Education and Training in Autism and Developmental Disabilities

Focusing on individuals with autism, intellectual disabilities and other developmental disabilities

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Education and Training in Autism and Developmental Disabilities

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Teaching Students with Moderate Intellectual Disabilities to Read: An Experimental Examination of a Comprehensive Reading Intervention
JILL ALLOR, PATRICIA MATHES, KYLE RÖBERTS, FRANCESCA JONES, and TAMMI CHAMPLIN

Friendships with Peers with Severe Disabilities: American and Iranian Secondary Students’ Ideas about Being a Friend
MOHSEN SHOKOOHI-YEKTA, and JO M. HENDRICKSON

Long-term Outcomes of Services in Inclusive and Self-Contained Settings for Siblings with Comparable Significant Disabilities
DIANE RÝNDAK, TERRI WARD, SANDRA ALPER, JILL F. STORCH, and JENNIFER WILSON MONTGOMERY

Mild Intellectual Disabilities: Legacies and Trends in Concepts and Educational Practices
EDWARD A. POLLOWAY, JACQUÉLINE LUBIN, J. DAVID SMITH, and JAMES R. PATTON

An Examination of the Effects of a Social Communication Intervention on the Play Behaviors of Children with Autism Spectrum Disorder
JENNIFER LONCOLA WALBERG and LESLEY A. CRAIG-UNKEFER

Characteristics and Hypothesized Functions of Challenging Behavior in a Community-Based Sample
ANNA INGEBORG PETURSDOTTIR, JOHN W. ESCH, RACHAEL A. SAUTTER, and KELISE K. STEWART

DILEK ERBAS

Mercury and Autism: A Review
JIE ZHANG and JOHN J. WHEELER

Response Cards: An Effective Intervention for Students with Disabilities
CHANNON HORN

Effects of Constant Time Delay Procedure on the Halliwick’s Method of Swimming Rotation Skills for Children with Autism
İLKÇER YILMAZ, FERMAN KONUKMAN, BENYAMIN BIRKAN, ARZU ÖZEN, MEHMET YANARDAG, and İLHAN ÇAMURSOY

Use of Self-Modeling Static-Picture Prompts via a Handheld Computer to Facilitate Self-Monitoring in the General Education Classroom
DAVID F. CIHAK, RACHEL WRIGHT, and KEVIN M. AYRES

Practices in Early Intervention for Children with Autism: A Comparison with the National Research Council Recommended Practices
ROBYN CONLEY DOWNS and ANDREW DOWNS

Manuscripts Accepted for Future Publication in Education and Training in Autism and Developmental Disabilities

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Manuscripts Accepted for Future Publication in Education and Training in Autism and Developmental Disabilities

June 2010

Acquisition and generalization of the picture exchange communication system behaviors across settings, persons, and stimulus classes with three students with autism. Maud S. Dogoe, Devender Banda, and Robin H. Lock, Department of Educational Psychology and Leadership, College of Education, P.O. Box 41701, Texas Tech University, Lubbock, TX 79409.

Training teachers to assess the challenging behaviors of student with autism using video teleconferencing. Wendy Machalicek, Mark F. O’Reilly, Mandy Rispoli, Tonya Davis, Russell Lang, Jessica Hetlinger Franco, and Jeffrey M. Chan, Department of Special Education and Counselor Education, GSE, PO Box 751, Portland State University, Portland, OR 97207.

Review of interventions to increase functional and symbolic play in children with autism. Russell Lang, Wendy Machalicek, Mark O’Reilly, Jeff Sigafoos, Mandy Rispoli, Karrie Shogren, and April Regester, Department of Special Education, 1 University Station D5300, The University of Texas at Austin, Austin, TX 78712.

Promoting active engagement in the general education classroom and access to the general education curriculum for students with cognitive disabilities. Martin Agran, Michael Wehmeyer, Michael Cavin, and Susan Palmer, University of Wyoming, Special Education Department, Dept. 3374, 1000 E University Ave., Laramie, WY 82071-2000.


An evaluation of the effects of sensory integration-based intervention by a preschool special education teacher. Penelope Wong Bonggat and Laura J. Hall, Department of Special Education, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-1170.

A preliminary investigation of parents’ opinions about safety skills instruction: An apparent discrepancy between importance and expectation. Martin Agran and Michael Krupp, University of Wyoming, Special Education Department, Dept. 3374, 1000 E University Ave., Laramie, WY 82071.

A review of the literature on community-based instruction across grade levels. Allison Walker, Nicole M. Uphold, Sharon Richter, and David W. Test, Temple University, Curriculum, Instruction and Technology in Education, Ritter Hall 362, 1301 Cecil B. Moore Avenue, Philadelphia, PA 19122.

Culturally diverse parents’ perspectives on self-determination. Dalun Zhang, Leena Landmark, Cheryl Grenwelge, and Linda Montoya, Department of Educational Psychology, 4225 TAMU, College Station, TX 77843-4225.

Personal safety programs for children with intellectual disabilities. Yu-Ri Kim, Department of Education, Sangmyung University, 7 Hongji-Dong, Jongno-Gu, Seoul, 110-743 KOREA.

Computer-based video instruction to teach students with intellectual disabilities to use public bus transportation. Linda Mechling and Eileen O’Brien, University of North Carolina Wilmington, Department of Early Childhood and Special Education, 601 S. College Road, Wilmington, NC 28404-5940.

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Teaching Students with Moderate Intellectual Disabilities to Read: An Experimental Examination of a Comprehensive Reading Intervention

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Southern Methodist University

Abstract: The primary purpose of our research was to determine if a comprehensive, phonics-based, direct instruction reading program would be effective in teaching early reading and language skills to students with moderate intellectual disabilities (ID). Participants were 28 elementary students from 10 public schools in an urban school district and one urban private school who were randomly placed into treatment and contrast groups. Students in the treatment condition received daily, comprehensive reading instruction in small groups of 1–4 students for approximately 40 minutes per session. A broad array of measures was studied, including phonemic awareness, phonics, word recognition, comprehension, and oral language. Means favored the intervention group on all measures, with moderate to strong effect sizes. Statistically significant differences were found on most measures, including phonemic awareness, phonics, vocabulary, and comprehension. These findings demonstrated that students with moderate ID can learn basic reading skills given consistent, explicit, and comprehensive reading instruction across an extended period of time.

In recent years, there has been growing national recognition that literacy is a civil right. The national rhetoric suggests that all children have the right to scientifically-based reading instruction and that it is not acceptable for any child to leave school with low literacy skills (No Child Left Behind Act, 2002). However, within the rhetoric about all children, references to students with intellectual disabilities (ID), or mental retardation, are typically vague or absent. One might question how one set of children could be overlooked in discussions about all children. In our experience, the answer appears to be that all has really referred to all children who are believed to be capable of learning to read (Katims, 2000). We define reading as the ability to process individual words in connected text resulting in understanding the author’s intended meaning. With this definition in mind, many educators assume that children with ID are not capable of learning to read (Katims). The expectation has been that, at best, students with ID, particularly those with moderate ID, can learn to identify a specific list of words memorized by sight. The result is that typically little effort is made to teach these students to become fully literate and only 1 in 5 children with mild or moderate ID achieves even minimal literacy skills (Katims, 2001).

Research on Reading and Intellectual Disabilities

Although much progress has been made in recent years regarding the education of students with ID, to date, very little reading research has been conducted with these students. What research has been done has focused primarily on students with mild ID (see Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006) and has focused...
only on isolated subskills of reading, rather than on comprehensive reading interventions that integrate all essential components of reading (defined below). Currently, no research has been conducted to determine whether students with ID can learn to read by fully processing the print and meaning of connected text, as is consistent with current theories of reading development (see reviews Browder & Xin, 1998; Browder et al., 2006; Conners, 2003; Joseph & Seery, 2004).

In spite of the paucity of research, the research that does exist is promising, suggesting that students with ID are capable of learning various aspects of reading. Sight word recognition has received the greatest attention from researchers and the preponderance of evidence demonstrates that students with even moderate and severe levels of ID can learn to automatically recognize a fairly large corpus of words with systematic instruction (Browder et al., 2006). Even so, these students have little ability to generalize their learning beyond the specific words included in instruction, and thus, are far from achieving even basic literacy (Browder et al.). Research on the effectiveness of phonics instruction is primarily limited to students with mild ID, but that research is also promising. Conners (1992) and Joseph and Seery (2004) found fourteen studies that examined phonics instruction for students with ID and these studies lend preliminary support to the effectiveness of phonics interventions. Unfortunately, these studies were all relatively brief, providing at most a few months of instruction, and they focused on isolated subskills of phonics, rather than a comprehensive, systematic approach that might result in skilled decoding. Further, none of these studies focused specifically on phonemic awareness (PA). In 1996, O’Connor, Notari-Syverson, and Vadasy, described the progress of several students with mild ID who participated in a PA intervention study. Of the nine students with ID who participated in the six-month PA intervention, three made substantial progress. In a recent study, students with ID receiving instruction for approximately 10 weeks made significantly more progress on sounding out activities than a similar control group (Conners, Rosenquist, Slight, Atwell, & Kiser, 2006). Studies on vocabulary and comprehension are even more limited, only including demonstrations of very basic skills, such as using a sight word in the context of a functional activity or matching a word to a picture (Browder et al.).

Taken in its totality, the research base on teaching students with ID to read is sparse and inadequate. At the present time, there are no studies that have examined the effectiveness of a comprehensive reading intervention delivered over a sustained period of time. Without this type of research, we cannot determine whether “all” as described in No Child Left Behind should or should not include students with ID. In short, we simply do not know what is possible for students with ID. The mission of the research reported here is to take important steps toward addressing this question. Specifically, we seek to determine what is possible for teaching children with moderate levels of ID to read.

