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Differential Response to a School-Based Program for Young Children With ASD

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Abstract

Differential outcome and differential response to research-based interventions are challenging issues for researchers, teachers, and families of young children with autism spectrum disorder (ASD). In this article, the authors present information on responders to an early education program, Project DATA (Developmentally Appropriate Treatment for Autism), designed for children with ASD. Using case study methods, the authors identified six themes that were associated with optimal responders. The themes include the following: responders made continual progress, their challenging behaviors served clear functions, teachers were able to identify motivators, responders became sociable, they learned efficiently in group arrangements, and they generalized new skills. Findings are discussed in terms of implications for individualizing intervention approaches within the context of comprehensive treatment models.

Keywords

autism spectrum disorders, case study, early education

In the two decades since the seminal Lovaas (1987) study that changed the way that families, researchers, and advocates talk about interventions for young children with autism spectrum disorder (ASD), there has been an explosion of both scientific and popular press reports about ASD. These reports have touted new information about causes, cures, and interventions. Some of this information includes reports of pseudoscience, something that has always been prevalent in ASD, but much of it has included important advances in treatment for children with ASD (Howlin, Goode, Hutton, & Rutter, 2009; Reichow & Woolery, 2009; Rogers & Vismara, 2008). In fact, in a recent review, Odom and his colleagues (Odom et al., 2010) stated that evidence of effectiveness was the weakest area of documentation that they found. Finally, even the interventions with the best documented outcomes, using the most convincing research designs (Dawson et al., 2009; Lovaas, 1987), only report the best outcomes for approximately 50% of the participants.

Variability in outcomes continues to be one of the most perplexing problems facing researchers working in the field of ASD. Despite an increasing amount of research on a number of treatment approaches, we still are unable to predict what child and family characteristics are related to best outcomes. Schwartz, Sandall, McBride, & Boulware, 2004 and others with data from multiple replications, across investigators, using randomized group designs (e.g., Lovaas Young Autism Project; Lovaas, 1987; Reichow & Woolery, 2009). On the other hand, Odom and his colleagues (Odom et al., 2010) identified 30 comprehensive treatment models (CTMs) for students with autism that met their six criteria, including (a) a published description of the model in a refereed publication, (b) a procedural manual, (c) a conceptual framework, (d) the model must address multiple developmental domains, (e) the model must be intensive, and (f) the model had to be implemented in at least one site in the United States.

These 30 CTMs demonstrate some of the promises and concerns in the area of intervention for young children with ASD. On one hand, there are many choices of interventions that have some preliminary effectiveness data (e.g., Project DATA [Developmentally Appropriate Treatment for Autism];
outcomes, and how outcomes in early childhood are related to later school success (Estes, Rivera, Bryan, Cali, & Dawson, 2010). The observed variability in outcomes may be attributed to a variety of factors, including features of the intervention, characteristics of the child, family risk and opportunity factors, and the description of the outcome measures (Wolery & Garfinkle, 2002). This variability in outcomes encourages us to parse out what factors might account for good or disappointing outcomes. Research in this area might lead to matching effective interventions with individual children and their unique learning characteristics so that more consistent outcomes are produced. In Guralnick’s (1997) terms, we must apply “second-generation” research to the everyday practice of early intervention.

In a wide array of studies examining later performance of children with ASD, researchers have tried to identify what child variables are correlated with or might be good predictors of overall gains. For example, in follow-up studies using records reviews, higher IQ, use of speech by age 5 years, and/or severity of the symptoms of autism have been identified repeatedly to be good predictors of good outcomes for children with ASD (DeMyer et al., 1973; Gillberg & Steffenburg, 1987; Lotter, 1974, 1978; Rutter, 1970, 1985; Sigman & Ruskin, 1999). However, even though these studies show that children with higher IQ do better than those with a cognitive deficit in addition to ASD, they do not answer the question of why children with the same level of cognitive ability before intervention may respond differentially to the intervention. Interestingly, recent research suggests that IQ scores at the end of preschool may not be predictive of academic achievement in elementary school (Estes et al., 2010). This adds further confusion to the attempt to both identify which children with ASD are most likely to be good responders and how should consumers (e.g., parents, teachers, and people with ASD) of early intervention programs for children with ASD define good outcomes.

Other analyses have attempted to identify those child variables or characteristics that might be predictive of good outcomes for children with ASD who participated in planned early intervention programs. The results are somewhat mixed. Among the variables identified are IQ and verbal communication as predictors or early indicators of good outcomes (Harris & HANDLEMAN, 2000; McEachin, Smith, & Lovaa, 1993; Venter, Lord, & Schopler, 1992). Other studies have identified more specific variables that appear to be potential predictors of good outcome or positive response to early intervention. Joint attention (i.e., gaze shifting between two people and an object or event), imitation, and play skills have all been found to predict good early intervention outcomes (Bono, Daley, & Sigman, 2004; Charman et al., 2003; Sigman & McGovern, 2005; Toth, Munson, Meltzoff, & Dawson, 2006).

