Project DATA for Toddlers:

An Inclusive Approach to Very Young Children With Autism Spectrum Disorder

Gusty-Lee Boulware,
Ilene S. Schwartz,
Susan R. Sandall,
and
Bonnie J. McBride
University of Washington

Because more children under the age of 3 years are being diagnosed with autistic spectrum disorder (ASD), early interventionists face the challenge of identifying appropriate programs to meet the unique needs of very young children with ASD and their families. Project DATA (Developmentally Appropriate Treatment for Autism) for Toddlers is an inclusive early intervention program for children between 1 year and 3 years old who have been diagnosed with ASD and is based on an existing program for preschoolers with ASD at the University of Washington. Project DATA for Toddlers uses the effective preschool model and makes modifications to meet the unique developmental needs of toddlers. In this article, the authors describe the components of Project DATA for Toddlers and present preliminary findings, specifically, child outcome data from the areas of cognition, communication, self-regulation, functional skills, and elementary school placement. They also discuss the implications for early intervention service delivery programs.

The prevalence of autistic spectrum disorders (ASD) is increasing at an astonishing and alarming rate. In the early 1980s the prevalence of this disorder was thought to occur in 3 to 5 individuals out of 10,000; only 25 years later, the current figures suggest a prevalence of 60 individuals out of 10,000 (Autism Society of America, 2005). Although we do not know why there are more children with ASD, we do know that (a) these children are entering the special education/early intervention system at a rate that challenges existing capacity and (b) they are being diagnosed earlier than ever before. The increased numbers and the earlier age at diagnosis are having a dramatic impact on early intervention providers. Supplying appropriate services to very young children with ASD challenges the philosophical underpinnings and structure of many early intervention programs. In this article, we describe a model demonstration project that blends practices from early childhood special education/early intervention and applied behavior analysis to provide effective, developmentally appropriate services to toddlers with ASD and their families.

Traditionally, early intervention services have been family centered, concerned with issues of social ecology and natural environments, and of relatively low intensity (i.e., less than 2 hrs per week of services; Kochanek & Buka, 1998). In contrast, programs for children with ASD have been extremely intensive, often providing more than 25 hours a week of teacher-directed instruction; have not valued inclusive settings in the early stages of intervention; and have viewed the child with ASD as the primary, and sometimes isolated, target of the intervention (e.g., Dawson & Osterling, 1997; Harris & Handleman, 1994; Lovaas, 1987). In addition to the obvious differences between the many programs designed for young children with ASD and early intervention programs, philosophical differences often appear as well. Whereas most of the programs designed for children with ASD use applied behavior analysis as their conceptual framework, early intervention programs are more likely to be oriented toward a more developmental model and may have either no understanding or a misunderstanding of how the principles of behavior could be applied appropriately to very young children.

Schwartz, Sandall, McBride, and Boulware (2004) described a model that attempted to bridge these and similar divides for preschool children with ASD. The Project DATA (Developmentally Appropriate Treatment for Autism) model was developed as a response to a need in our community for effective programs for young children with ASD. Specifically, we were interested in dem-

Address: Gusty-Lee Boulware, University of Washington, Experimental Education Unit, Box 357925, Seattle, WA 98195; e-mail: bouleware@u.washington.edu

pro-ed

onstrating that a program that focused on inclusive services as a key component of the model for all children with ASD could help children achieve meaningful educational outcomes while being acceptable to parents and school districts. The results of Project DATA are quite promising. The participants made gains in every developmental domain, and the consumers of the program (e.g., parents and school district officials) were pleased with the results. An additional measure of the social validity and acceptability of this program is that 5 years after the federal funding for this program stopped, the initial program site continues to operate with funding from the local public school district, a number of districts in our state have replicated the model, and we continue to get requests for training from districts that want to replicate the model.

Project DATA for Toddlers was also started in response to a community need. Although the average age for diagnosis of ASD is still well over age 3 years, many parents report having initial concerns about their child's development early in their child's second year of life (Filipeck et al., 2000). Most researchers now agree that ASD can be reliably identified by 24 months of age (Cox et al., 1999; Stone et al., 1999), and most clinics that conduct multidisciplinary developmental assessments, even those not associated with universities or NIH-funded Centers for Excellence in Autism, can now identify children with ASD well before their third birthday. This improvement in diagnosis has created a crisis in many communities regarding how to provide intervention to these very young children with ASD and their families. In most communities, those agencies that are most likely to provide the autism diagnosis do not offer ongoing early intervention services. Agencies providing early intervention services are unlikely to have established a model to provide appropriate services to toddlers with ASD. Even those rare agencies that have appropriate models in place and have adequately trained staff to serve very young children with ASD and their families have been greatly challenged by the increasing numbers of children with ASD. Given this context, our team decided to work with parents and our colleagues in the early intervention community to adapt the Project DATA model to the unique developmental concerns of toddlers with ASD. In this article, we provide a brief description of Project DATA for Toddlers and report preliminary outcome data.

Overview of Project DATA for Toddlers

Component 1: High-Quality, Inclusive Early Childhood Program

The basis of our model is an existing high-quality, inclusive early childhood program for all children with disabilities ages birth to 3 years and their families. The following five general practices guide the services provided in this program:

1. services take place in an inclusive environment that contains activities, materials, and routines used in typical toddler playgroups;
2. services are family centered;
3. practices are guided through transdisciplinary teaming;
4. interventions are both empirical and value-driven; and
5. programs include both developmentally and appropriate practices (Sandall, Hemmeter, Smith, & McLean, 2005). Specifically, the early childhood program offers families the following array of services: inclusive playgroup experiences, parent support groups, a school-wide parent education group, and family resource coordination services.