Conceptual Framework

While there is little research on reading to guide decision making for children with moderate ID, much research has been conducted with other populations who also find learning to read very difficult, and thus, should inform research on teaching students with ID to read. This research provides the conceptual framework for our study. As is consistent with current research, we see reading as an integrated process, rather than a set of isolated skills. In a relatively simple view of reading, good readers effortlessly recognize words and build mental representations of the message of the text (Ehri, 2005; Perfetti, Landi, & Oakhill, 2005). Studies examining the underlying processes of word recognition are clear. Good readers fully process print, attending to the inner structure of each word that is read (Adams, 1990; Ehri, 2005; Ehri & McCormick, 1998; Torgesen, 2002). They do this quickly and effortlessly. Researchers believe good readers are able to focus attention on the meaning of print because word recognition processes are automatized. The underlying processes of comprehension are arguably more complex, depending on a variety of factors including listening comprehension, linguistic abilities, relevant knowledge, and general intelligence (Perfetti et al.). Specific to written language understanding are factors in-
including sensitivity to story structure, inference making, and comprehension monitoring (Perfetti et al.). We know that students progress through predictable stages as their word recognition and comprehension skills develop (Chall, 1996; Ehri; Ehri & McCormick, 1998). In early stages students develop phonological awareness and print awareness, along with expressive and receptive oral language skills. In later stages decoding and morphographic knowledge increases, eventually leading to the quick and effortless retrieval of words from long-term memory, enabling students to read fluently and, most importantly, focus on making sense of the message of text. Good readers make inferences and monitor their own comprehension, ensuring that stories and information are cohesive (Perfetti et al.).

Research on Early Reading Interventions

Over the past 30 years numerous studies focused on the prevention and correction of reading problems with students who struggle to learn to read who do not have ID. A primary finding from this research is that intervention provided to small groups of children in the primary grades can be highly effective in preventing reading problems for most children and greatly reducing the depth of reading problems for those who continue to experience difficulty, (e.g., Foorman & Torgesen, 2001; Mathes et al., 2005; Mathes & Denton, 2002; Denton & Mathes, 2003; National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). Likewise, we now understand the critical content students must acquire if they are to become competent readers. Effective interventions in early reading target multiple components of the reading process in an integrated and comprehensive manner, including concepts of print, oral language, phonological and phonemic awareness (PA), letter knowledge, word recognition, fluency, and comprehension (see Foorman & Torgesen, 2001; National Reading Panel, 2000; Pressley, 1998; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001; Snow et al., 1998). Many experimental studies demonstrate that teaching PA results in improved reading and spelling outcomes (see Ehri et al., 2001). Letter knowledge, including letter naming and letter-sound recognition, is also an important predictor of reading achievement (Share, Jorm, Maclean, & Matthews, 1984; Adams, 1990), and these skills influence other key early literacy skills, such as PA and phonemic decoding (Blairoll, 2004; Evans, Bell, Shaw, Moretti, & Page, 2006; Foy & Mann, 2006; Roberts, 2003; Treiman, Tincoff, & Richmond-Welty, 1996; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998). Many children who have difficulty learning to read also struggle with the development of good oral language skills (Perfetti et al., 2005). One method demonstrated to be effective for students with language delays is interactive storybook reading (Arnold & Whitehurst, 1994; Dickinson & Smith, 1994; Karweit & Wasik, 1996; Valdez-Menchaca & Whitehurst, 1992). Explicit instruction in basic comprehension strategies is also a critical component of successful early reading interventions (Mathes et al., 2005).

As we approach the task of intervening with children with moderate ID, it is important that we provide instruction that not only teaches the critical content of reading, but also synthesizes what is known to be effective in teaching students with ID. For these students, a behavioral approach appears to be most appropriate (Adams & Engelmann, 1996; Bowder et al., 2006; Joseph & Seery, 2004). The role of the teacher in a behaviorist model is to explicitly teach content and model skills, providing systematic review of skills and reinforcement for mastery.

Purpose of the Study

The purpose of this study was to analyze the effectiveness of a carefully crafted, comprehensive reading intervention built on behavioral principles in teaching primary-grade students with moderate ID to read. Students in this study participated in our intervention for one to one and a half years. Specifically, we implemented and expanded an explicit, systematic reading intervention that had been empirically validated with students at-risk for learning disabilities (Mathes et al., 2005) and with students who are both struggling readers and English Language Learners (Vaughn, Mathes et al., 2006). This intervention, now published as Early Interventions in Reading Comprehensive Reading Intervention / 5
(Mathes & Torgesen, 2005a), was (a) rooted in behavioral theory, (b) comprised of all of the content demonstrated to be critical for struggling readers without ID, and (c) supplemented with additional language development support.

This study adds to the literature in several ways. First, the reading intervention is comprehensive in nature, with instruction targeting oral language, phonemic awareness, alphabetic knowledge, phonemic decoding, and basic comprehension strategies. Second, the intervention in this study includes many components that have been previously validated with students at-risk for reading failure who have IQs in the average range, thus extending that research to the population of students with moderate ID. Third, the study extends these techniques with the addition of oral language activities and modified teaching techniques. Fourth, the study employs a longitudinal, randomized trial design. In this article, we report data collected after the students had been in the study for at least one full academic year. Future reports will follow the students for approximately four academic years. Finally, phonemic awareness and phonemic decoding were measured repeatedly allowing for the use of advanced statistical techniques. We addressed the following specific research question: Does a comprehensive reading program taught to primary-grade students who have moderate ID (IQs ranging from 40–55) result in better reading outcomes than typical special education instruction on measures of (a) phonemic awareness, (b) alphabetic knowledge, (c) word recognition/phonemic decoding, and (d) oral language/comprehension?

Previously Validated Intervention Components

The intervention included components previously validated for students without ID. The first, and most comprehensive, is Early Interventions in Reading (Mathes & Torgesen, 2005a; Mathes et al., 2005; Vaughn, Mathes et al., 2006). We also built upon oral language storybook techniques successfully used with English Language Learners (Vaughn, Cirino et al., 2006; Vaughn, Linan-Thompson, Mathes, Duradola, & Cárdenas-Hagan, 2007). Finally, we used a simple game to provide students with extensive modeling, practice, and feedback in phonemic awareness segmentation and blending, as well as the application of those skills to print (Allor, Gansle, & Denny, 2006). (See Method section for further details about the intervention.)

Method

Research Design

This study focused on students with moderate intellectual disabilities (i.e. IQs ranging from 40-55) who were participants in a larger, longitudinal study examining the effectiveness of a comprehensive reading program for students with low IQs (ranging from 40–79: Allor, Roberts, Mathes, Roid, & Cheatham, 2010). Students were randomly assigned within each school to either (a) an intervention group that participated in daily, small group reading instruction delivered by research teachers or (b) a contrast group receiving typical special education.

Participants

Schools. The study took place in 10 elementary schools in a large, southwestern urban school district and one private school for students with special needs. District personnel worked with the researchers to select schools with a relatively large number of students with ID and that would provide a balanced sample, racially and economically. An urban, private school that served students with special needs was added to increase the size of our sample of students with moderate ID.

Teachers. Six certified special education teachers were hired to provide instruction to students in the research study. The highest degree held by five of the teachers was a bachelor’s degree, while one teacher also held a master’s degree. Five were female and one was male. Five were Caucasian and one was African American. Five were jointly hired and supervised by district personnel and researchers, teaching at two or three different schools each day. One taught exclusively at the private school. At the outset of the study, two were new to teaching and the others had 5, 9, 12, and 35 years of teaching experience, respectively. Three of the teachers had prior experi-
ence working with students with reading difficulties, one had prior experience with students with behavioral disorders, one was bilingual, and one had prior experience teaching students with ID.

Students. At the outset of the study, researchers and school district personnel identified all students in each of the schools with moderate ID (IQ scores between 40 and 55) and who were in grades 1 to 4. All students in this IQ range were included regardless of the cause or comorbid conditions (i.e., Down Syndrome, autism, William’s Syndrome, physical disability, etc.). Students were randomly assigned within each school into either the intervention group or the contrast group. Due to the small number of students within each school, students were not matched on other variables. Twenty-four students began the study in the first year and another seven students joined the study at the beginning of the second year (these seven were also randomly assigned to the treatment or contrast group). Of these 31 students, two moved during the study and one was removed from the sample due to misidentification, resulting in a sample of 28 students (treatment, \( n = 16 \); contrast, \( n = 12 \)). The mean age of the participants was 9.46 \( (SD = 1.19) \) for the treatment group and 9.25 \( (SD = 1.76) \) for the contrast group. This difference was not significant \( (t = -.106) \). Other demographic information is presented in Table 1. Chi-square analyses revealed no significant differences on any demographic variables, including race, gender, socioeconomic status, and educational placement.

### Measures

We employed two types of measurement schemes. First, we assessed at pretest and posttest. Second, we collected continuous progress monitoring data every four weeks during the first year of the intervention and every six weeks during the second year.

### Pre-post

All students were assessed prior to the intervention and at the end of the Spring semester of the second year. Pretesting during the first year occurred between October and February on a staggered schedule with students in the treatment and contrast groups tested at approximately the same time. The 7 students who entered the study in the second year were pretested in August or September of that year.

---

**TABLE 1**

Student Demographic Data by Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment (( n = 16 ))</th>
<th>Contrast (( n = 12 ))</th>
<th>( \chi^2 ) (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n ) (%),</td>
<td>( n ) (%),</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14 (88%)</td>
<td>8 (67%)</td>
<td>1.77 (1)</td>
</tr>
<tr>
<td>F</td>
<td>2 (12%)</td>
<td>4 (33%)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>4 (25%)</td>
<td>4 (33%)</td>
<td>.58 (3)</td>
</tr>
<tr>
<td>African American</td>
<td>9 (56%)</td>
<td>5 (42%)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>2 (13%)</td>
<td>2 (17%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (6%)</td>
<td>1 (8%)</td>
<td></td>
</tr>
<tr>
<td>Free Lunch Program Participation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free</td>
<td>5 (31%)</td>
<td>3 (25%)</td>
<td>.15 (2)</td>
</tr>
<tr>
<td>None</td>
<td>10 (63%)</td>
<td>8 (67%)</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (6%)</td>
<td>1 (8%)</td>
<td></td>
</tr>
<tr>
<td>Special Education Placement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self contained class for students with ID</td>
<td>12 (75%)</td>
<td>11 (92%)</td>
<td>1.39 (2)</td>
</tr>
<tr>
<td>Self contained class for students with autism</td>
<td>1 (6%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>General education w/ resource</td>
<td>3 (19%)</td>
<td>1 (8%)</td>
<td></td>
</tr>
</tbody>
</table>

\( ^a \) No differences were statistically significant.
The following measures comprised the comprehensive battery:

**Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997).** The PPVT-III measures receptive vocabulary. The technical manual reports reliability coefficients ranging from .91 to .98 and adequate content, criterion, and construct validity.