Variables related to the nature of the program or intervention have also been examined. Early age of entry into intervention (<48 months; Fenske, Zalenski, Krantz, & McClannahan, 1985) and intensity of treatment (Lovaa, 1987) have been cited as variables likely to predict good outcomes. Again, however, the literature is mixed. Eaves and Ho (2004) found that the amount or type of intervention was not predictive of good outcomes, but rather, nonverbal IQ score prevailed as predictive of outcomes as did severity of autism. Although Gabriels, Hill, Pierce, Rogers, and Wehner (2001) found IQ to be a highly predictive variable for good outcomes, they did not find language, age at entry, amount or type of intervention, or family stress to be highly correlated with outcomes.

More recently, prospective studies have added to our knowledge. Szatmari, Bryson, Boyle, Streiner, and Duku (2003) found that early verbal language and nonverbal skills were predictive of outcomes in adaptive behavior, communication, and socialization for children with higher functioning autism and Asperger syndrome. That is, children who scored higher at intake demonstrated better outcomes after 6 years. Stone and Yoder (2001) found that motor imitation skills and more hours of participation in speech/language therapy were associated with better expressive language outcomes for children with ASD. However, they did not find joint attention and object play to be predictors of expressive language development as in other studies. Finally, Estes and her colleagues (2010) reported that improvements in social skills at age 6 in children with ASD may be more predictive of academic achievement at age 9 than IQ scores.

In recognition that some children with ASD may not learn effectively even when taught with methods that are supported by research, the current project proposes that it may be possible to identify variables that might be used to select appropriate interventions that can be implemented so the child does not have to fail in an intervention that might not be well suited to that child. For example, Sherer and Schreibman (2005) identified potential responders and nonresponders to pivotal response training based on their analysis of archival records of children with autism participating in this treatment approach. In an intervention study, they found that newly enrolled children who matched either responder (e.g., interest in toys, tolerant of others nearby, lower rates of nonverbal self-stimulatory behaviors, higher rates of verbal stimulatory behaviors) or nonresponder (e.g., low rates of toy play, low rates of approach behaviors, low rates of verbal self-stimulatory behaviors, modest rates of avoidant behavior, and modest rates of nonverbal self-stimulatory behavior) profiles demonstrated improvements or lack of improvement as expected.

The issue of variable outcome as well as varying response to research-based interventions remains a vexing one for researchers, teachers, and families. In this article, we present
information on responders to an early education program for children with ASD (Project DATA; Schwartz et al., 2004). Project DATA is a behavioral approach to early intervention that provides children integrated preschool experiences and intensive, explicit instruction. In the decade-plus that we have been operating our program, more than 55% of our students leave the program and enter integrated elementary school classrooms. Like other treatment programs mentioned above, we have many students who achieve exceptional outcomes and others who make slow, but steady, progress but whose overall progress is disappointing. Our primary purpose for developing and analyzing the case studies reported here was to understand why some children with ASD respond well to this intervention approach and do those children share common characteristics. We were equally interested in identifying common characteristics of students who made disappointing progress in Project DATA. From the results of these case studies, we expected to uncover other features or characteristics that could be used in the future to develop strategies to better match children and their families to potential approaches to early intervention.

Method

We used a multiple-case study method to document, describe, and analyze the progress of children who participated in the program (Yin, 2003). Such a methodology was appropriate for this study because it allowed us to regard the individual child as the unit of analysis. We used archival records, including student progress data, documents, school reports, and interviews with key informants to develop a comprehensive look at the participation and response of each of these children while enrolled in the program. We then analyzed the case studies to identify potential themes or variables that seemed to influence a positive response to the intervention program.

Conceptual Framework

The children we describe were all enrolled in a model demonstration project that began in response to community needs and the increasing numbers of young children with a diagnosis of autism. The model has five components: a high quality inclusive early childhood experience, extended instructional time, technical and social support for families, collaboration and coordination across services, and transition support for children and families (Schwartz et al., 2004). The model is guided by the following elements associated with effective programs (Dawson & Osterling, 1997):

- Curriculum content that addresses the ability to
  - attend to elements of the environment
  - imitate others
  - use and comprehend language
  - play appropriately with toys
  - interact socially with others
- Highly supportive teaching environments and generalization strategies
- Classroom environments that are predictable and routine
- A functional approach to behavior problems
- A planned transition from the preschool to elementary school
- Family involvement.

Project DATA was established prior to publication of the National Research Council’s report (2001), yet it incorporates the major findings from that report. The model blends the strengths of different disciplines (i.e., early childhood education and applied behavior analysis) with the goal of creating a comprehensive and effective educational program for young children with ASD.