We conducted the Project DATA inclusive playgroup for toddlers at a university-based comprehensive early childhood program. Every year, this program provides services to more than 200 children ages birth to 7 years in integrated early intervention and early childhood special education classrooms. The playgroup consisted of five toddlers with identified disabilities and five toddlers without disabilities. Of the five toddlers with disabilities, we attempted to never have more than two children with ASD. In the state of Washington, children qualify for publicly funded birth-to-3 early intervention services based on the following criteria: for children ages 2 to 3 years, entry is based on at least a 50% delay in one area of development (i.e., cognitive, motor, self-help, communication, social) or a 25% delay in two areas; and for children under the age of 2 years, entry is based on at least a 25% delay in one area of development. Because Project DATA for Toddlers is jointly funded by model demonstration grant funds from the U.S. Department of Education and our state Part C program, entry into the project was based on the above eligibility criteria as well as having a diagnosis on the autism spectrum. We did not use any other entry criteria (e.g., minimum test score on the *Bayley Scales of Infant Development*) to determine entry into the program (cf., Lovaas, 1987; Stahmer & Ingersoll, 2004). To maintain the heterogeneity of the playgroups, we assigned participants across the four existing playgroups. A head teacher, an assistant teacher, and a classroom aide staffed our groups. Speech, physical, and occupational therapists provided therapeutic interventions within the playgroup and consulted with the educational team members, including family members

Activities that promote high levels of engagement and provide multiple opportunities to apply systematic

instruction to achieve educational goals (Sandall & Schwartz, 2002) were planned for the playgroup, and we considered the following components as essential to the effectiveness of the model:

- Teaching communicative and social competence by using naturalistic teaching strategies to enable children to act upon the environment to achieve their goals and engage in positive social relationships with others (Prizant, Wetherby, Rubin, & Laurent, 2003; Schwartz, Billingsley, & McBride, 1998).
- Emphasizing multiple modes and communication functions on the part of the child, depending on the child's abilities and interest (e.g., verbal, gestures, *Picture Exchange Communication System* [Frost & Bondy, 2002], sign language), as well as the family's interests, strengths, and priorities.
- Using instructional strategies that maintain the natural flow of classroom activities. Rather than removing children from free-choice or snack times to provide instruction, we worked with teachers in using evidence-based instructional strategies to embed instructional episodes into the ongoing routines and activities of the playgroup (McBride & Schwartz, 2003).
- Providing an environment that was responsive and predictable to each individual (e.g., use of visual supports to provide information), as well as using positive behavior support strategies and contextually driven behavior plans to address the children's emotional and self-regulatory needs (Gomez & Baird, 2005; Kern & Dunlap, 1998; Lucyshyn, Dunlap, & Albin, 2002).
- Incorporating a comprehensive curriculum that addressed all areas of development and—for children with ASD—emphasized the core deficit areas of this disability (i.e., imitation, communication, play, social interaction; Dawson & Osterling, 1997).

Teaching within inclusive contexts is critical for very young children with ASD because it increases their ability to learn and demonstrate skills where and when they are needed. This approach contrasts with the numerous programs in which children with ASD are required to "earn" their way into more natural settings (e.g., Bondy & Frost, 1994; Handleman & Harris, 1994) or are exclusively taught one-on-one in clinic or home settings (e.g., Lovaas, 1987). We required that all children participating in the Project DATA for Toddlers program attend the inclusive playgroup twice weekly for 1.5 hrs each session. This inclusive portion of their program began when the children started Project DATA. No prerequisites or behavioral milestones had to be achieved before children were welcomed into the inclusive playgroup.

The university-based comprehensive early childhood program offered the parent support groups and schoolwide parent education group monthly to all parents participating in the program, which included parents from Project DATA for Toddlers. We encouraged the parents of our study children to participate; this was not a requirement.

Last, we assigned a resource coordinator to each family whose child participated in the playgroup. This person assisted the families in navigating the special education system as well as in accessing related resources in the community. Families in Project DATA met with their resource coordinator on an as-needed basis.

Although the program characteristics just described are considered high-quality early intervention, evidence is mounting that a program of this intensity is insufficient to meet the needs of young children with ASD and their families. We therefore supplemented the program with four additional components (National Research Council, 2001). Table 1 delineates the minimum amount of services provided to each child and family in Project DATA for Toddlers.

TABLE 1. Services Provided to Participants in Project DATA for Toddlers

Feature	Arrangement	Hours/week
High-quality early intervention experience	Integrated playgroup 1.5 hrs per session twice each week	3
Extended instructional time	Individualized instruction 2 hrs per session three times each week	6
Family support	Support in home or community by project staff 2 hrs each week; 5 hrs delivered by family	7
Total (minimum)		16

Component 2: Extended Instructional Time

We added an additional 6 hours of highly supportive instructional time at the center for the toddlers with ASD. This intensive intervention component focused on highly individualized instruction and addressed areas of need that had been identified by families and other members of the Individualized Family Service Plan (IFSP) team. The aims of instruction were increasing the child's success in accessing developmentally appropriate and age-appropriate activities and environments and improving his or her functioning at home and in community settings.

Intervention strategies included naturalistic teaching techniques (Hepting & Goldstein, 1997), embedded learning opportunities (Sandall & Schwartz, 2002), positive behavior support strategies (Kern & Dunlap, 1998), discrete trial teaching methodology (Koegel, Russo, & Rincover, 1977), visual supports, and response prompting strategies (Wolery, Ault, & Doyle, 1992). These strategies can be integrated successfully because they are all based on empirical information about children's learning. By using a variety of strategies, we are able to match the child's need for support in each teaching interaction to the type of instruction given.