**The Expressive Vocabulary Test (EVT; Williams, 1997).** The EVT measures expressive vocabulary. The technical manual reports internal reliability alphas ranging from .90 to .98 with a median of .95 and test-retest reliability coefficients range from .77 to .90. Data on content, criterion, clinical and construct validity are reported in the technical manual.

**The Woodcock Language Proficiency Battery-Revised.** (WLPB-R; Woodcock, 1991). We included memory for sentences and listening comprehension from the language composite. We included letter-word identification (real word reading), word attack (nonsense word reading), and passage comprehension from the reading composite. The WLPB-R has good reliability (internal consistency ranged from .81–.92; test-retest ranged from .75 to .95). Adequate content, concurrent, predictive, and construct validity data are also reported in its technical manual.

**The Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999).** Five subtests of the CTOPP were used: Blending Words, Blending Nonwords, Segmenting Words, Sound Matching (first sound and last sound), and Rapid Letter Naming. The CTOPP has good reliability (internal consistency ranged from .83 to .95; test-retest ranged from .70 to .92). Adequate content, concurrent, predictive, and construct validity data are also reported in its technical manual.

**Test of Word Reading Efficiency (TOWRE: Torgesen, Wagner, & Rashotte, 1999).** Both subtests were administered: phonemic decoding efficiency and sight word efficiency. Reliability coefficients are .95 and .96, respectively. Data on content-description, concurrent, construct identification, and item validity are reported in its technical manual.

**Continuous Progress Monitoring**

In order to assess progress continuously across a school year, we used Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002). DIBELS measures are commonly used for collecting continuous progress monitoring data. We administered 4 subtests: Initial Sound Fluency (ISF), Phoneme Segmentation Fluency (PSF), and Nonsense Word Fluency (NWF). ISF, PSF, and NWF reliability coefficients range from .72 to .92 on single probes and .91 to .98 on the means of multiple probes (3 to 5 probes). Concurrent and predictive validity with a variety of reading tests ranges from .36 to .82. In addition, the Letter Naming Fluency (LNF) test was given at pre and posttest. The alternative form reliability coefficient for LNF was .88. Validity coefficients for this measure ranged from .65 to .71.

**Intervention Overview**

Students in the intervention condition received approximately 40 to 50 minutes of instruction daily in small groups of one to four from one of our six highly trained and supported intervention teachers across the duration of the study. The intervention was comprehensive, including systematic and explicit instruction in multiple content strands (i.e. concepts of print, phonological and phonemic awareness, oral language, letter knowledge, word recognition, vocabulary, fluency, and comprehension) woven together so skills and strategies were integrated and applied in context.

The intervention built on a curriculum previously validated with students without ID, Early Interventions in Reading (Mathes & Torgesen, 2005a, 2005b), which was comprised of 240 lessons split evenly into two levels. However, students in the current research did not possess the prerequisite skills necessary to profit from this curriculum. Thus, we created an additional 60 lessons we called the Foundation Level (Allor, Mathes, & Jones, 2010). An oral language component was also developed and included in both the Foundation Level and Level One. In total, 300 lessons have been designed to take students from being nonreaders with very little or no letter knowledge or phonological awareness to reading at approximately an ending 3rd grade reading level. Since no students had yet begun Level Two at the time of the article, only details...
about the Foundation Level and Level One are provided here.

Based on pre-test DIBELS scores, 13 students began the intervention in the Foundation Level and three began in Level One. The three students beginning in Level One were among the older students in the study (2 third graders and 1 fourth grader). Groups were determined by DIBELS pretest scores as well as other practical considerations. Thus, two of the 16 students were taught individually, while others were taught in groups of two to four. Grouping arrangements changed as needed, based on rate of progress.

Instructional Design and Features

All of the lessons in the program were fully-specified and employed the principles of Direct Instruction (Carnine, Silbert, Kame’enui, & Tarver, 2004; Coyne, Kame’enui, & Simmons, 2001; Englemann, 1997; Englemann & Carnine, 1982; Kame’enui & Simmons, 1990). We chose this model of instruction because of its long standing record of success with various populations at-risk for school failure (Adams & Engelmann, 1996; Borman, Hewes, Overman, & Brown, 2003; Carlson & Francis, 2002; Ligas, 2002). Instructional content was carefully analyzed and organized into a systematic scope and sequence intended to reduce student confusion and target big ideas and key strategies. Errors were reduced through integration of new learning with previous learning, ongoing review, and opportunities for group and individual responding. The goal was to integrate skills and strategies over time, resulting in a set of daily lesson plans with overlapping content strands and extensive cumulative review and application (i.e., concepts of print, phonological and phonemic awareness, letter knowledge, word recognition, connected text fluency, comprehension strategies, vocabulary, and oral language development). Following a behavioral approach, lessons provided for (a) frequent reinforcement on both an interval and intermittent schedule, (b) carefully orchestrated time delay techniques between stimuli presentation and student responses, and (c) multiple opportunities to practice each item of content.

Each lesson plan was highly detailed, providing exact wording to ensure teacher language was clear and kept to a minimum. By following these plans, teachers delivered explicit instruction in integrated instructional strands, responding to individual student learning needs by scaffolding instruction when necessary. Thus, while lesson plans were prescribed, the way in which lessons were actually delivered required teachers to make on the spot decisions and minor adjustments in the plans in order to focus on specific target areas needed by students within a group. Accompanying these lesson plans, teachers were provided storybooks for read-alouds, pictures for vocabulary support, student activity books, magnetic pictures (Foundation Level only), daily reading books using decodable stories (Level One only), a puppet with a fully articulated mouth, letter-sound picture cards, “automatic” word cards, and lesson mastery tracking forms. Additionally, the Foundation Level included a game designed to provide students with opportunities to practice the PA skills of blending, segmenting, and letter-sound correspondence (See Allor et al., 2006 for details).

Instructional Strands

Concepts of print. During the Foundation Level, students developed various concepts of print. These included pointing to the title and author of a book, tracking from left to right, and pointing to individual words while repeating a sentence.

Phonological and phonemic awareness. Activities in this strand spanned the Foundation Level and Level One and addressed skills along the continuum of phonological and phonemic awareness, including clapping words in sentences, clapping syllables within a multi-syllabic word, initial sound isolation, phoneme segmentation, phoneme blending, and phoneme discrimination. Over time the complexity of words included in segmentation and blending activities increased.

Letter knowledge. In this strand, students learned letter names and the sounds of individual letters and letter combinations, as well as worked on speeded retrieval (i.e., rapid automatic naming tasks). Starting in the 21st lesson of the Foundation Level, students were taught to map phonemes to letters, with new letter-sound correspondences introduced ev-
very few days and followed by daily cumulative review.

**Word recognition.** This strand included both phonetically regular and irregular words. Toward the end of the *Foundation Level*, students were taught a small number of sight words; these words were high-frequency, phonetically irregular words presented as tricky words to be recognized automatically. Students were also taught to decode very simple phonetically regular words (i.e. closed syllable, consonant-vowel-consonant: CVC) by blending the sounds represented by the letters. As students progressed through *Level One*, additional sight words were taught and the time allowed to sound out the words was reduced, while the complexity of the words was increased (i.e. variant spelling patterns, blends, additional syllable types, and multisyllabic words). Students were also taught to be flexible decoders.

**Fluency with connected text.** Beginning very early in *Level One*, word recognition strategies were applied as students read decodable stories. As students acquired greater mastery of more elements, as well as the ability to decode more difficult words, this text became more challenging. To promote fluency, repeated reading of these stories was built into daily lessons. Typically students read a story in unison on the first reading, followed by reading a page or two individually on the second reading. The third reading was typically read in pairs, with the teacher timing the reading rate of one student.

**Comprehension strategies.** A major objective was for children to read strategically to increase understanding. Thus, prior to reading a story, students “browsed the story” looking at the pictures and predicting story content. Students then read to find out if their predictions were true. With expository text, teachers activated prior knowledge by asking students to tell what they already knew about the topic and to read to learn more. After reading the story, students then engaged in a number of activities depending on the students’ competence and text structure. Initially, students were only asked to tell about what they read. Information in any order was accepted. Over time, students sequenced information until they were able to sequence only the most important information. In later lessons, students identified story grammar elements for narrative text and new information learned in expository text.

**Vocabulary and oral language development.** Language goals were addressed through storybook read-alouds, with direct teaching of spoken vocabulary and key background knowledge, as well as extensive discussion. In the *Foundation Level*, teachers explicitly taught vocabulary and engaged students in conversation using open-ended questions and building on student language (Arnold & Whitehurst, 1994). When students began *Level One*, the Storybook routine became more complex, with books organized into themes to facilitate vocabulary and concept review. One book was read from and discussed for 3 to 5 days, with two to three new vocabulary words taught each day. Students listened for and discussed the “target words” during the reading of the story. After the passage was read aloud, students provided an oral retell and discussed the story with the teacher who employed feedback and scaffolding to encourage the use of complete sentences and new vocabulary terms.

**Staff Development**

During the first year of the intervention, the teachers attended a total of six days of training on the intervention, four at the beginning of the school year and two later in the school year. Teachers were visited by two experienced reading coaches every other month to address their individual needs and the needs of their students. The coaches were former teachers who had previously taught the *Early Interventions in Reading* (Mathes & Torgesen, 2005a) curriculum under similar research conditions. Teachers also attended three meetings with the entire research team, including the coaches and lead research investigators who had created the curriculum.

