Dawson 2010, p. 207).”

As with all early behavioral interventions, longer term follow-up studies and replications will be required to demonstrate the consistency of evidence over time. The authors are confident that the benefit of their treatment approach is efficacious in posing an impact in improvements for children with early signs of ASD (Rogers and Dawson 2010). A variety of studies have indicated increases in language and cognitive abilities, adaptive skills, and social interaction with use of the ESDM.

While positive outcomes are reported in most cases of early intervention, the field does not yet possess treatment that meets the present criteria for well-established or probably efficacious treatment (Rogers and Vismara 2008). Most notably, will research findings translate to the community settings for any of these approaches? Further research requires evaluation, including age at start of treatment, treatment modality, intensity, and baseline language/IQ (Rogers and Dawson 2010). Recent preliminary data for intensive intervention in children younger than 2 years have been identified; however, these studies need to be replicated. Similarly, researchers need to identify which children are likely to benefit from which treatments and how well they will respond to interventions (Warren et al. 2011).

References

- Baranek, G. T. (1999). Autism during infancy: A retrospective video analysis of sensory-motor and social behaviors at 9–12 months of age. *Journal of Autism and Developmental Disorders*, 29(3), 213–224. doi:10.1023/A:1023080005650.
- Bourgondien, M., & Coonrod, E. (2012). TEACCH: An intervention approach for children and adults with autism spectrum disorders and their families. In S. Goldstein & J. Naglieri (Ed.), *Intervention for autism spectrum disorders*. New York: Springer Science.
- Centers for Disease Control and Prevention. (2009). Autism and family history. Retrieved October 8, 2009 from <http://www.cdc.gov/genomics/resources/diseases/autism.htm>.
- Cook, E. H., Jr. (2010). Reduction of increased repetitive self-grooming in ASD mouse model by metabotropic 5 glutamate receptor antagonism; randomized controlled trial of early start Denver model. *Autism Research*, 3(1), 40–42. doi:10.1002/aur.118.
- Corsello, C. (2005). Early intervention in autism. *Infants and Young Children*, 18(2), 74–85. doi:10.1097/00001163-200504000-00002.
- Dawson, G., Rogers, S., Muson, J., Smith, M., Winter, J., Greenson, J., Donaldson, A., & Varley, J. (2010). Randomized, controlled trial of an intervention for toddlers with autism: The Early Start Denver Model. *Pediatrics*, 125(1), e17–e23. doi:10.1542/peds.2009-0958.
- Greenspan, S. I., & Wieder, S. (2005). Can children with autism master the core deficits and become empathetic, creative, and reflective? A ten to fifteen year follow up of a subgroup of children with autism spectrum disorders (asd) who received a comprehensive developmental, individual difference, relationship based (dir) approach. *The Journal of Developmental and Learning Disorders*, 9, 39–61.
- Ghaziuddin, M. (2005). *Mental health aspects of autism and asperger syndrome*. London: Jessica Kingsley.
- Ghuman, J. K., Peebles, C. D., & Ghuman, H. S. (1998). Review of social interaction measures in infants and preschool children. *Infants and Young Children*, 11(2), 21–44.

- Gutstein, S. (2005). Relationship development intervention: Developing a treatment program to address the unique social and emotional deficits of autism spectrum disorders. *Autism Spectrum Quarterly* (Winter).
- Howard, J., Sparkman, R., Cohen, H., Green, G., & Stanislaw, H. (2005). A comparison of intensive behavior analytic and eclectic treatments for young children with autism. *Research in Developmental Disabilities, 26*(4), 359–383. doi:10.1016/j.ridd.2004.09.005.
- Howlin, P., Magiati, I., & Charman, T. (2009). Systematic review of early intensive behavioral interventions for children with autism. *American Journal on Intellectual and Developmental Disabilities, 114*(1), 23–41. doi:10.1352/2009.114;23-41.
- Paul, R. (2011). Sally J. Rogers and Geraldine Dawson: Review of Early Start Denver Model for young children with autism: Promoting language, learning, and engagement. *Journal of Autism and Developmental Disorders, 41*(7), 978–980. doi:1007/s10803-010-1041-8.
- Rogers, S. J., & Dawson, G. (2010). *The Early Start Denver Model: Promoting language, learning, and engagement*. New York: Guilford.
- Rogers, S. J., & Vismara, L. A. (2008). Evidence-based comprehensive treatments for early autism. *Journal of Child Adolescent Psychology, 37*(1), 8–38. doi:10.1016/S0140-6736(10)60300-5.
- Rubin, E., Prizant, B., Laurent, A., & Wetherby, A. (2012). Social Communication, Emotional Regulation and Transactional Support (SCERTS). In S. Goldstein & J. Naglieri (Eds.), *Intervention for autism spectrum disorders*. New York: Springer Science.
- Stone, W. L., Coonrod, E. E., & Ousley, O. Y. (2000). Brief report: Screening tool for autism in two year olds (STAT): Development and preliminary data. *Journal of Autism and Developmental Disorders, 30*(6), 607–612. doi:10.1023/A:1005647629002.
- Vismara, L. A., Colombi, C., & Rogers, S. J. (2009). Can one hour per week of therapy lead to lasting changes in young children with autism? *Autism, 13*(1), 93–115. doi:10.1177/1362361307098516.
- Vismara, L. A., & Rogers, S. J. (2010). Behavioral treatments in autism spectrum disorder: What do we know? *Annual Review of Clinical Psychology, 6*, 447–468. doi:10.1146/annurev.clinpsy.121208.131151.
- Vismara, L. A., Young, G. S., & Rogers, S. J. (2010). Community Dissemination of the Early Start Denver Model: Implications for Science and Practice. *Topics in Early Childhood Special Education, 30*(1), 1–12. doi:10.1177/0271121411409250.
- Warren, Z., Veenstra-VanderWeele, J., Stone, W., Bruzek, J. L., Nahmias, A. S., Foss-Feig, J. H., Jerome, R. N., Krishnaswami, S., Sathe, N. A., Glasser, A. M., Surawicz, T., & McPheeters, M. L. (2011, April). Therapies for Children With Autism Spectrum Disorders. Comparative Effectiveness Review No. 26. (Prepared by the Vanderbilt Evidence-based Practice Center under Contract No. 290-2007-10065-I.) AHRQ Publication No. 11-EHC029-EF. Rockville, MD: Agency for Healthcare Research and Quality. www.effectivehealthcare.ahrq.gov/reports/final.cfm.
- Warren, Z., McPheeters, M. L., Sathe, N., Foss-Feig, J. H., Glasser, A., & Veenstra-VanderWeele, J. (2011). A systematic review of early intensive intervention for autism spectrum disorders. *Pediatrics, 127*(5), e1303–e1311. doi:10.1542/peds.2011-0426.