We conducted the intensive instruction portion of the program at the university-based setting, which was staffed at a 1:1 teacher-to-child ratio and used group (e.g., snack time, circle time, group art project, gross-motor activity) and individual instruction to teach relevant skills. The explicitness of this instruction depended on child need. We required the children to participate in this component three times weekly for 2-hour sessions.

Component 3: Increased Technical and Social Support for Families

Because a family provides the indispensable context for and the most powerful influence on a child's development, especially in the first 3 years of life, any intervention must include collaboration with the families (Kelly & Barnard, 2000). In our model, families with toddlers with ASD received a 2-hour weekly home or community visit along with training and programs to guide family members in providing 5 additional hours of instruction to their children. Monthly "toddler topics" facilitated by staff, parents, or community members through a parent education group were also offered. This group met at the center and provided information and support related to raising a child with ASD (e.g., promoting communication in everyday routines, promoting positive toddler behavior, supporting siblings of children with autism, getting a good night's sleep). Parents are encouraged to invite any person important to their family (e.g., grandparents, aunts, cousins, close friend, tutors, babysitters) to participate in any service offered. Once enrolled in the program, families are interviewed to better understand their young child within the context of everyday routines. Through this interview, families identify priority routines or developmental areas with which they would like support during home and community visits. Families commonly identified the following target areas:

- comforting their children when distressed;
- teaching their children new skills;
- addressing challenging behaviors effectively,
- playing and communicating with their children;
- interacting in general with their children;
- sleeping through the night; and
- maintaining good transitions and outings in the community (Boulware & McBride, 2000).

We collaborated with the family in developing intervention plans and emphasized embedding the intervention within the context of the parent–child relationship. Using strong provider–parent and provider–child relationships allowed us to offer an effective intervention encompassing positive family–child interactions as a means of enhancing child development (McCollum & Yates, 1994). Our ultimate goal was to support the family members in feeling competent and confident about their ability to enhance their children's development and address challenging behavior within the context of everyday routines (Boulware, Schwartz, & McBride, 1999; Fox, Dunlap, & Buschbacher, 2000; Woods, Kashinath, & Goldstein, 2004)

In addition to support within ongoing family routines, some parents rated tutor training as a priority for providing additional learning opportunities to their children. As part of the weekly home/community visits, Project DATA staff therefore provided training and ongoing support for tutors, nannies, or other childcare providers hired by the families.

The planned intervention with families thus took place in the inclusive playgroups, home, and community settings. We know from our previous work with preschoolers with ASD that intervention efforts with families must take place in the community (e.g., grocery stores, day-care center, the playground) to enhance the success of family participation in "normalized" activities and to decrease parental isolation. This type of intervention is critical. As one father of a child in Project DATA put it, "The services we are receiving from Project DATA are making life less complicated for us. We are now getting more of an opportunity to make 'normal' family decisions."

Component 4: Coordination of Family-Negotiated Services

Each family had a service coordinator who was associated with the center's early intervention program. This person acted as the liaison among the family, staff members in the playgroup and extended instructional time activities, and the professionals who provided any other family-negotiated services (e.g., childcare, private speech therapy, occupational therapy).

Component 5: Systematic Transition Planning

The service coordinator also took on the role of the transition facilitator as the family and child prepared to leave the birth-to-3 program, working with the parents to identify an appropriate placement and to ensure that staff members at the receiving school were given support and training. This process began at least 6 months prior to the child's third birthday.

Method

Participants

Eight young children (seven boys, 1 girl) with ASD participated in the first iteration of the Project DATA for Toddlers. Psychologists who had no formal affiliation with our program conducted the ASD diagnoses of the children. The children had been referred to the program by a variety of community practitioners (e.g., psychologists, pediatricians, speech therapists, early intervention providers). The participants were between the ages of 18 months and 29 months at the time of referral, seven were Caucasian and one was African American, and they were enrolled in the program for a minimum of 9 months. More information on individual participants is provided in Table 2.

Measures

We collected ongoing instructional data on current target objectives for each child. During the intensive instructional component, we collected, graphed, and summarized the data daily. We held weekly meetings to review individual child data and to make modifications to programming as needed. Data were collected weekly in the integrated classroom, we collected data weekly and reviewed them on a regular basis at team meetings.

We also examined other measures of child variables, especially those relevant for children with ASD (i.e., social, communication, play, self-regulation). One of the purposes of this model demonstration project was to determine which measures would be most useful in documenting progress in very young children with ASD and which measures would be most useful in communicating these changes to parents, early intervention professionals, and researchers.

Bayley Scales of Infant Development–Second Edition. The *Bayley Scales of Infant Development–Second Edition* (BSID-II; Bayley, 1993) is a norm-referenced test that assesses the developmental functioning of young children from observation of the children's interaction with stimuli. Test items are administered and scored in a standardized fashion. Project staff members administered the Mental Scale and included items that assessed memory, habituation, problem solving, early number concepts, generalization, classification, vocalizations, language, and social skills. This assessment has a mean standard score (Mental Developmental Index [MDI]) of 100 and a standard deviation of 15. The standard score can be translated into the following categories: significantly delayed (MDI < 70), mildly delayed range (MDI = 70–84), and normally developing range (MDI = 85–115).

Temperament and Atypical Behavior Scale. The *Temperament and Atypical Behavior Scale* (TABS; Neisworth, Bagnato, Salvia, & Hunt, 1999) is a developmentally appropriate observation rating system for early assessment and classification of significant problems in self-regulatory behavior for young children from 11 months to 71 months of age. Atypical self-regulatory behaviors are organized within four factors: detached, hypersensitive/active, underreactive, and dysregulated, which are translated into an overall TABS Temperament and Regulatory Index (TRI) score. The TRI scores classify a child's regulatory behavior as typical, at risk, or atypical (Bagnato & Neisworth, 1999). A project DATA staff member administered the TABS during a home visit, and we used information gathered during the TABS interview to plan the intervention.