Setting

All children in this study attended an early childhood center located on a university campus and closely associated with the local school district. The center serves children from birth through 6 years of age in infant–toddler playgroups, half-day preschool classrooms, and full-day kindergarten. Two thirds of the children in each preschool and kindergarten classroom are eligible for special education, whereas the remaining one third are typically developing. Half of the infants and toddlers participating in the playgroups qualify for Part C services. Children attend the playgroup twice per week; preschool and kindergarten classes are held 5 days per week. The children who qualify for special education in each classroom present with a multitude of strengths, needs, and diagnoses. Classroom teams consist of a head teacher, assistant teacher, occupational or physical therapist, and speech–language pathologist; all related services are integrated into the preschool classroom. All classroom teachers had a master’s degree in special education, and assistant teachers in every classroom were currently students working on their teaching certification in special education. The goal of the center is to provide classroom activities that promote dynamic interactions between children and the environment, in a family-centered and developmental-behavioral approach to instruction and curriculum (Allen & Schwartz, 2001).

The extended instructional day component takes place in the same early childhood center. Children who have a diagnosis of ASD and are a part of the Project DATA model participate in an extended instructional day. This more intensive intervention component focuses on highly individualized instruction and addresses areas of need identified...
by families and others on the child’s team. Instruction is aimed at increasing the children’s success in accessing developmentally and age-appropriate activities and improving his or her functioning at home and in community settings. Instruction is guided by behavioral principles and occurs in one-to-one or small group arrangements. Preschool-aged children participate in 1 and 1.5 hr of extended instruction time each day of the school week, for a total of 20 hr a week of classroom time. The parents of preschool children also received monthly home visits from the Project DATA teachers and were invited to attend a monthly parent education event at the center. Toddlers attend 3 days per week (i.e., the days they do not have play group) for 2 hr each day for a total of 9 hr a week of classroom time. Toddlers with ASD were offered a weekly 2-hr home visit, and their parents were also invited to the monthly parent education event.

Participants
To identify the participants in the study, we interviewed Project DATA staff members who had 3 or more years of experience with the project. These eight staff members were familiar with all of the 50 students who had participated in DATA to that point in time. They were shown the list of all students who had participated as well as a written description of an “optimal” responder. They were asked to nominate those children who were “optimal” responders. An optimal responder was described as a child who responded well to the treatment and who had made good progress and demonstrated good outcomes. Optimal responders were not necessarily the highest performing children but rather, those who seemed to respond particularly well to the DATA treatment package. In addition, we asked the same nominators to identify “poor” responders. A poor responder was described as a child who did not respond well to the treatment and who had made little or very slow progress. Midway through the study, we returned to the nominators and asked them to identify another category of children, those who had not made as much progress as initially expected.

We compiled all of the lists of nominees and found that four children were nominated as “optimal” responders by all staff members. There were three boys and one girl. From this list, we selected two boys and one girl to be used for in-depth data collection. The fourth child had not yet graduated from DATA. Later in our analysis, we constructed a mini case study for this child and used it to confirm themes that emerged from analysis of the other three responders. Three children were nominated as “poor” responders (two boys and one girl) by all staff members. Finally, two children (boys) were nominated to the “not as well as expected” category of response to the DATA treatment approach. All children had a diagnosis of ASD from specialists external to the project.

Data Collection and Analysis
Before data collection began, the research team met to discuss the research questions, the proposed design, and case methodology. Next, the team developed a written guide for data collection. The research team formed three pairs with each pair assigned to construct an in-depth case study of the original three optimal responders. Each pair included one person who had taught the target child for at least 1 year. The data for each child were collected according to principles outlined by Yin (2003); we used multiple sources of data, developed a case study database, and constructed a chain of evidence that linked the research questions, data, and conclusions. We used a combination of archival records (e.g., test scores and progress reports), documents (e.g., individualized education plans [IEPs]), parent report, and informal interviews with teachers to collect data. In addition to the case study, we constructed charts for each child that detailed (a) year-by-year performance on standardized and curriculum-based measures, (b) objectives by domain on annual IEPs/individualized family service plans and corresponding progress reports, and (c) instructional programs developed to address behaviors and skills related to the core deficits of ASD and the corresponding performance data for each program.

The team met monthly during the 5 months of data collection. At these meetings, reports were given and emerging themes were discussed. Through these meetings, the team assured that similar data sources were used and comparable evidence was collected across case studies. As a theme emerged, the research team tested it by constructing confirming and disconfirming tables. Those themes that showed consistency across the optimal responders were further tested by reviewing comparable data for the poor responders.

Midway through the data collection process, the team determined that it was important to compare the preliminary findings from the optimal responder case studies with contrasting DATA participants. The team observed that while the poor responders showed a clear contract to optimal responders (e.g., poor responders made slow or sometimes no progress), there were other participants who had shown strong initial response to the intervention but whose later performance was disappointing. At this point, we returned to the nominators and asked them to identify participants who had “not done as well as expected.” Mini case studies were developed for two children who were identified by all nominators. Following cross-case analysis, of the “optimal” and “not as well as expected” cases, we developed a mini case study for the fourth optimal responder to confirm our findings.

Validity and credibility were established in several ways. We used multiple sources of evidence. We developed case study databases that followed consistent guidelines. Finally,
the research team read each of the case studies and met regularly to discuss emerging themes and test alternative theories.