During the second year, teachers participated in three days of training, two days at the beginning of the school year and one day in the middle of the school year. The number of coaching visits was reduced to two per semester. Research team meetings with the teachers were increased in frequency to once per month and focused on using student data to
make instructional decisions, including both academic and behavioral modifications.

**Implementation Fidelity and Intensity**

Three fidelity observations were conducted each year to measure the degree to which the intervention was implemented. After each observation, the research assistants shared feedback with teachers. A 3-point rating scale was used to evaluate the fidelity of implementation across several categories including teaching to mastery, maintaining a good pace, maintaining student attention, and providing error correction and scaffolding. A score of 3 indicated that the teacher implemented the category exactly as intended. A score of 2 indicated that the category was implemented acceptably but with some error. A score of 1 indicated that the category was poorly represented. A score of 0 indicated that the behavior was expected but not observed. The measure included a global checklist for readiness of materials, appropriate seating arrangement, and instructor warmth and enthusiasm. Interrater agreement was calculated and exceeded 85%. Averaged across six fidelity observations, teachers’ scores ranged from 2.29 to 2.96 out of 3 with a mean of 2.75 (SD = 0.25). The mean, calculated as a percentage score, was 90.9% (SD = 8.63).

Total instructional time for each student varied depending on when they began the intervention and attendance. As a result, instruction for the students varied from 30 to 53 weeks, with a mean of 42.8 weeks (SD = 10.34). The average length of an instructional session was 40 minutes (SD = 6). Students participated in an average of 119 (SD = 11) instructional sessions during the study.

**Results**

**Pretest Equivalence**

Pretest data were analyzed using independent t-tests. These indicated no statistically significant differences between the treatment and contrast groups on any pretest measure. Pretest equivalency data are presented in Table 2.

**Growth from Pretest to Posttest**

Independent t-tests on difference scores of the pretest and posttest measures were conducted.
TABLE 3
Growth on Pretest to Posttest Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Treatment (n = 16)</th>
<th></th>
<th>Contrast (n = 12)</th>
<th></th>
<th></th>
<th>t</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest M</td>
<td>SD</td>
<td>Posttest M</td>
<td>SD</td>
<td>Difference M</td>
<td>SD</td>
<td>Pretest M</td>
</tr>
<tr>
<td>CTOPP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blending Words</td>
<td>2.00</td>
<td>3.50</td>
<td>4.44</td>
<td>4.94</td>
<td>2.44</td>
<td>4.66</td>
<td>.92</td>
</tr>
<tr>
<td>Blending Nonwords</td>
<td>.88</td>
<td>1.78</td>
<td>2.31</td>
<td>2.94</td>
<td>1.44</td>
<td>2.75</td>
<td>.83</td>
</tr>
<tr>
<td>Segmenting Words</td>
<td>.37</td>
<td>1.50</td>
<td>3.06</td>
<td>3.87</td>
<td>2.69</td>
<td>3.75</td>
<td>.00</td>
</tr>
<tr>
<td>Sound Matching</td>
<td>2.00</td>
<td>2.45</td>
<td>4.69</td>
<td>3.93</td>
<td>2.60</td>
<td>2.91</td>
<td>1.50</td>
</tr>
<tr>
<td>EVT</td>
<td>34.94</td>
<td>13.28</td>
<td>42.38</td>
<td>11.51</td>
<td>7.44</td>
<td>9.31</td>
<td>30.08</td>
</tr>
<tr>
<td>PPVT</td>
<td>40.81</td>
<td>21.70</td>
<td>50.81</td>
<td>25.38</td>
<td>10.00</td>
<td>10.22</td>
<td>33.92</td>
</tr>
<tr>
<td>TOWRE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sight Word Efficiency</td>
<td>2.69</td>
<td>5.65</td>
<td>11.38</td>
<td>11.12</td>
<td>8.69</td>
<td>9.45</td>
<td>6.08</td>
</tr>
<tr>
<td>Phonemic Decoding Efficiency</td>
<td>.38</td>
<td>1.50</td>
<td>5.00</td>
<td>6.53</td>
<td>4.63</td>
<td>5.38</td>
<td>2.42</td>
</tr>
<tr>
<td>WLPB-R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory for Sentences</td>
<td>23.44</td>
<td>10.02</td>
<td>27.88</td>
<td>7.22</td>
<td>4.44</td>
<td>7.66</td>
<td>21.17</td>
</tr>
<tr>
<td>Listening Comprehension</td>
<td>2.81</td>
<td>3.25</td>
<td>5.44</td>
<td>6.11</td>
<td>2.63</td>
<td>4.24</td>
<td>1.25</td>
</tr>
<tr>
<td>Letter-Word Identification</td>
<td>12.25</td>
<td>7.61</td>
<td>18.75</td>
<td>7.72</td>
<td>6.50</td>
<td>4.05</td>
<td>11.25</td>
</tr>
<tr>
<td>Passage Comprehension</td>
<td>2.62</td>
<td>3.30</td>
<td>5.31</td>
<td>3.95</td>
<td>2.69</td>
<td>2.65</td>
<td>1.58</td>
</tr>
<tr>
<td>Word Attack</td>
<td>1.00</td>
<td>2.85</td>
<td>2.94</td>
<td>2.82</td>
<td>1.94</td>
<td>2.49</td>
<td>.75</td>
</tr>
</tbody>
</table>

* p < .05
to determine whether students in the treatment condition made greater gains than students in the contrast condition. Because of positive results in previous studies with *Early Interventions in Reading*, we anticipated the directionality of any differences (Mathes et al., 2005) and, therefore, we analyzed the data using a one-tailed test of the null hypothesis (Gall, Gall, & Borg, 2007). *T*-test and effect size results are presented in Table 3. Statistically significant results were found on the following measures: CTOPP Blending Nonwords, CTOPP Segmenting Words, CTOPP Sound Matching, PPVT, TOWRE Sight Word Efficiency, TOWRE Phonemic Decoding Efficiency, WLPB-R Letter-Word Identification, WLPB-R Passage Comprehension, and WLPB-R Word Attack. No statistically significant differences were found on CTOPP Blending Words, EVT, WLPB-R memory for sentences, and WLPB-R listening comprehension, although all means favored the treatment group and effect sizes were moderate to strong.

We also applied the Bonferroni correction procedure because we employed multiple, related measures of various reading constructs. This adjustment was made to help control for Type I error (Dunn, 1961). We adjusted our critical *p* value by dividing .05 by the number of measures in a given construct, i.e. phonemic awareness, phonemic decoding, real word recognition, reading comprehension, and oral language measures. After making this correction, differences on PPVT, TOWRE Sight Word Efficiency, and WLPB-R Passage Comprehension were no longer statistically significant. Other findings remained the same. Additionally, Analysis of Covariance tests were conducted on gain scores to note differences between the treatment and contrast groups. These initial analyses were not performed in a HLM environment because of a lack of power in the HLM design. Therefore, independent samples *t*-tests were used because they were more appropriate and more parsimonious. With the continuous progress monitoring data, HLM growth curve analysis is more appropriate as it can model complex covariance structures and effectively model explanatory variables that are able to mediate the changes in growth from student to student.

The HLM model investigated differences among the success of the intervention for students with moderate ID (IQ scores between 40 and 55). HLM combines the strength of simple ANOVA (mean difference analysis) and regression (correlational analysis) to build a model that both considers differences across students (the second-level or student-level) and incorporates a correlational component for each of these students (the time covariate). This assumption is fundamental to our analysis since we are hypothesizing that belonging to the intervention group and the cross-level interaction between time and intervention (a student-level variable) will have an impact on growth.

For each of the three dependent variables, PSF, ISF, and NWF, two models were tested. Because these models included interaction effects, it was important to code time with a meaningful zero (Hox, 2002). Therefore, time was centered with zero being the day that a student began the program and increasing numbers representing the number of weeks the student was involved in the intervention.
The first model included only the time covariate with random effects for the intercept and for the time variable and was presented as:

\[
y_{it} = \gamma_{00} + \gamma_{10} * \text{time} + u_{0i} + u_{1i} * \text{time} + e_{it},
\]

where \(y_{it}\) is the dependent variable for that model, \(\gamma_{00}\) is the average fluency at time = 0, \(\gamma_{10}\) is the average student increase in fluency for each week since the program began, \(u_{0i}\) is the random effect of \(\gamma_{00}\), \(u_{1i}\) is the random effect for \(\gamma_{10}\), and \(e_{it}\) is the random effect of the measurement occasions within individual students.

The second model included a student-level (level-2) effect to identify whether or not the student was in the intervention or control group. In this model, the intercept \(\gamma_{00}\) has a slightly different interpretation than in the first model as it now represents the average fluency for a student in the control group at time = 0 (the intervention group receives a “1” for the level-2 grouping variable). This new model is:

\[
y_{it} = \gamma_{00} + \gamma_{10} * \text{time} + \gamma_{01} * \text{group}
+ \gamma_{11} * \text{time} * \text{group} + u_{0i} + u_{1i} * \text{time} + e_{it},
\]

where \(\gamma_{01}\) is the effect of a student belonging to the intervention group at time = 0 and \(\gamma_{11}\) represents the cross-level interaction between time and the intervention effect.

Hox (2002) has noted that it is typical to include both of the main effects in a model in the presence of a statistically significant interaction effect. As can be seen from the results of our three models in Tables 4–6, the model structures are the same across all four analyses. The only change between each analysis was the dependent variable.

The analysis in Table 4 represents the effect of the intervention on ISF across time for students. There was no statistical difference between the intervention and contrast groups at the initial time-point (\(t = 1.026, p = 0.711\)). The interaction effect tested to see whether or not the amount of difference between the intervention group and contrast group changed over time. For example, a large positive value for \(\gamma_{11}\) would mean that students involved in the intervention tended to have larger gains in ISF over the contrast group students the longer they were involved in the intervention. In this analysis, however, the value for this interaction (0.167) was not statistically significant over time (\(p = 0.058\)) indicating that students in the intervention and control groups tended to have the same rate of change over time.