Communication and Symbolic Behavior Scales. The *Communication and Symbolic Behavior Scales* (CSBS; Wetherby & Prizant, 1992) is a standardized instrument that examines communication, social, and symbolic abilities in children whose functional communication age is between 8 months and 2 years. The examiner evokes communication by using a variety of activities (i.e., bubbles, books, toys in a jar). He or she scores the function of each communicative act, as well as the child's symbolic behavior, on 22 scales. Raw scores for each of the 22 scales are converted into a Likert-type scale ranging from 1 to 5 (1 = *few instances of the behavior,* 5 = *a high number of behaviors*). The 22 scaled scores are grouped to form seven communication cluster scores: communicative functions, gestural communicative means, vocal communicative means, verbal communicative means, reciprocity, social–affective signaling, and symbolic be-

TABLE 2. Gender, Age at Entry, Time in Program, and Outcomes for Eight Participants in Project DATA for Toddlers Program

Child/ gender	Age at entry (mos) 2004–2005	Time in program (mos)	BSID-II		TABS		PCI	Elementary school placement
			Pre-MDI/ postclass.	Post-MDI/ postclass.	Pre-[a]	Post-[b]		
1 (boy)	23	17	< 50 delay	< 50 delay	Atypical	Atypical	1.01	Segregated
2 (boy)	28	9	63 mild delay	73 mild delay	At risk	At risk	.891	Home schooled
3 (boy)	21	21	< 50 significant delay	84 normal limits	Atypical	Typical	1.86	General education
4 (boy)	18	19	61 significant	93 significant	Atypical	Typical	1.77	General education with support
5 (boy)	33	9	< 50 significant	76 mild	Atypical	At risk	3.47	General education with support
6 (girl)	29	10	< 50 significant delay	< 50 significant delay	At risk	At risk	.213	Segregated program
7 (boy)	20	10	78 mild delay	93 normal limits	Atypical	Typical	1.31	Unknown
8 (boy)	27	13	74 mild delay	95 normal limits	At risk	At risk	1.27	General education with support

Note. BSID-II = *Bayley Scales of Infant Development–Second Edition* (Bayley, 1993); MDI = *Mental Developmental Index;* TABS = *Temperament and Atypical Behavior Scale* (Neisworth, Bagnato, Salvia, & Hunt, 1999); PCI = proportional change index (Wolery, 1983).
[a]Pre- = preintervention. [b]Post- = postintervention.

havior. The cluster scores are then converted to age-based standard scores for interpretation, with a mean of 10 and a standard deviation of 3. A child's language stage is also assessed and rated as prelinguistic, early-one word, late one-word, or multiword. Both the age-based standard scores and language stages are reported. Project DATA staff members administered, videotaped, and coded the CSBS.

Functional Outcomes. To measure functional outcomes, our team constructed an index that represented performance on selected items from the *Assessment, Evaluation, and Programming System for Infants and Young Children* (AEPS; Bricker, 1993) as well as the items from the curriculum-referenced measure developed by the Project DATA staff. On this index, 10 functional outcomes are represented: use of speech to communicate, ability to follow simple and complex instructions, motor imitation, toilet training during daytime hours, appropriate play, representational play, parallel play, interacts with peers, and imitates peers. We conducted all of these assessments approximately 1 week before entering the program and 1 week before exiting the program.

In addition to the data collected while the children were participating in the program, we attempted to contact all the families when their children made the transition to elementary school. These data are presented as a snapshot of the molar, long-term effects of the program.

RESULTS

All eight children made gains during the time they were enrolled in this program. Six of the eight children made impressive gains on more than one of the outcome measures. A description of child performance on individual measures is provided in this section.

BSID-II

Six of the eight children demonstrated an increase in their MDI scores (see Table 2). At intake, five of the chil-

dren were in the significantly delayed range and three were in the mildly delayed range. At program exit, two of the children remained in the significantly delayed range, three were classified in the mildly delayed range, and four were functioning in the normal range.

We calculated a proportional change index (PCI; Wolery, 1983) for each child to document his or her rate of development while in the intervention. The PCI compares children's rate of development at pretesting to their rate of development during an intervention. Children who continue to develop during the intervention as they did prior to the intervention receive a PCI score of 1.0, children whose rates of development appear to be slower during an intervention as compared to prior receive a PCI score less than 1.0, and children whose rate of development appears to accelerate during an intervention receive a PCI score greater than 1.0. If a child receives a score higher than 1.0, the intervention is said to have a positive effect on the child's development. At exit, six of the children demonstrated PCI scores greater than 1.0 (M = 1.5, range = 0.21–3.5). These data are displayed in Table 2.

TABS

Assessment data revealed that Children 3, 4, and 7 went from the status of atypical regulatory behavior at entry into the program to typical regulatory behavior at exit (see Table 2). This signifies great improvement in their abilities to engage with the environment, react to incoming stimuli, and modulate neurophysiological behavior (e.g., sleeping, crying, self-comforting). At entry, Child 5 demonstrated atypical regulatory behavior; however, upon leaving the program, he was classified as "at risk," with fewer regulatory behaviors that interfered with his ability to relate to his environment in a positive manner. We found no changes for Children 1, 2, 6, and 8.