Case Studies

Responders

Natalie. Natalie entered the infant/toddler program at 32 months of age. She lived at home with her parents and two older siblings, one of whom had a diagnosis of autism. Recent immigrants to the United States, the family speaks two native languages in addition to English. Both parents are professionals and mother attended night school while Natalie was in our program. An aunt lived with the family and helped care for the children.

At entry, Natalie qualified for special services in the social, adaptive, and communication domains. On the Bayley Scales of Infant Development, she earned a Mental Development Index (MDI) of 54 (i.e., significantly delayed performance). In addition to attending the toddler playgroup, Natalie received private speech therapy once a week. Shortly before her third birthday, Natalie received a diagnosis of Pervasive Developmental Disorder, Not Otherwise Specified. At age 3, she enrolled in the preschool program and Project DATA and attended for 2 years before making the transition to a kindergarten classroom at the center. Natalie received no private therapies or other services during her preschool and kindergarten years. Natalie attended school regularly, and after kindergarten, she transitioned to an inclusive classroom in her school district with support from special education services. At exit, Natalie’s IQ on the Stanford-Binet was 83.

When Natalie began attending the toddler playgroup, she used few words and had minimal functional communication. She had long, strong, and frequent tantrums, and did not follow simple directions or classroom routines. (Note: Descriptors for participants are drawn from progress reports.) A behavior plan consisting of ignoring the tantrums and reinforcing (primary and social) appropriate behaviors was successful in decreasing the tantrums and engaging Natalie in the playgroup activities. Natalie responded well to the organized environment and use of prompting procedures, reinforcement, and visual supports. After only 4 weeks in the preschool program and Project DATA, Natalie learned basic imitation skills, including verbal imitation, and began using verbal communication functionally. She quickly learned the classroom routines, followed simple directions, and began to increase her vocabulary. In addition, she became very receptive to adult and peer interactions, greeting familiar people in the hall and classrooms. After the first month of preschool, she was grouped with a peer for her instructional time in Project DATA. By the end of her first year of preschool, Natalie was talking and playing with peers; she had gained numerous social, cognitive, and language skills.

In her second preschool year, Natalie received all of her special instruction in a small group arrangement. She continued to make steady progress in language, social, and cognitive areas. She demonstrated minimal challenging behaviors. Her final progress report before leaving kindergarten states that in reading, Natalie has progressed into the top reading group and not only reads very well, but she enjoys it immensely . . . Natalie is a very social little girl and loves to interact with the other students in our class. She has great friendships . . . which she has maintained throughout the school year. She also loves to tell jokes, laugh, and please adults.

James. James entered the infant/toddler program at 21 months of age. He lived at home with his mother, father, and older sister. His father was an executive, mother worked part-time, and the children were cared for by a full-time nanny. James was referred to our program because of speech and language delays. He began the infant/toddler program and Project DATA concurrently, shortly after receiving a diagnosis of autism. Separation was difficult for James and his caregivers. His mother remained with his playgroup for about a month and then his nanny remained with him for several more months. While enrolled in the infant/toddler program, James also received about 4 hr per week of private speech and behavioral therapy. Due to interfering behaviors, the evaluation team was unable to establish a standardized score for James on any standardized, norm-referenced test at entrance to the infant/toddler program.

James transitioned to the preschool program and the preschool Project DATA classroom at age 3. During his preschool years, he continued to receive private speech therapy once a week and in-home applied behavior analysis (ABA) programming for approximately 4 hr per week. James attended school regularly. During his first year in the Project DATA preschool classroom, James was grouped with another student during instructional time. In his second year of preschool, his team reduced his Project DATA attendance to 3 times per week. After 2 years of preschool, James transitioned to a kindergarten class in the community and no longer received special education support. He scored a developmental quotient of 84 on the Battelle Developmental Inventory at exit from our program.

During the first month in the toddler playgroup, James was inconsolable despite his mother’s presence. One teacher described him as “leaking from everywhere—crying, drooling . . . his nose.” His teacher found it difficult to get to know him or to identify preferred activities or toys. Slowly, he learned to follow the routine through the teacher’s use of
visual supports. In the playgroup, he did not use words or gestures. His mother reported that he reached to be picked up, led her places with her hand, engaged in several repetitive behaviors, and tantrumed with headbanging. Mother also reported that James kept himself busy by wandering around and playing with wheels and cars.

At first, James demonstrated minimal response to discrete trial teaching. Consequently, his team opted to use a more responsive teaching approach and followed James’ lead to establish interactions with him. After 5 months, James began to show an increase in skills such as gross motor and verbal imitation, pointing, and playing social games such as chase. He imitated actions in videos at home before imitating actions of teachers. At about the same time, he quickly moved through the early phases of the Picture Exchange Communication System (PECS), and his mother reported that he also began to initiate play with his older sister at home. He continued to make regular progress in the infant/toddler program. By the time he entered preschool at age 3, he was using verbal language as well as PECS, imitating, demonstrating many early concepts, and participating in social games. He participated in learning activities alongside his peers.