### Table 4

Model Fit Estimates for Initial Sound Fluency with Students with IQs in the Moderate Range

<table>
<thead>
<tr>
<th></th>
<th>(M_0: ) Null model</th>
<th>(M_1: ) + group &amp; interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>estimate</td>
<td>s.e.</td>
</tr>
<tr>
<td>Fixed Effects:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept (\gamma_{00})</td>
<td>5.000</td>
<td>1.326</td>
</tr>
<tr>
<td>Time (\gamma_{10})</td>
<td>0.238</td>
<td>0.046</td>
</tr>
<tr>
<td>Group (\gamma_{01})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Group (\gamma_{11})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Effects:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\sigma^2_e)</td>
<td>30.706</td>
<td></td>
</tr>
<tr>
<td>(\sigma^2_{u0})</td>
<td>38.957</td>
<td></td>
</tr>
<tr>
<td>(\sigma^2_{u1})</td>
<td>0.040</td>
<td></td>
</tr>
<tr>
<td>(\text{COV}(u_0, u_1))</td>
<td>0.017</td>
<td></td>
</tr>
<tr>
<td>Fit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td>1678.826</td>
<td></td>
</tr>
<tr>
<td>BIC</td>
<td>1699.882</td>
<td></td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>1666.826</td>
<td></td>
</tr>
</tbody>
</table>
Table 5 shows the effect of the intervention on PSF across time for students. As can be seen from this analysis, there was no statistical difference between the intervention and contrast groups at the initial time-point (\(p = 0.199\), \(p = 0.927\)), thus indicating that they were statistically equivalent in terms of PSF when the program began. Also in model M1, the value for the interaction effect (0.417) was statistically significant over time (\(p < .001\)), thus indicating that students in the intervention group tended to have a larger rate of growth in PSF over time than did the students in the contrast group.

Table 6 shows the effect of the intervention on students’ NWF across time. Again, there

<table>
<thead>
<tr>
<th>TABLE 5</th>
<th>Model Fit Estimates for Phoneme Segmentation Fluency with Students with IQs in the Moderate Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects:</strong></td>
<td></td>
</tr>
<tr>
<td>Intercept (\gamma_{00})</td>
<td>0.681  1.032  0.509</td>
</tr>
<tr>
<td>Time (\gamma_{10})</td>
<td>0.369  0.066  (&lt; .001)</td>
</tr>
<tr>
<td>Group (\gamma_{01})</td>
<td>-0.199  2.139  0.927</td>
</tr>
<tr>
<td>Time*Group (\gamma_{11})</td>
<td></td>
</tr>
<tr>
<td><strong>Random Effects:</strong></td>
<td></td>
</tr>
<tr>
<td>(\sigma^2 )</td>
<td>27.819  27.832</td>
</tr>
<tr>
<td>(\sigma^2_{u0})</td>
<td>20.332</td>
</tr>
<tr>
<td>(\sigma^2_{u1})</td>
<td>0.107  0.231</td>
</tr>
<tr>
<td>(COV (u_0, u_1))</td>
<td></td>
</tr>
<tr>
<td><strong>Fit:</strong></td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td>1666.922  1657.986</td>
</tr>
<tr>
<td>BIC</td>
<td>1687.979  1685.996</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>1654.922  1641.986</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 6</th>
<th>Model Fit Estimates for Nonsense Word Fluency with Students with IQs in the Moderate Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects:</strong></td>
<td></td>
</tr>
<tr>
<td>Intercept (\gamma_{00})</td>
<td>2.786  1.794  0.122</td>
</tr>
<tr>
<td>Time (\gamma_{10})</td>
<td>0.327  0.065  (&lt; .001)</td>
</tr>
<tr>
<td>Group (\gamma_{01})</td>
<td>-3.725  3.586  0.309</td>
</tr>
<tr>
<td>Time*Group (\gamma_{11})</td>
<td></td>
</tr>
<tr>
<td><strong>Random Effects:</strong></td>
<td></td>
</tr>
<tr>
<td>(\sigma^2 )</td>
<td>37.252  37.266</td>
</tr>
<tr>
<td>(\sigma^2_{u0})</td>
<td>75.907</td>
</tr>
<tr>
<td>(\sigma^2_{u1})</td>
<td>0.088  0.455</td>
</tr>
<tr>
<td>(COV (u_0, u_1))</td>
<td></td>
</tr>
<tr>
<td><strong>Fit:</strong></td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td>1673.274  1666.205</td>
</tr>
<tr>
<td>BIC</td>
<td>1694.057  1693.847</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>1661.274  1650.205</td>
</tr>
</tbody>
</table>
was no statistical difference between the intervention and contrast groups at the initial time-point ($-3.725$, $p = 0.309$), thus indicating that they were statistically equivalent in terms of NWF when the program began. Also in model M1, the value for the interaction effect (0.337) was statistically significant over time ($p = 0.003$) thus indicating that students in the intervention group tended to have a larger rate of growth in NWF over time than did the students in the contrast group. It should be noted that one student in the treatment group was excluded from this analysis because the student began the study above benchmark and maintained scores above benchmark.

Graphs of scores for individual students on PSF and NWF are presented in Figures 1 and 2. The graphs on the left show the scores for the 12 students in the contrast group; the graphs on the right show the scores for the 16 students in the treatment group.

**Discussion**

In this article, we report the results from a longitudinal study examining the effectiveness of a comprehensive early literacy intervention for students with moderate intellectual disabilities (ID). This article reports on student progress after participating in the intervention, or typical special education instruction, for one to one and a half years. The purpose of the study is to determine if students participating in the intervention make significantly more progress on a variety of reading and language measures than similar students participating in typical special education. Our outcomes strongly support the effectiveness of the intervention with students with moderate ID. These findings are discussed in detail below.

**Research Question:** Does a comprehensive reading program taught to primary-grade students who have moderate ID (IQs ranging from 40-55) result in better early reading outcomes than typical special education instruction on measures of (a) phonemic awareness (PA), (b) phonics, (c) word recognition, and (d) oral language/comprehension? The answer to this question is clearly yes. On all outcome measures, means favored the intervention group, with moderate to strong ESs on all measures. Despite low statistical power due to the small sample size (16 in the intervention and 12 in the contrast group), statistically significant differences were found on multiple measures, including measures of phonemic awareness, phonics, word recognition, vocabulary, and comprehension.

The clearest, and arguably one of the most important findings in the study were on measures of phonemic awareness (PA). Students participating in the intervention consistently outperformed students in the contrast group on measures of PA. Effect sizes on the four CTOPP subtests (gains from pretest to posttest) ranged from a moderate effect of .57 to a strong effect of .88. The differences on both Blending Nonwords and Segmenting Words were statistically significant (See Table 3). Additionally, these differences remained significant after the Bonferroni correction. Although differences on CTOPP Blending Words and Sound Matching were not statistically significant, effect sizes were moderate to strong (.57 and .68, respectively). Results from the HLM analysis also revealed that the students in the intervention group tended to have a higher rate of growth on DIBELS-PSF over time, with this interaction statistically significant ($p < .001$; see Table 5 and Figure 1). This finding is particularly compelling because it indicates that students in the intervention group consistently outperformed students in the contrast group over a long period of time. Unexpectedly, the same pattern of results was not evident on DIBELS-ISF, but this was likely because students with ID found the language and cognitive demands of the task challenging, preventing them from demonstrating their ability to isolate phonemes.

Consistent differences in favor of the treatment group were also evident on multiple measures of alphabetic decoding. Effect sizes on nonsense word reading measures, TOWRE phonemic decoding and WLPB word attack, were 1.0 and .66, respectively, with statistically significant differences on the former measure. These differences remained significant after the Bonferroni correction procedure. Additionally, HLM analyses of NWF measures across time revealed a statistically significant interaction in favor of the treatment group ($p = .003$; See Table 6 and Figure 2).

Data also indicate that students in the treatment group consistently made more growth on word recognition (i.e., real word reading)
than students in the contrast group. Two measures directly assessed this skill, TOWRE Sight Word Efficiency and WLPB-R Letter-Word Identification. Differences on these measures were statistically significant and ESs were strong (.72 on TOWRE-word reading efficiency and .99 on WLPB-R Letter-Word Identification).

Outcomes for oral language and comprehension were also positive. Effect sizes were moderate to strong on language measures, ranging from .36 to .71, with significant differences on receptive vocabulary (PPVT). Differences on passage comprehension were statistically significant. (See Table 3.)

Conclusions

This study provides clear support for raising expectations related to reading for students
with moderate ID. Students with moderate ID should not be left behind; they should be provided with scientifically-based reading instruction. The findings of this study strongly support the conclusion that students with moderate IDs can make important gains in reading and language skills when provided with intensive and comprehensive instruction over an extended period of time. A broad array of measures was studied, including PA, phonics, word recognition, comprehension, and oral language. ESs on all measures were moderate to strong, with means consistently favoring the intervention group. Statistically significant differences were found on multiple measures, including phonemic awareness, phonics, word recognition, and comprehension. These findings are consistent with existing research and extend that research in several ways.

First, explicit, systematic instruction in PA and phonics that has proven to be effective for students with IQs in the average range (Ehri et al., 2001; Mathes et al., 2005) is also effective for students with moderate ID. Prior research on teaching PA and phonics to students with ID focused on those with mild ID and was limited to relatively brief instructional periods targeting isolated skills (Joseph & Scery, 2004; O’Connor et al., 1996). The current study demonstrates that with an integrated and systematic approach, students with moderate ID can successfully combine isolated skills in PA and phonics to decode unfamiliar words.

Second, this study is consistent with previous research demonstrating the effectiveness of systematic approaches in improving sight word recognition (Browder et al., 2006). In this study sight word instruction was one component of the comprehensive reading program implemented. Effect sizes on measures of sight word recognition were high and differences between the treatment and contrast groups were statistically significant.