CSBS

We collected preintervention and postintervention data on seven of the eight children. At intake, five children had been classified at the prelinguistic stage, one child had been classified at the early one-word stage, and one child had been classified at the multiword stage according to the CSBS (see Table 3). Upon exiting the program, two children remained at the prelinguistic stage, one child entered the early one-word stage, and four were classified at the multiword stage. In addition to increasing the length and complexity of their social communicative behavior, the children used a wider variety of forms and functions to communicate. Many of the children who made the transition into verbal communication continued to use gestures and symbols to repair their communicative attempts, and they demonstrated an expanded use of creative strategies to gain the attention of their communicative partners. Children 3 and 4 demonstrated gains across each cluster, with Child 3 making significant progress (over 2 *SD*) in the use of vocalizations, reciprocity, and symbolic level of play. Child 4 also demonstrated similar gains in the areas of vocal, verbal, reciprocity, social–affective signaling, and symbolic play. Child 5 made very small gains in the areas of verbalizations, social–affective signaling, and symbolic play. Interestingly, although this child did not demonstrate verbal gains, he did become a fluent user of the *Picture Exchange Communication System* (PECS; Frost & Bondy, 2002) during his time in the program. Child 7 demonstrated notable progress in verbalizations and social–affective signaling, and Child 8 had an increase of nearly 2 *SD* in reciprocity and social–affective signaling. For Children 1 and 6, no improvement was noticed, except for small gains in the areas of symbolic play.

Functional Outcomes

The results are displayed in Figure 1. Before entering Project DATA, only one of the children used at least five words spontaneously. At the end of treatment, five of the eight children did. None of the children were able to follow simple or complex directions prior to entering the program; upon exit, six children were able to follow simple instructions, and half of the group was able to follow complex instructions (e.g., "Go give Mommy the ball"). One child was able to imitate at entry; at exit the entire group was able to do this. Preassessment data indicated that none of the children were toilet trained. At the end of the intervention, six children were using the toilet appropriately during waking hours. The children demonstrated similar gains for representational play, parallel play, interaction (i.e., responding to a peer), and peer imitation (i.e., explicitly told to "copy ____"). Lastly, at intake none of the children demonstrated appropriate play (across five separate activities), but six children did so at exit.

Elementary School Placement

In the spring of 2005, we contacted the families to ask what type of school program their child had participated in during the 2004–2005 school year. We were able to collect these data for seven of the eight participants, and the results are presented in Table 2. In 2004–2005, the participants were in first or second grade. Four of the seven students contacted had full-time placements in general education classrooms. One of the students no longer had an individualized education program (IEP), whereas the other three still received varying levels of support in general education. One student was being homeschooled. Two of the students were in full-time segregated special education classrooms designed for students with ASD.

TABLE 3. Pre- and Post-CSBS Language Stages and Age-Based Standard Scores for Participants in Project DATA for Toddlers Program

	Language stage		Commun. function		Commun. means gestural		Commun. means vocal		Commun. means verbal		Reciprocity		Social–affective signaling		Symbolic	
Child	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-
1	PreL	PreL	3	3	3	3	3	3	4	4	3	3	3	3	3	5
2	No data															
3	PreL	MW	3	5	3	5	3	10	4	8	3	10	8	10	3	15
4	PreL	MW	3	7	3	8	4	15	5	12	4	13	3	9	4	14
5	PreL	One	3	3	3	3	3	3	4	6	3	4	8	10	4	7
6	PreL	PreL	3	3	3	3	3	3	4	4	3	3	8	8	3	4
7	One	MW	9	9	10	10	17	10	6	11	9	11	5	9	18	17
8	MW	MW	3	3	3	3	5	9	8	8	3	8	3	8	11	9

Note. CSBS = *Communication and Symbolic Behavior Scales* (Wetherby & Prizant, 1992); PreL = Prelinguistic language stage; One = Early one-word language stage; MW = Multiword language stage.