Throughout his preschool experience, James was taught in small group arrangements. Instructional programming focused on social and communication behaviors, including conversational skills with peers and adults, increasing his vocabulary, playing games, and articulating emotions. He demonstrated few challenging behaviors by this time. James was considered very outgoing and enjoyed being with adults and peers. He enjoyed jokes and being silly to make others laugh. In his transition report, his teacher stated that “he has many friends and enjoys imaginative play, creative art projects . . . follows rules, participates in group activities, and contributes to social and group discussions.”

**Thomas.** Thomas entered the infant/toddler program and Project DATA at 32 months of age with a diagnosis of autism. Prior to diagnosis, he attended a nearby early intervention program. He received additional private speech therapy once a week. Thomas lived at home with both parents and an older sister. Both parents worked full-time in professional positions. His grandparents provided childcare for the children. During his preschool years, Thomas’ mother became unemployed and then the parents separated. Both parents remained involved in Thomas’ care and educational programming. His grandparents continued to provide child care assistance. Thomas received an MDI of 75 (i.e., mildly delayed performance) on the Bayley Scales of Infant Development at the time of enrollment in the early intervention program.

At age 3, following 3 months in the infant/toddler program, Thomas transitioned to preschool. He attended preschool and Project DATA for 2 years before attending the kindergarten classroom. Following graduation from our kindergarten program, Thomas transitioned to another year in kindergarten in his neighborhood school with special education support. During his preschool years, Thomas received private speech and occupational therapy. In addition, he received in-home behavioral therapy for approximately 4 to 6 hr per week. Thomas maintained regular attendance while in the toddler, preschool, and kindergarten programs. Evaluations at the kindergarten transition showed a moderate delay in both receptive and expressive language, significant delays in gross motor skills, mild delays in fine motor skills, and average preacademic skills for his age. His performance was reported as low to average intelligence on the Stanford-Binet.

At entry to the infant/toddler program, Thomas was described as inflexible. One of his preferred activities was lining up small toys. His mother reported that he babbled and said “mama” and “dada.” Although his teacher reported some challenging behaviors, including headbanging, these were addressed through visual supports and reinforcement for appropriate behavior. His teacher described him as “high needs” because of his need for visual schedules, pictures, and a timer, but she also considered him “easier” than some of the other children in his class due to the clarity of the functions of his challenging behaviors. Thomas made quick progress through the early phases of the PECS protocol. By the time he exited the toddler program (after approximately 3 months), Thomas played near his peers during free choice time, and he responded more appropriately and affectionately to social interactions from staff. His teachers reported that he had an easy transition to preschool even though it occurred at midyear. His preschool teachers used picture schedules and other visual supports to help him learn the new classroom routine.

During preschool, Thomas continued to make progress in using PECS, imitating, and using gestures. His visual skills exceeded his other skills, and he quickly learned to match all types of pictures and objects. Receptive language skills were a struggle for Thomas. It took him approximately 7 to 8 months to follow simple one-step directions and identify pictures and objects receptively. In addition, learning to wait, taking turns, and sharing his toys were also challenging skills for him to learn.

At the beginning of his first full year of preschool Project DATA, Thomas was paired with another child for instruction and then remained with a small group for instruction throughout his time in the Project DATA classroom. Thomas demonstrated challenging behaviors at various times during his preschool years. His headbanging resurfaced; he wore a soft-sided helmet for a time and the behavior was ignored and it diminished. A variety of troubling behaviors that seemed to indicate frustration with his verbal communication difficulties persisted. Though his team taught him alternative communication behaviors, these were never quite quick enough to completely replace his
mildly aggressive behaviors. Despite these behaviors, Thomas was considered a social and likable peer who had friends in his classroom. His programming focused on receptive and expressive language, play skills, and social skills, including entering and participating in games.

Thomas continued to make progress in all areas of development. In kindergarten, his special instruction focused on more sophisticated social behaviors, receptive and expressive language, social problem solving, and preacademics. When he left our early childhood program, his transition report stated that he had “preferred play partners and will often initiate play with these peers or join in cooperative play with them.” In addition, his kindergarten teacher described Thomas as “continuing to impress us with his ability to learn quickly . . . and surpass all our expectations on a regular basis.”

“Not as Well as Expected” Responders

Teddy. Teddy began the toddler program at 34 months of age, approximately 6 months after receiving a diagnosis of autism. He remained in our program throughout preschool and then left to join a special education classroom for kindergarten in his school district. He lived at home with his parents and two older siblings. He received private speech therapy and occupational therapy, with sensory integration for a short time. For approximately 2 years, he followed the gluten-free/casein-free diet (GF/CF). In addition, he participated in auditory integration therapy. He also received in-home behavioral intervention that included one-to-one intervention at least 12 to 15 hr per week.