Third, we found that a comprehensive reading intervention can positively impact oral language and comprehension. With moderate ESs on oral language measures and strong, statistically significant differences on reading comprehension and receptive vocabulary, the current study extends previous research that had demonstrated only very basic, isolated comprehension skills (Browder, 2006). As is similar in research with students without ID, it is likely that gains in comprehension are strongly influenced by gains in word recognition. It appeared that the students in the treatment group were able to identify more words than the students in the contrast group, enabling them to answer a few basic comprehension items on the standardized measure.

Fourth, the longitudinal design of this study provides information about the level of reading performance that can be expected after one to one and a half years of consistent instruction in a comprehensive reading program. Eight of the 16 students in the treatment group were approximately halfway through Level One or further. At this level, students were able to identify the most common sound for all individual letters and read words made up of those letters. For example, students were able to successfully say the sounds in words such as last, mom, slip, and step, as well as blend those sounds together to form the word. Further, students at this level were working on basic comprehension strategies, such as retelling stories, sequencing main events, and story grammar. Generally, students in this study took approximately twice the amount of time to successfully complete lessons than struggling readers in previous studies. Further, a closer look at the graphs in Figures 1 and 2 reveals that gains on DIBELS measures of PA and phonics (PSF and NWF) were typically not evident until students had been participating in the intervention for approximately 15 to 20 weeks of instruction. The time needed to evidence gain was much longer in duration than is typical of struggling readers without ID. Thus, while the content of instruction for both groups is the same, what differentiates them is the persistence needed on the part of schools to provide this instruction.

Practical Implications

The findings of this study have important practical implications for educators in the field of intellectual disabilities. First, and most importantly, our findings support educators who choose to provide reading instruction that is comprehensive and not limited to sight word memorization, even with students with IQs in the moderate range. Second, reading
programs should be selected that are consistent with the techniques of the intervention described in this study, including (a) systematic, explicit instruction in all components of reading; (b) repetitive, routine activities implemented with consistent instructional language; and (c) fast-paced, short activities that are highly motivating. Third, to be effective with students with ID, programs must be implemented with extremely high degrees of fidelity. This requires initial and ongoing professional development. Fourth, practitioners need to make data-based decisions about how to modify instruction and provide positive behavioral support. In addition to using existing progress monitoring measures, such as DIBELS, observation of student performance during lessons and other informal measures is key to making appropriate decisions.

Limitations and Future Research

One limitation of the current study is the variability of student performance on outcome measures, as is common among students with IDs. We met the challenge of eliciting optimal performance from our students on study measures by ensuring familiarity of examiners and discontinuing testing when necessary. We also addressed this issue by including repeated measures across time, when possible. This enabled us to employ data analytic techniques (i.e., HLM) that analyzed trends across time and minimized the impact of variability of the data. Due to this limitation, findings related to measures only administered at pretest and posttest should be interpreted cautiously. Further research is needed to develop reading and language tests that use repeated measures of progress, especially untimed measures as existing repeated measures are usually timed.

Another limitation of the study is the small sample size. This is a common problem when studying low-incidence populations because it is logistically challenging and resource-intensive to increase sample size with a low-incidence population. Even after carefully selecting schools with as many students with moderate IDs as possible and with the addition of a school that focuses on students with IDs, our sample remained quite small for a group design study. This is problematic because it increases the probability of Type II error and it is possible that significant differences between the groups on some measures were not detected simply because of the small sample size. A competing limitation is that by conducting multiple t-tests on related measures we increased the possibility of Type I error. We addressed this limitation by applying the Bonferroni correction procedure. Our findings held up under the scrutiny of this conservative procedure.

Further research is needed to address multiple questions related to teaching students with ID to read. One need is further exploration of the relationship between IQ and response to reading instruction. Currently, we are examining this issue with our larger study in which we are following the progress of students with IQs ranging from 40 to 79 over four academic years. In that study, we are also addressing the question of the level of reading competence that can be achieved by students with low IQs. In this article, language measures were administered only at pretest and posttest. Further analyses of language measures, especially measures across time, are also needed. Given the variability of student performance, language measures that can be administered frequently would be useful for research and for teachers to use in their classrooms for ongoing progress monitoring. Finally, further research is needed to determine progress over a longer period of time, especially on measures of advanced reading, including fluency and comprehension.

Summary

In summary, students with moderate IDs can learn basic reading skills given consistent, explicit, and comprehensive reading instruction across a long period of time. Success requires that we apply key instructional features that have been demonstrated to be effective with struggling readers with average IQs, as well as techniques known to be effective for students with IDs. Teachers must be provided with up-to-date materials and extensive professional development and continued support in order to implement research-based instruction with high degrees of fidelity. Additionally, teachers must monitor student progress in order to make academic and behavioral modifications.
needed to ensure success. Teachers also need access to coaches with expertise in reading. Although we hope this study raises expectations for students with IDs, particularly moderate IDs, we also wish to emphasize that providing effective reading instruction to students with IDs is extremely challenging. Finally, we need to continue to explore what is possible for students with ID if they are provided consistent, comprehensive reading instruction for an extended period of time.

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Friendships with Peers with Severe Disabilities: American and Iranian Secondary Students’ Ideas about Being a Friend

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Abstract: We used the Student Friendship Perception Survey (SFPS) (Hamre-Nietupski, Hendrickson, Nietupski, & Shokoohi-Yekta, 1993; Hendrickson, Shokoohi-Yekta, Hamre-Nietupski, & Gable, 1996) to examine the opinions of 656 American and 289 Iranian high school students (13–18 years old, M = 15.0 and 15.5, respectively) in inclusive settings regarding friendships with peers with severe disabilities. Student opinions related to (a) general friendship issues; (b) school settings/placement; (c) who should facilitate friendships; (d) teacher and school responsibilities; (e) parent involvement; (f) willingness to invest in friendships; (g) reasons for friendships; and (h) difficulties being friends were analyzed. Iranian students favor more inclusive school environments and oversight by school personnel. Both American and Iranian students feel responsible for initiating friendship acts, and both view knowing how to interact as a main challenge. Cultural factors and implications for practice and research are discussed.

In the United States the Individuals with Disabilities Education Act of 1997 (IDEA, 1999), currently the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), mandates that students with disabilities be served in settings with students without disabilities to the maximum extent possible. In Iran the school system is under the jurisdiction of the Ministry of Education and Training. Public education is available throughout Iran and the majority of Iranian students complete secondary school (Melchiorre, 2004). For the most part, public education (i.e., 1st grade through university levels) is free, however acceptance to postsecondary school requires passing entrance exams. The Bureau of Education for Exceptional Children and Students exists within the Ministry of Education, and almost three decades ago The Special Education Organization (SEO) was established and gradually inclusive education introduced. In recent years specialized personnel have conducted training to ensure students with disabilities benefit from inclusive education (Joibari, 2003). To date inclusive education, especially in Iranian high schools, is in its infancy. In the current investigation, we query high school students without disabilities attending inclusive schools (i.e., schools that to some extent serve individuals with disabilities in general education) regarding friendships with students with severe disabilities. Our objective is to identify similarities and differences in the views of American and Iranian adolescents on the value of such friendships and on strategies to enhance friendship formation.

Assumptions of the centrality and the significance of friendships to the well-being and life trajectories of all students regardless of disability status are well established in the literature (e.g., Asher, Parkhurst, Hymel, & Williams, 1990; Bagwell, Schmidt, Newcomb, & Bukowski, 2001; Bierman, K., 2004; Buyssse, Goldman, & Skinner, 2002; Hartup, 1992, 1996; Overton & Rausch, 2002; Rutter, 1989). Research indicates that friendships reported
by students with and without disabilities are based on empathy, reciprocity, intimacy, trust, mutuality, and sharing experiences (Margalit & Efrati, 1996; Rosenblum, 1998; Heiman, 2000; Turnbull, Blue-Banning, & Pereira, 2000). Adolescent friendships, as Rosenblum notes, tend to be characterized by loyalty, trust, self-disclosure, openness, and affection. Conversely, lack of friends is associated with deficiencies of social competence, peer rejection, loneliness, decreased self-esteem, depressive symptoms, and inadequate social networks (Bierman, 2004; McVilly, Stancliffe, Parmenter, & Burton-Smith, 2006; Odom et al., 2006). We know that friendship can mitigate personal, educational, vocational, and societal challenges. Adolescent friendships and social occasions provide the venue for youths to practice age-appropriate skills (e.g., self-advocacy, leadership, conflict resolution) and develop interactive styles (e.g., dependence or independence, active coping or passive coping) (Haghighatgou & Peterson, 1995).

Although specific definitions of friendship vary, researchers agree that a youngster’s conceptions of friendship are (a) developmental (Furman & Bierman, 1984; O’Brien & Bierman, 1988), (b) affected qualitatively by disability and personal characteristics (Margalit & Efrati, 1996; Odom et al., 2006; Parker & Asher, 1993; Siperstein, Leffert, & Wenz-Gross, 1997), (c) associated with school climate and classroom contextual variables (Buysse, Goldman, & Skinner, 2003; Hamm, 2000; Han & Chadsey, 2004; Sasso, et al., 1992; Way & Chen, 2000), and (c) influenced by gender and ethnicity (Hamm; Turnbull, Blue-Banning, & Pereira, 2000; Way & Chen). For the purpose of this study, we employ the definition of friendship used by Hendrickson and colleagues (1996). Friendship is a social relationship between two people that is reciprocal, rewarding, and fun for both parties; it is a relationship that is characterized by multiple, voluntary contacts, and shared experiences across time.