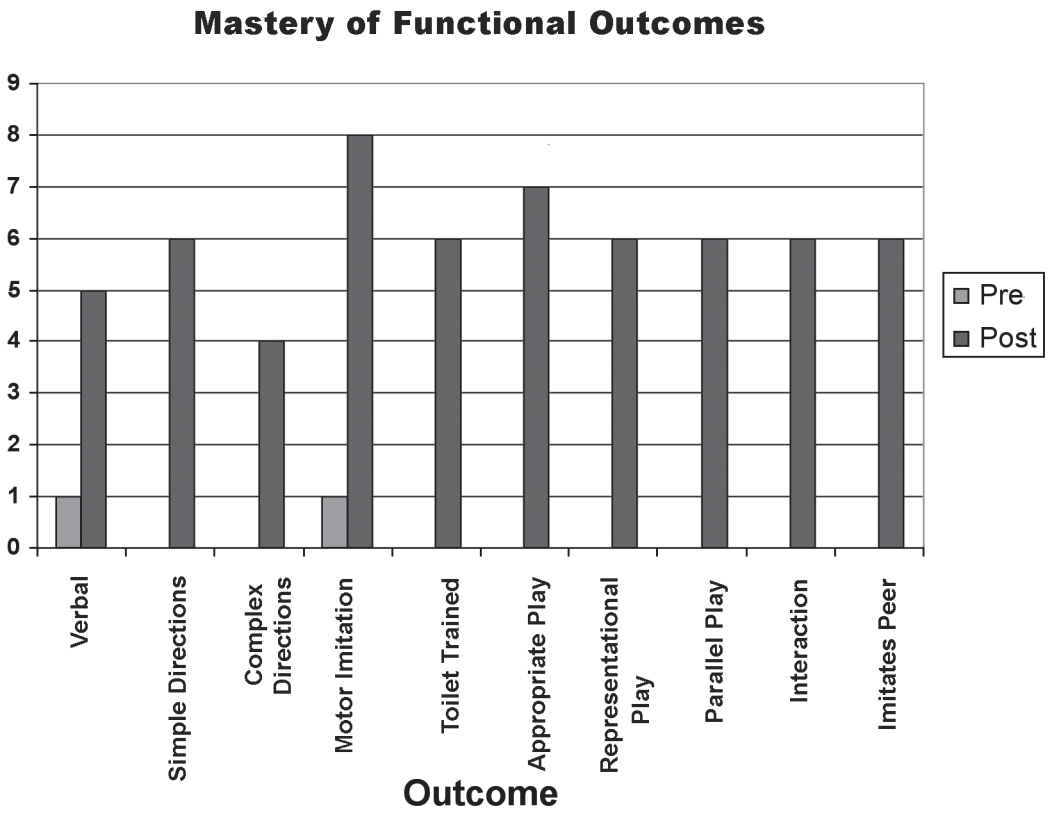

FIGURE 1. Functional outcomes preintervention and postintervention for the eight participants in Project DATA for Toddlers.

Discussion

Our goal for Project DATA for Toddlers was to develop a program for very young children with ASD that was effective, was acceptable to consumers, and blended the best practices of applied behavior analysis and early intervention/early childhood special education. The data that we have presented on the first eight toddlers with ASD to participate in our program suggest that this program has the potential to be a viable model of service delivery for very young children with ASD and their families. While enrolled in the program, all eight toddlers made gains in functional behaviors, and five of the eight made impressive gains as demonstrated by standardized assessments and functional outcomes. School placement data indicated that these gains were maintained over time. We were able to collect school placement data for the most recent school year for seven of the children, who were in first or second grade. Four of the seven were fully included (one with no special education supports), one child was being homeschooled but was accessing general education content, and two children had been placed in segregated special education classrooms. These outcomes are promising, especially when considering that our program had no entry criteria other than a diagnosis of ASD. Because the collection of project data was partially funded by county Part C money, and because we wanted to replicate the real-life conditions faced by early intervention programs and public schools, students with a diagnosis of ASD were accepted into the program. Unlike many "model" or "experimental" programs for young children with ASD, no other admission criteria were considered (cf. Lovaas, 1987; Stahmer & Ingersoll, 2004). This may present some problems in regards to the heterogeneity of our sample, but it more closely replicates the populations of children with ASD being served by early intervention and public school agencies across the country.

Even our most successful participants did not leave our program and enter general education, however. All eight participants left our early intervention program on their third birthday and entered public school special education preschool services. In addition, many of the children received some outside therapy during their participation in our program and after they aged out of it. Although most of the children received 1 hour per week of insurance-reimbursed speech therapy and occupational therapy, two children (Participants 3 and 8) were provided with home programming for more than 10 hours per week while they were in our program and through-

out preschool. During these children's time in our study, any home programming that the parents provided was supervised by our program staff members. As part of the family support component of the program, we agreed to train home therapists, nannies, babysitters, grandparents, and other caregivers. Parents could also choose to spend part of their weekly home visit for home program coordination. This type of training and support for all caregivers may have helped to provide consistency for the young children with ASD. Further research is needed to determine if this type of support for families and other caregivers is related to long-term outcomes for young students with ASD.

Changes in child outcome achieved in this study appeared to be similar to the results from studies of other programs for very young children with ASD (e.g., McGee, Morrier, & Daly, 1999; Stahmer & Ingersoll, 2004). At 3 years of age, five of the seven children for whom we had CSBS scores were verbal (and the two children who were still nonverbal were proficient PECS users), six children scored with either mild delays or in the normal range on the BSID-II, and only one child scored as atypical on the TABS. These data show that we were able to help these children achieve meaningful outcomes in social communication skills, cognitive development, and self-regulation skills in a relatively short period of time. In addition, although we do not know what types of services all of these children received between exiting early intervention and entering kindergarten, an impressive number of children who participated in Project DATA for Toddlers entered elementary school in general education. In first grade, 57% of the students were in general education first grade classrooms and completing grade-level academic demands; only 29% of the children were in segregated special education placements. Most of the children in general education continued to receive some support in special education and related services (e.g., speech therapy, social skills, occupational therapy), and all but one child still had an IEP. We are not saying that these children no longer had ASD but rather that by the time they were in first grade, their ASD did not prevent more than half of these children from accessing the general education environment and succeeding in the curriculum.

The participants in the Project DATA for Toddlers intervention demonstrated changes in sensory sensitivity and self-regulation as measured by the TABS. At pretesting no children received a score of typical on this measure; at posttesting, three children did. Interestingly, at preintervention, all three of these children were rated as atypical (the lowest of three possible ratings). The types of behaviors that are rated by the TABS are often reported as the most difficult to handle and the most troubling to parents of very young children with ASD. These behaviors include being upset by changes in schedules, being lost in their "own world," staring at lights, being easily frustrated, having severe temper tantrums, not attending to others when they are hurt, and not being able to comfort themselves when upset. Our intervention project, although having a conceptual framework firmly rooted in applied behavior analysis, attempted to address these self-regulatory behaviors directly with the children and indirectly through education for the parents and other caregivers. Clearly, based on the improvements on the TABS scores for half of the sample, this intervention had effects on these behaviors, which are often ignored by behavioral programs and seem resistant to change. Clearly, more research is needed to understand why half of the sample did not show any changes in this area and if specific components of the intervention package are more effective in facilitating change in these behaviors.