When he began the toddler program, Teddy presented many challenging behaviors, especially during transitions. Once visual supports were used to help him understand the classroom routine and transitions, Teddy quickly learned the routine and contingencies, and his challenging behaviors decreased dramatically. In addition, he quickly learned the first three phases to the PECS, which also helped in decreasing his challenging behaviors. When he began our program, Teddy had clear motivators and was especially motivated by adults whom he became attached to, appearing to seek praise from them when he had responded correctly.

During his first few months in the program, Teddy rapidly learned several skills, including using gestures, such as pointing to request desired objects, imitating actions with and without objects, following directions, receptively identifying many objects and pictures in his environment, using PECS, matching objects and pictures, and sustaining functional play with objects. Teddy’s teachers were excited about his progress. However, after approximately 6 months in our program, Teddy’s learning stalled. He no longer found adults motivating, and he became more intrigued with sensory stimulation, including watching items fall (i.e., he threw and dropped items from a high distance). In addition, his classroom reports note that his challenging behaviors decreased but never disappeared; he usually found another behavior to replace the challenge that adults were working to reduce. Related to these challenging behaviors, it was not until Teddy’s last year in our program that he was taught alongside another student. Until this time, he was taught in one-to-one arrangements for specialized instruction. In his preschool classroom, Teddy rarely played near other children unless assisted by an adult. If left on his own, he spent his free choice and recess time dropping balls into a basketball hoop.

Allen. Allen began his intervention in the toddler program at the age of 17 months, immediately following a diagnosis of ASD. He remained in our program throughout preschool and then exited to attend a self-contained classroom in his school district. He lived at home with his parents. Allen received private speech therapy and occupational therapy that used sensory integration as its primary form of treatment. He also followed the GF/CF diet for a couple of years. In addition, he received in-home behavioral intervention for approximately 10 to 15 hr/week, and his nanny was trained to use ABA techniques.

At entrance to the toddler classroom, Allen was described as easy going and not challenging to his teachers. He demonstrated functional play with toys (i.e., activating cause and effect toys and playing appropriately with cars). His communication skills included babbling, saying a few words, and reaching to make requests. Allen made good eye contact, although he was not able to establish joint attention. Allen was able to follow simple routine directions and quickly learned other simple novel directions.

During the first few months of his intervention, Allen learned some new skills quickly, such as imitation with objects, following simple directions, pointing to request, verbal imitation, and requesting preferred items using one word. In addition, he used expressive language to label items in his environment. Allen’s teachers were impressed with his initial progress, but it became apparent after several months in the toddler program that after learning new skills, Allen had difficulty using these behaviors fluently and in other environments. After about 6 months in the program, Allen’s learning hit a plateau, and the following year in the toddler program, Allen’s learning regressed.

Allen received his specialized instruction in one-to-one or one-to-two arrangements. However, when taught alongside a peer, he was highly distracted. He was continually challenged by stimuli in his environment to learn his new skills fluently and generalize these skills. In addition, it was difficult for his teachers to find clear motivators for him. His reports state that Allen would “check out” and gaze at other children or activity in the room. At one point during his programming in Project DATA, he was removed from his busy classroom to learn in a quiet setting alone with his teacher. This was helpful in learning some new skills;
however, despite extensive programming, he was not able to generalize skills to other settings. Allen rarely played near other children without assistance from a teacher. If left alone during free choice time, Allen stood at the sensory table and let the sand or water trickle through his fingers for the entire session.

Findings

We identified six themes that were associated with our optimal responders and were not associated with the poor responders or with the children who did not respond as well as expected.

Responders make continual progress and do not show plateaus or regression. All three responders demonstrated behaviors that interfered with their learning when they entered our program. Natalie screamed and refused to enter the classroom. James cried and cried and cried. Thomas resisted any direction or change to his plan. However, all three responded to visual supports and positive reinforcement and over the first 3 to 6 months of enrollment, demonstrated rapid progress and learned foundational skills, such as sharing attention, imitating, pointing, and matching. They continued to make progress, sometimes zooming through instructional sequences; their records showed no periods of plateau or regression. In contrast, both Teddy and Allen made early progress with foundational skills, but then slowed and struggled. Teddy, for example, quickly learned to request using PECS but never progressed beyond this phase. The same pattern was shown when a voice-output device was introduced. Moreover, Allen’s first teacher recalled that he wondered if Allen really had autism during those first months in his toddler playgroup but then, this thought was replaced by his teacher’s frustration with Allen’s slow progress and high distractibility.

The challenging behaviors of responders served clear functions. All three responders demonstrated challenging (e.g., tantrums) and/or repetitive (e.g., lining up toys) behaviors particularly at entry to the intervention program. Their teachers were able to identify the functions of the behaviors, and the children responded to interventions to replace these behaviors with more appropriate and effective behaviors. For example, Thomas’ headbanging and other aggressive behaviors were disturbing, but they almost always could be interpreted as meaning “I don’t like this” or “I don’t want to do this.” As time went on, all three children responded to more universal strategies (e.g., visual supports and environmental arrangements) to ameliorate problematic behaviors that did occur. In contrast, the poor responders and those who did not respond as well as expected also displayed many challenging behaviors, including self-stimulatory behaviors. Our analysis showed that their behaviors were more likely to serve multiple functions, including sensory needs, and did not resolve easily when behavior support plans were implemented. For example, Teddy and Allen’s instructional teams completed comprehensive functional behavioral assessments but were never able to identify reliable functions for the boys’ challenging behaviors. In addition, the form of their disturbing behavior changed frequently, further complicating teachers’ attempts to understand and respond.