Friendships, intellectual disabilities, and inclusion. For adolescents with severe disabilities, friendship formation is arguably very closely linked to the school and its social contexts. Just as self-determination capabilities of students are likely to be influenced by the opportunities the teacher provides (Shogren, et al. 2007), friendship formation is likely to be affected by opportunities to interact at school and the attitudes, knowledge, and behaviors of peers. Unfortunately, the empirically-based practices required for teaching academics (Turnbull, Turnbull, & Wehmeyer, 2007) are not mandated for social domain competencies (e.g., social reciprocity, friendship formation and maintenance). With regard to friendships of secondary students with severe disabilities, there is a dearth of solid scientific evidence. We know substantially more about preschool (Boyd, Conroy, Asmus, McKenney, & Mancil, 2008; Buyesse, et al., 1997; Odom, et al., 2006), elementary (Overton & Rausch, 2002) and middle-school children (Han & Chadsey, 2004; Siperstein, Leffert, & Wenz-Gross, 1997) and their dispositions toward and interactions with students with disabilities than we do about secondary students. Siperstein and colleagues (1997), for example, report data on a large sample of American 7th- and 8th-grade students’ views and experiences related to inclusion and to students with intellectual disabilities (ID). Less than half of the students (38%) indicate they have a schoolmate with mental retardation, and only 10% report having a friend with mental retardation. Nonetheless, similar to earlier studies (Harper, 1997; Hendrickson, et al. 1996), students without disabilities continue to be open to the notion of making friends with a classmate with a disability. Han and Chadsey (2004) and Siperstein and colleagues (1997) report that most (i.e., 89% and 88%, respectively) students without disabilities have a positive attitude about the idea that friendships can be formed between students with and without disabilities.

Theoretically speaking, in more inclusive education settings students with disabilities should have more opportunities to interact with peers without disabilities and thereby create a larger network of friends (Fryxell & Kennedy, 1995; Kennedy, et al., 1997; Hamre-Nietupski, et al., 1994; Turnbull, et al., 2007). This conclusion, for example, is supported by Heiman’s (2000) study of 12- to 15-year-old students with mild intellectual disabilities. Heiman’s survey data reveal that students served in special schools have fewer friends and respond more passively to loneliness than students in mainstream schools. Han and Chadsey (2004) note that the most frequent
reason students report for not having a friend with severe disabilities is limited opportunity for interaction. Although it would be naive and erroneous to assume inclusive schools per se are sufficient for friendship formation, the challenge of providing opportunity to interact in school settings seems imminently surmountable. What may be needed is the so-called political will. In this regard, Emerson and McVilly (2004) and Rosenblum (1998) among others argue for agency and governmental educational initiatives to specifically target the social domain.

Friendships and comparative research. In the past, the majority of research pertaining to friendship, disability, and inclusion has been conducted in the United States. More recently, international interest in friendship formation and variables affecting student friendships has become apparent in the literature. By way of example, Lee, Yoo, and Bak’s (2003) study of the peer relationships of Korean elementary students in inclusive settings reveals qualitative differences in interactions between students with and without disabilities (e.g., more physicality in exchanges of typical friends, game play characterized by students with disabilities placed in a receiver role). Indeed one-third of the Korean children without disabilities mention opportunity to spend time together in the classroom as a key factor in friendship formation. Laws and Kelly (2005) examine the friendships intentions of 9- to 12-year-old students in mainstream schools in the United Kingdom (U.K.); their results show that attitudes toward physical disability predict friendship intentions. According to Shams (2001) in a study of adolescents of Asian and non-Asian background in the U.K., a low preference for mixed ethnic friendships is indicative of a greater need for physical assistance (and advice) as well as increased loneliness.

Cross-cultural investigations of friendships and peer relationships often involve college students as the primary participants. Shokouhi-Behnam, Chambliss, and Caruso (1997) query American and Iranian college students living in the Washington, D.C. area of the U.S. on familial and peer relationships. On the closest-friend subscale of the Shokouhi-Behnam et al. study, Euro-American students rate trust/justice and loyalty in friendships significantly higher than Iranian-Americans. The authors conclude that Euro-American students rely more on friends outside of the family than Iranian-Americans.

Women report loyalty in close friendships significantly higher than men do. In the Koh, Mendelson, and Rhee (2003) study of Canadian and Korean students’ satisfaction with friendships, the authors argue that friendship functions (e.g., companionship, self-validation) vary and that student feelings about friendship can be differentially affected by culture. Koh and colleagues point out that Korean and Canadian cultures vary on collectivism/individualism as well as ethnical homogeneity/heterogeneity; in turn these factors affect various aspects of friendship (e.g., functions, satisfaction).

Research on social interactions and friendships of school-aged children in Middle Eastern countries, specifically Iran, is sparse although some studies do pertain to social skills and related issues albeit in different respondent populations. Shahim (1999), for instance, administered the Social Skills Rating scales (Gresham & Elliott, 1990) to teachers and parents of children with mild mental disabilities. In addition to high internal consistency of the Farsi translation of the scales, Shahim reports that boys and girls with mental disabilities generally score similarly on social skill items. Iranian boys are seen to have more behavioral issues than girls and to not attend to instructions as well.

Haghighatgou and Peterson (1995) measure the depressive symptoms and coping styles of junior and senior high school students in Tehran, Iran. First, they identify four factors—passivity, problem-solving, acting out, and denial, using a standard factor analytic procedure. Haghighatgou and Peterson conclude that depression is higher among Iranians (than U.S. adolescents) and that depression significantly correlates with being female, low socio-economic class, and a passive coping style. The authors caution that in Iran solemnity and seriousness are highly valued, so the cultural interpretation of depressive symptoms may differ from a western perspective. It also is possible that the prevalence of depression differs in Iran. Unfortunately, the above mentioned studies are only indirectly related to friendships. We only could locate one refereed study of Iranian friendships.
Nasrabadi, Parsayekta, & Emami, 2004) in our literature search. Nasrabadi and colleagues conduct interviews with male nurses and nursing students who reveal that smoking tobacco is associated with friendship, trust, and belonging to the group. Nasrabadi and colleagues also conclude that peer pressure is a crucial factor in smoking behavior and that smoking actually is maintained through friendship networks.

We fully concur with Pottie and Sumarah (2004) who note that interpersonal connections, friendships, and belonging are critical to a fulfilling life. For adolescents with severe disabilities the factors that affect friendship formation need to be identified so families, peers, educators, and other professionals can engage in policy-making and scientifically-based actions that promote the student’s current and future quality of life. We know that a variety of factors may influence an adolescent’s willingness to be friends with peers with severe disabilities, however there is a dearth of cross-cultural data on adolescent friendship intentions and perceptions related to peers with disabilities. The current study is the first cross-cultural study of American and Iranian secondary students’ perceptions about friendship formation and facilitation. Our goal is to gain a preliminary understanding of the views of western and middle-eastern adolescents as a baseline for the development of secondary school-based friendship formation strategies in these two distinct cultures.

**Method**

**Participants and schools.** A total of 656 American and 289 Iranian high school students served in general education inclusive schools participated in this study. American students came from 23 school districts in Iowa, Illinois, and Florida. They ranged in age from 13 to 18 years with an average age of 15.0 years old. Overall 48.5% of the American students were male, and 51.5% were female. Iranian students came from 10 inclusive schools in five school districts of Mashhad, Khorasan. They ranged in age from 13 to 19 years old with an average age of 15.5 years. Overall, 48.8% of the Iranian students were male, and 51.2% were female.

Most of the American students (95%) attended schools (n = 23) with an enrollment of 250 to 1,000 students, and 100% of Iranian students attended schools (n = 10) with an enrollment of 250 to 1000. Twenty-five school districts in the United States and 10 schools in Iran were contacted initially. Twenty-three U.S. districts (92%) agreed to participate, and all of the Iranian schools (100%) agreed. In Iran schools are segregated by gender; five schools served young women, and five schools served young men.

**Instrument.** We administered the Students Friendship Perception Survey (SFPS) which was developed by Hamre-Nietupski et al. (1993) and revised by Hendrickson et al. (1996). (For a more in-depth description of the instrument see Hamre-Nietupski et al. and Hendrickson, et al.). Briefly, at the top of page one, the definitions of students with severe disabilities and students without disabilities were written:

“Students with Severe Disabilities” are students with moderate, severe, or profound mental disabilities. They also may have physical disabilities, visual impairments, hearing impairments, and behavior that is different or challenging compared to most students. “Students without Disabilities” means students who do not have disabilities. They are often referred to as “typical,” “normal,” or “regular” students.

Six short questions related to the concept of forming friendships with students with severe disabilities followed the definitions. Students responded by circling 1, 2, 3, or 4 on a 4-point Likert-type scale (1 = strongly disagree to 4 = strongly agree).

The next four questions required rank ordering (e.g., 1 = 1st, 2 = 2nd, and 3 = 3rd) the settings where friendships are most likely to happen, who should take primary responsibility for facilitating friendships, what teachers/schools can do, and what parents can do to promote friendship formation. The students marked all of the response choices that applied on the next three sections (i.e., what they would be willing to do, reasons for being a friend, and reasons it might be difficult to be a friend).

The first author, fluent in both English and Farsi, translated the SFPS to Farsi. A team of three teachers and university faculty members trained in special education and fluent both
in English and Farsi, reviewed and evaluated the questionnaire on the acceptability and accuracy of the translation and for item and overall instrument readability and clarity. Recommended revisions were incorporated into the final version of the SFPS (Farsi), and it was administered to a class of Iranian students as a field trial with no changes needed.

**Administration procedure.** The same procedure used by Hendrickson et al. (1996) was employed in the administration of the SFPS. Written instructions were provided to each general education teacher after being interviewed in person or over the telephone. Survey administrators embedded the survey in a teacher-directed, explicit instruction lesson related to forming friendships with individuals with disabilities. The teacher and the students in class discussed the meanings of friendship, severe disabilities, and students without disabilities. After the questionnaires were distributed, the teacher read each item aloud. Approximately 20–30 minutes were required to complete the survey. Standard assent and consent procedures were employed. No names were collected to ensure anonymity.