The Project DATA for Toddlers resulted in impressive changes in functional outcomes, including toileting training, imitation, verbal communication, and interaction with peers. These results are important because we were able to report improvement for all of the children, even those children who did not demonstrate change in standardized assessments or on the PCI. Even children whose PCI score indicated that they might have experienced some regression during the program (Children 2 and 6) demonstrated positive changes in functional outcomes. Because we derived these outcomes from a commercially available curriculum-based measure, they may be an important way to document growth for children with ASD in early intervention programs. We have continued to see maintenance and improvement in these functional skills over time. For example, during the last school year, parents of four of the children (Participants 2, 4, 5, and 8) reported that their children had meaningful and reciprocal relationships with peers at school and in the community. Interestingly, these are the same four participants who were attending and succeeding in general education classrooms.

Limitations

Although the outcomes presented here are optimistic, they must be considered carefully, given that this is a program description with data from a small sample of participants. In addition, we had no control group for our study. We do not know if this group of eight children with ASD would have made similar gains without intervention or with a different intervention. Common sense and clinical experience will lead most readers to suggest that a "no treatment condition" would not be an ethical or legal option for these children, but we do not have an experimental design to help validate the outcomes of this study. Also, our group of families was rather homogeneous. Although we had some socioeconomic diversity across our families, we had relatively little racial or eth-

nic diversity, and all the families were native English speakers. All of the family members were extremely motivated to participate in this intervention and demonstrated this by (a) providing transportation for their children to the center 5 days a week, (b) participating in home visits and family education programs, and (c) making modifications to environments, routines, and activities to help their children be more successful. Clearly, we need to explore the effectiveness of this intervention and other interventions for children with ASD with children and families who are experiencing multiple risk factors in addition to ASD. We also need to find support for and conduct methodologically sound studies that can help to determine the best evidence-based practices for very young children with ASD and their families.

Implications for Practice and Policy

The Project DATA for Toddlers model offers a promising approach to providing services for very young children with ASD that are effective, are inclusive, and blend methods from early intervention and applied behavior analysis. This model also seems to be acceptable to consumers, including parents, school district officials, and early intervention providers. In a clear measure of authentic social validity, our local lead Part C agency adopted this model as the community standard of practice and invested in training for all early intervention providers in the county. Although this is a wonderful show of social validity for our program, it raises an issue of costs.

In our state, the average child qualifying for early intervention services receives 3 hours per week of intervention that is funded by the early intervention/Part C system. The 16 hours per week suggested by Project DATA for Toddlers is significantly less than the 25 hours per week recommended by the National Research Council (2001) or the 40 hours (plus) a week recommended by Lovaas (1987) and any number of other sources in the popular press or on the Internet, but it is a great deal more than the 3 hours currently funded. Although it would clearly be beyond the scope of the data we presented here to suggest that the Project DATA model should be the standard of service for toddlers with ASD, we did demonstrate that many of the toddlers who did participate made meaningful progress toward important educational outcomes. At the current funding levels, most early intervention/Part C programs cannot provide this level of service. This begs important policy questions: How can programs afford to fund this service? How can our society afford not to? As the number of children with ASD continues to grow and the average age of identification continues to drop, these questions must be answered.

When parents, professionals, and researchers discuss intervention programs for very young children with ASD, one of the first questions raised is "How many hours?" In terms of the most effective configuration of services for very young children with ASD, there are any numbers of answers. Parents can consult as many as 42,500,000 Web sites about autism through an Internet search using Google and find many answers to that question. Few of the answers, however, would suggest a program that offers 16 hours per week of programming. Parents, researchers, and educators need to change the dialogue on defining effective services for young children with ASD. Rather than obsessing on the number of hours of services and the names of interventions, we need to examine what happens during those hours. We need to look at the quality of instruction, the programming of generalization, the range of curricular domains that are addressed, and how progress is monitored and programming adjusted based on those data. The DATA Project for Toddlers offers a model that addresses these issues and results in meaningful gains for the majority of the children who participate. It is our hope that this model, and others like it, can help to create policies so that every very young child with ASD and his or her family can easily access an effective program in their community that meets their needs. ◆

REFERENCES

Autism Society of America (2005). www.autism-society.org

Bagnato, S. J., & Neisworth, J. T. (1999). Normative detection of early regulatory disorders and autism: Empirical confirmation of DC: 0-3. *Infants and Young Children, 12,* 98–106.

Bayley, N. (1993). *Bayley scales of infant development* (2nd ed.). San Antonio, TX: Psychological Corp.

Bondy, A. S., & Frost, L. A. (1994). The Delaware autistic program. In S. L. Harris & J. S. Handleman (Eds.), *Preschool education programs for children with autism* (pp. 37–54), Austin, TX: PRO-ED.

Boulware, G., & McBride, B. J. (2000, April). *Providing services to toddlers with autism and their families: Parent–child interactions as a context for intervention*. Poster session presented at the Conference on Research Innovations in Early Intervention, San Diego, CA.

Boulware, G., Schwartz, I., & McBride, B. (1999). Addressing challenging behavior at home: Working with families to find solutions. *Young Exceptional Children, 3*(1), 21–27.

Bricker, D. (1993). *Assessment, evaluation, and programming system for infants and young children: AEPS measurement for birth to three years*. Baltimore: Brookes.

Cox, A., Charman, T., Baron-Cohen, S., Drew, A., Klein, K., Baird, G., et al. (1999). Autism spectrum disorders at 20 and 42 months of age: Stability of clinical and ADI-R diagnosis. *Journal of Child Psychiatry, 40,* 719–732.

Dawson, G., & Osterling, J. (1997). Early intervention in autism. In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 307–326). Baltimore: Brookes.