Teachers were able to identify clear motivators for responders. All responders had preferred items, toys, or activities of interest. Their preferences served as potent reinforcers; their teachers reported they could easily identify potential motivators and incorporate them into learning activities. In contrast, it was far more difficult to identify potential motivators for the poor or “not as well as expected” responders. When motivators were identified, they often satisfied sensory needs (e.g., toys that light up or spin), were more difficult to incorporate into learning activities (e.g., dropping objects), and usually were fleeting in their effectiveness.

Responders become sociable. They respond to adults and peers. Upon learning foundational skills and establishing functional communication, all responders demonstrated their interest in the people around them. They were not described as sociable when they entered the program, but acquisition of basic communication skills seemed to facilitate social awareness. Soon, these children were described as sociable, fun, and friendly in their progress reports. Natalie loved to tell jokes and please adults, James enjoyed being silly and making others laugh, and Thomas had preferred play partners. In contrast, Teddy seemed to seek adult attention when he first entered the program, but later reports described his use of adults as objects. Allen had good eye contact when he entered the program, but this skill did not progress. Neither boy learned to establish joint attention with adults or peers.

Responders learned how to learn in a group arrangement. All responders were learning alongside their peers within months of entry into Project DATA. They did not require one-to-one teaching arrangements and, indeed, watched their classmates and interacted with them during their specialized instructional time. By the end of their enrollment in DATA, the responders were taught in small groups, attended to group directions, and answered in unison with their peers during group instruction. In contrast, Teddy and Allen learned to sit alongside a peer during instruction, but their teachers remarked on their inattentiveness by saying that they checked out during any group time.

Responders generalize newly acquired skills across environments. Responders used newly learned skills in settings where they had not been taught. This was most noticeable when the children learned a new skill in their extended instructional session and then used it in their preschool classroom or at home. Review of their individual plans and progress reports showed that their teachers usually did not have to plan programming for generalization across settings.
to occur. Review of the individual plans of Teddy and Allen showed that, in addition to slow progress during the acquisition phase of learning, both boys required additional intensive programming for fluency and generalization and often were not able to reach criterion during these learning phases.

**Confirmation of Themes**

To confirm our themes, we constructed a mini case study for a fourth child, Ezra, who we considered to be an optimal responder but had not yet graduated from our program at the time of data collection. Ezra began his intervention in the toddler program and moved to the preschool program after a few months. When he began the toddler program, he spoke several words; however, he did not always use them functionally. He had a difficult time relating to other people and directing his language to others. He followed simple directions and was able to identify a variety of objects in his environment. He demonstrated challenging behaviors (i.e., screaming and falling to the floor) when asked to change activities or when the usual routine was altered. Once enrolled in the toddler program, Ezra quickly learned basic imitation skills, matching, and joint attention. When he entered the DATA preschool classroom, he was immediately grouped with peers and began working on social skills, flexibility, and expanding his language. The functions of his challenging behaviors were clear. In addition, he had obvious preferences in activities and toys. The file review revealed that Ezra used newly learned skills in other settings in the school, at home, and in the community.

The final mini case study confirmed our themes: (a) Responders made continuous progress in learning new skills; (b) early in their enrollment, responders demonstrated social responsiveness to adults and peers and interacted with adults and peers; (c) responders demonstrated clear preferences and interests that aided motivation; (d) teachers were able to identify the functions of the responders’ challenging behaviors and implement effective behavior plans; and (e) responders generalized newly learned behaviors to other settings and with other people without extensive additional instruction.

**Discussion**

The purpose of this investigation was to examine why some children respond well to the Project DATA intervention and what characteristics those good responders have in common. Furthermore, we hoped that by studying good responders, we would gain insight for modifying or tailoring the intervention approach for those children whose response is not good.

Previous research has identified a number of variables that have some potential in helping teachers and researchers better predict children’s response to early intervention. The anticipated purpose of such predictive power is that we will be better able to individualize the type and amount of early intervention to optimize an individual child’s learning. Possible variables that have been identified in previous studies are as follows: IQ, verbal communication skills, social skills, imitation, early entry, intensive services, joint attention, and social motivation. We found consistent support for learning to establish and use joint attention with others and sociability. All of our responders learned to establish joint attention early in their enrollment and all became quite social. In contrast, neither Teddy nor Allen learned to establish joint attention and both were described as “loners” in their classrooms. We found some support for IQ and imitation ability. Our responders (with the exception of James) and “not as well as expected” children received scores in the mild to moderate range of cognitive disability at entry into the program. James and all of the non-responders did not have IQ or developmental scores at entry. That is, the examiners reported that they were unable to score them on a standardized test. Communication ability, though not necessarily verbal ability, was an important variable. All of our responders showed good success in learning PECS and achieved verbal communication even though Thomas was never as facile as he wanted to be. In contrast, Teddy and Allen made some early progress with PECS but were never facile communicators during their early childhood years. In other words, the responders learned to use communication as a social tool, they communicated to initiate and maintain interaction, not only to gain access to objects or activities. The “not as well as expected” responders used their limited communication skills in a very concrete manner.

Lovaas and Smith (1988) suggested that demonstrating rapid learning during the first 3 months of intervention is an important sign of optimal response to treatment. Lovaas (1993) further suggested that learning verbal imitation within the first 3 months may be particularly predictive. All of the optimal responders in the current study made relatively quick progress at entry and learned to imitate and used imitation to learn a variety of new skills. Our “not as well as expected” children made good progress at entry and learned motor imitation but struggled with more complex imitation. It is important to note, however, that not all of our responders learned quickly when exposed to discrete trial teaching. For example James, one of our responders, did not learn to imitate through discrete trial teaching but rather through a responsive teaching approach and as his mother observed, by watching videos. This change in treatment modality was made because he was not responding to the treatment. Once he did learn to imitate, he acquired other skills very quickly and began to respond to more traditional behavioral teaching strategies. This differential response to teaching strategies may be one of the most important lessons
learned in working with young children with ASD. The Project DATA staff had the latitude and necessary skills to make changes in instructional methods with this student based on his performance data. The ability to tailor CTM to the needs of individual children may be one of the keys in developing programs for children with ASD that produces more good responders.

Intensity of early intervention has been hailed as a crucial element of effective services (Lovaa, 1987; National Research Council, 2001). All of the children we studied received approximately 20 hr of services per week through Project DATA (i.e., their early childhood program plus the extended school-based instructional time). Interestingly, it was the “not as well as expected” children who received the most hours of weekly services; their families supplemented the public program with more than 15 additional hours of therapy per week. Finally, all of the children we studied for this project were identified early (between 17 and 32 months of age) and enrolled in services within a few months of diagnosis, making it difficult to test the variable of early entry into services.

As the research team discussed and analyzed the case studies, we were repeatedly struck by the importance of social responsiveness. At entry, the optimal responders were challenging to their teachers and caregivers and often resistant to social bids of any kind. However, their relatively quick, positive response to visual supports, instructions, and behavior support plans was accompanied by increases in positive social behaviors. Adults and peers interpreted at least some of their behaviors as indicating interest in people. The responders began to play near and approach others; similar to the social approach behaviors that Sherer and Schreibman (2005) reported in the children, they identified as responders. Our responders were described in their exit reports as “fun” and “sociable” and as having friends.

Our study has some important limitations. First, we studied a relatively small sample using qualitative methods. In that our primary purpose was to better understand the phenomenon of variable response and outcome of children with ASD enrolled in early intervention, we believe our approach was appropriate, but it does limit our ability to make statements from our findings to the larger population. In addition, our study was retrospective. Although we have identified some potential variables associated with good response and good outcomes and we confirmed some previously identified variables, we do not yet know why some children responded well to our approach and others did not.

We suggest that traditional quantitative methods (i.e., randomized control trials) will not answer the question. One of the findings from the current study was that even in a highly individualized, blended approach such as DATA, some children simply do not do as well as expected. Teddy and Allen’s instructional programs were modified based on their performance data. We tried a wide array of instructional approaches, but these boys’ learning seemed to stall. James, a responder, provides an example of the strength of an individualized approach. When the discrete trial method was not successful, his teachers tried a more child-directed approach, accompanied by extensive data collection, with good result. We suggest that research designs that assign children to well-defined, often manualized methods may limit our ability to find out what approaches work with what children.

Future research needs to address the child and family variables associated with children who are good responders and poor responders to different interventions for young children with ASD. To answer the second-generation research questions about interventions for children with ASD, we need to go beyond assessing formal children characteristics—such as IQ, age at entry, and number of words at entry—and examine more process variables like the ability to learn in groups, the ease of identifying reinforcers, the ability to engage in social interactions, and affect during intervention. We should also examine family characteristics, such as consistency of caregiver, the child’s opportunities to respond at home, and parent’s belief about the effectiveness of the intervention, to examine how they relate to child outcomes. Finally, we need to study how manualized CTM builds enough flexibility into their approach so that they can respond to the differential learning needs of young children with ASD.

In the last 2 decades, we have experienced breakthroughs in the treatment of children with ASD that many people may have thought impossible. Many children make remarkable gains in early learning programs; however, there are still a large number of children with ASD who do not respond well to the current interventions and continue to be severely affected by ASD throughout their lives. In this article, we suggest that based on case studies of selected Project DATA graduates, we can identify the characteristics of good responders to intervention. This information will help us refine current interventions and potentially create new interventions that will help more children with ASD respond more positively to the intervention that they receive in their preschool years.

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