Filipeck, P. A., Accardo, P. J., Ashwal, S., Baranek, G. T., Cook, E. H., & Dawson, G. (2000). Practice parameter: Screening and diagnosis of autism. *Neurology, 55,* 468–479.

Fox, L., Dunlap, G., & Buschbacher, P. (2000). Understanding and intervening with children's challenging behavior: A comprehensive approach. In A. M. Wetherby & B. M. Prizant (Eds.), *Autism spectrum disorder: A transactional developmental perspective* (Communication and Language Intervention Series, *Vol. 9*, pp. 307–331). Baltimore: Brookes.

Frost, L. & Bondy, A. (2002). *The picture exchange communication system training manual*. Newark, DE: Pyramid Educational Products.

Gomez, C. R., & Baird, S. (2005). Identifying early indicators for autism in self-regulation difficulties. *Focus on Autism & Other Developmental Disabilities, 20*, 106–116.

Handleman, J. S., & Harris, S. L. (1994). The Douglass Developmental Disabilities Center. In S. L. Harris & J. S. Handleman (Eds.), *Preschool education programs for children with autism* (pp. 71–86). Austin, TX: PRO-ED.

Harris, S. L., & Handleman, J. S. (1994). *Preschool education programs for children with autism.* Austin, TX: PRO-ED.

Hepting, N. H., & Goldstein, H. (1997). What's natural about naturalistic language intervention. *Journal of Early Intervention, 20,* 249–265.

Kelly, J. F., & Barnard, K. E. (2000). Assessment of parent–child interaction: Implications for early intervention. In J. P. Shonkoff & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed., pp. 258–289). New York: Cambridge University Press.

Kern, L., & Dunlap, G. (1998). Curricular modification to promote desirable classroom behavior. In J. K. Luiselli & M. J. Cameron (Eds.), *Antecedent control: Innovative approaches to behavior support* (pp. 289–308). Baltimore: Brookes.

Kochanek, T. T., & Buka, S. L. (1998). Patterns of service utilization: Child, maternal, and service provider factors. *Journal of Early Intervention, 21,* 217–231.

Koegel, R. L., Russo, D. C., & Rincover, A. (1977). Assessing and training the generalized use of behavior modification with autistic children. *Journal of Applied Behavior Analysis, 10,* 197–205.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55,* 3–9.

Lucyshyn, J. M., Dunlap, G., & Albin, R. W. (2002). *Families & positive behavior support: Addressing problem behavior in family context*. Baltimore: Brookes.

McBride, B. J., & Schwartz, I. S. (2003). Effects of teaching early interventionists to use discrete trials during ongoing classroom activities. *Topics in Early Childhood Special Education, 23*, 5–17.

McCollum, J. A., & Yates, T. J. (1994). Dyad as a focus triad as means: A family centered approach to supporting parent–child interactions. *Infants and Young Children, 6,* 26–33.

McGee, G. G., Morrier, M. J., & Daly, T. (1999). An incidental teaching approach to early intervention for toddlers with autism. *Journal of the Association for Persons with Severe Handicaps, 24,* 133-146.

National Research Council, Committee on Educational Interventions for Children with Autism. (2001). *Educating children with autism*. Washington, DC: National Academy Press.

Neisworth, J. T., Bagnato, S. J., Salvia, J., & Hunt, F. M. (1999). *TABS manual for the Temperament And Atypical Behavior Scale: Early childhood indicators of developmental dysfunction.* Baltimore: Brookes.

Prizant, B. M., Wetherby, A. M., Rubin, E., & Laurent, A. C. (2003). The SCERTS model: A transactional, family-centered approach to enhancing communication and socioemotional abilities of children with autism spectrum disorder. *Infants and Young Children, 16,* 296–317.

Sandall, S. R., Hemmeter, M. L., Smith, B. J., & McLean, M. E. (2005). *DEC recommended practices: A comprehensive guide for practical application*. Longmont, CO: Sopris West.

Sandall, S. R., & Schwartz, I. S. (2002). *Building blocks for teaching preschoolers with special needs*. Baltimore: Brookes.

Schwartz, I. S., Billingsley, F. F., & McBride, B. (1998). Including children with autism in inclusive preschools: Strategies that work. *Young Exceptional Children, 2*(1), 19–26.

Schwartz, I. S., Sandall, S. R., McBride, B. J., & Boulware, G. (2004). Project DATA (Developmentally appropriate treatment for autism): An inclusive school-based approach to educating young children with autism. *Topics in Early Childhood Special Education, 24,* 156–168.

Stahmer, A. C., & Ingersoll, B. (2004). Inclusive programming for toddlers with autism spectrum disorders: Outcomes from the children's toddler school. *Journal of Positive Behavior Interventions, 6,* 67–82.

Stone, W. L., Lee, E. B., Ashford, L., Brissie, J., Hepburn, S. L., Coonrod, E. E., et al. (1999). Can autism be diagnosed accurately in children under 3 years? *Journal of Child Psychiatry, 40,* 219–226.

Wetherby, A. M., & Prizant, B. M. (1992). *Communication and Symbolic Behavior Scales manual (Normed ed.)*. Chicago: Applied Symbolix.

Wolery, M. (1983). Proportional change index: An alternative for comparing child change data. *Exceptional Children, 50,* 167–170.

Wolery, M., Ault, M. J., & Doyle, P. M. (1992). *Teaching students with moderate to severe disabilities: Use of response prompting strategies*. New York: Longman.

Woods, J., Kashinath, S., & Goldstein, H. (2004). Effects of embedding caregiver-implemented teaching strategies in daily routines on children's communication outcomes. *Journal of Early Intervention, 26,* 175–193.