**Results**

Table 1 presents the average ratings (M), standard deviations (SD), degrees of freedom (df), and t-scores for six general friendship formation items. As noted, these items were rated using a 4-point Likert scale (1 = Strongly disagree to 4 = Strongly Agree). First, both American and Iranian students agree that it is possible for friendships to form, that friendships benefit students with severe disabilities, and that students without disabilities should try to make friends with students with severe disabilities. However, as Table 1 shows, a significant difference is seen between American (am) and Iranian (ir) students on items 2, 3, 5, and 6. American students agree more strongly with the notion that friendships benefit the student with disabilities than Iranian students do (M<sub>am</sub> = 3.26 vs. M<sub>ir</sub> = 3.18). Iranian students feel more strongly than Americans that the student without a disability should reach out to the student with disabilities (M<sub>am</sub> = 3.22 vs. M<sub>ir</sub> = 3.47). Both groups agree that there are benefits to students without disabilities, however American students express significantly less agreement with the statement that adults should help these friendships happen (M<sub>am</sub> = 2.73 vs. M<sub>ir</sub> = 3.25) and that such friendships would be easy to establish (M<sub>am</sub> = 2.28 vs. M<sub>ir</sub> = 2.75). Neither group perceives the friendships as easy to form.

Table 2 presents the results related to the school setting or educational placement most conducive to friendship formation. Significant differences are seen in the items related to regular class placement for the entire day (df = 943, t = −6.36, p ≤ .05) and placement in a special class in a special school (df = 943, t = 5.62, p ≤ .05). On average Iranian second-

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**TABLE 1**

Student Beliefs about Friendships Between Students with Severe Disabilities and Students Without Disabilities

<table>
<thead>
<tr>
<th>General Friendship Issues</th>
<th>American (n = 656) M (SD)</th>
<th>Iranian (n = 289) M (SD)</th>
<th>df</th>
<th>T-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is possible for these friendships to happen.</td>
<td>3.27 (0.63)</td>
<td>3.25 (0.68)</td>
<td>943</td>
<td>1.00</td>
</tr>
<tr>
<td>2. Such friendships benefit students with severe disabilities.</td>
<td>3.26 (0.77)</td>
<td>3.18 (0.82)</td>
<td>943</td>
<td>2.00*</td>
</tr>
<tr>
<td>3. Students without disabilities should try to make friends with students with severe disabilities.</td>
<td>3.22 (0.73)</td>
<td>3.47 (0.76)</td>
<td>943</td>
<td>−5.00*</td>
</tr>
<tr>
<td>4. Such friendships benefit students without disabilities.</td>
<td>3.04 (0.79)</td>
<td>2.97 (0.97)</td>
<td>943</td>
<td>1.18</td>
</tr>
<tr>
<td>5. Adults should help these friendships happen.</td>
<td>2.73 (0.91)</td>
<td>3.25 (0.78)</td>
<td>943</td>
<td>−8.66*</td>
</tr>
<tr>
<td>6. It is easy to help students with severe disabilities and students without disabilities become friends.</td>
<td>2.28 (0.84)</td>
<td>2.75 (0.83)</td>
<td>943</td>
<td>−8.1*</td>
</tr>
</tbody>
</table>

*Note. Items rated on a 1 to 4 point Likert scale (1 = strongly disagree, 4 = strongly agree); df = degrees of freedom; *p ≤ .05
ary students more strongly favor the regular classroom. Iranian students do view placement of students with severe disabilities in a special schools less favorably than American students.

Tables 3–5 show the responses of both groups to questions in the following categories: (a) who should facilitate friendships, (b) how teachers and schools can help, and (c) how parents can facilitate such friendships. Results indicate that both groups highly value the role that they themselves (see Table 3) play in friendships. Approximately 77% of Americans and 80% of Iranian students report that they should take responsibility for facilitating friendships. Chi-square analyses reveal American students emphasize youth clubs and organizations more than the Iranians ($P_{am} = 38.87\%$ vs. $P_{ir} = 20.4\%$). On the other hand, Iranian students consider professionals (e.g., special education teachers, guidance counselors, school psychologists, and social workers) as more responsible for facilitating these friendships. Close to 30% of American and Iranian students feel that parents of students with severe disabilities should facilitate friendships, and about 20% of the respondents feel parents of students without disabilities should take some responsibility for the friendships.

Results presented in Table 4 present student views regarding how teachers and schools can facilitate friendships. There are two top activities the majority of students in both the U. S. and Iran agree upon. Both think schools should use ways of teaching that have students work together and arrange social

### TABLE 2
Student Beliefs about Educational Settings Most Likely to Facilitate Friendships

<table>
<thead>
<tr>
<th>Setting</th>
<th>American</th>
<th>Iranian</th>
<th>df</th>
<th>T-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A regular class for the entire day.</td>
<td>2.79 (1.14)</td>
<td>3.28 (1.05)</td>
<td>943</td>
<td>-6.36*</td>
</tr>
<tr>
<td>2. A regular class for part of the day.</td>
<td>2.67 (0.88)</td>
<td>2.73 (0.78)</td>
<td>943</td>
<td>-1.01</td>
</tr>
<tr>
<td>3. A special class in a regular school.</td>
<td>2.56 (0.96)</td>
<td>2.48 (0.89)</td>
<td>943</td>
<td>1.23</td>
</tr>
<tr>
<td>4. A special class in a special school.</td>
<td>1.95 (1.24)</td>
<td>1.50 (0.94)</td>
<td>943</td>
<td>5.62*</td>
</tr>
</tbody>
</table>

Note. Items rated on a 1 to 4 point Likert scale (1 = strongly disagree, 4 = strongly agree); df = degrees of freedom; *p ≤ .05

### TABLE 3
Student Perceptions of Who Should Facilitate Friendships with Students with Severe Disabilities

<table>
<thead>
<tr>
<th>Person or Agency</th>
<th>American</th>
<th>Iranian</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (Percentage)</td>
<td>Number (Percentage)</td>
<td>df</td>
</tr>
<tr>
<td>1. Student themselves.</td>
<td>502 (76.52)</td>
<td>231 (80.0)</td>
<td>1</td>
</tr>
<tr>
<td>2. Special education teachers.</td>
<td>302 (46.03)</td>
<td>155 (53.7)</td>
<td>1</td>
</tr>
<tr>
<td>3. Guidance counselors, school psychologists, social workers.</td>
<td>290 (44.20)</td>
<td>181 (62.0)</td>
<td>1</td>
</tr>
<tr>
<td>4. Youth clubs and organizations.</td>
<td>255 (38.87)</td>
<td>59 (20.4)</td>
<td>1</td>
</tr>
<tr>
<td>5. Regular education teachers.</td>
<td>232 (35.36)</td>
<td>98 (34.0)</td>
<td>1</td>
</tr>
<tr>
<td>6. Parents of students with severe disabilities.</td>
<td>292 (30.79)</td>
<td>83 (28.7)</td>
<td>1</td>
</tr>
<tr>
<td>7. Parents of non-disabled students.</td>
<td>129 (19.66)</td>
<td>56 (19.4)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. Items ordered by frequency of American student responses; df = degrees of freedom; *p ≤ .05
activities in which all students may participate. American students respond significantly more often to the strategy of teaching so students work together than Iranian students do. American and Iranian students respond similarly to the importance of teaching all students how to interact with each other, teaching the importance of such friendships, and organizing a circle of friends (range: 27% to 36%).

Significant differences are observed between the two groups on three other items. Iranians place greater importance of information on disabilities being presented to students, teachers, and parents and the need to encourage parents to create opportunities for such friendships. American students are more apt to suggest that students without disabilities tutor students with severe disabilities.

Table 5 presents student perceptions of how parents can facilitate friendships. An equal percent (56%) of American and Iranian students think a positive attitude toward such friendships at home is important. Seventy-three percent (72.6%) of Iranian students think parents should work with schools and teachers to think of ways to help friendships. Iranian responses to parent involvement (e.g., parents working with schools and being involved in support groups) is significantly higher than that of American students. American students more frequently identify organizing and attending parent support groups ($P_{am} = 40.85\%$ vs. $P_{ir} = 26.3\%$) than Iranians. Americans also favor serving as leaders in youth organizations ($P_{am} = 28.96\%$ vs. $P_{ir} = 21.8\%$).

Table 6 presents American and Iranian student reports of actions they are willing to take to facilitate making friends with students with severe disabilities. Although Chi square analyses show significant differences ($p \leq .05$) between the choices of the two groups on 10 of 12 items, we begin by discussing group similarities. First, fifty percent or more of both American and Iranian students identify four items most often: to be a peer tutor, to work on a team, to learn and to share information about disabilities, and to be part of a group spending time together regularly. The greatest number of Iranian responses (61.2%) indicate that students believe that they need to learn (and share) information. Iranian students are least willing (13% to 19%) to stay overnight, visit the other student’s home, invite the student with disabilities to their home regularly, or to have the student stay at their home. These same four activities are also the least frequent choices of American students. As seen in Table 7, for both groups the two most frequently selected reasons for friendships are that “They need friends, too,” and “I like to help people.”

<table>
<thead>
<tr>
<th>Types of Assistance</th>
<th>American (n = 656) Number (Percentage)</th>
<th>Iranian (n = 289) Number (Percentage)</th>
<th>Chi-square df Value Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use ways of teaching that have students work together.</td>
<td>432 (65.85)</td>
<td>170 (58.8)</td>
<td>1 4.29 0.04*</td>
</tr>
<tr>
<td>2. Arrange social activities in which all students may participate.</td>
<td>371 (56.55)</td>
<td>176 (57.4)</td>
<td>1 1.55 0.21</td>
</tr>
<tr>
<td>3. Teach students how to interact with each other.</td>
<td>233 (35.51)</td>
<td>98 (33.9)</td>
<td>1 0.23 0.63</td>
</tr>
<tr>
<td>4. Teach the importance of such friendships.</td>
<td>233 (35.51)</td>
<td>91 (31.4)</td>
<td>1 1.45 0.23</td>
</tr>
<tr>
<td>5. Organize a “Circle of Friends” around the student with disabilities to encourage interaction and support.</td>
<td>197 (30.03)</td>
<td>79 (27.3)</td>
<td>1 0.70 0.40</td>
</tr>
<tr>
<td>6. Present information on disabilities to students, other teachers, and parents.</td>
<td>184 (28.04)</td>
<td>118 (40.8)</td>
<td>1 15.07 0.00*</td>
</tr>
<tr>
<td>7. Teach non-disabled students to be tutors.</td>
<td>161 (24.54)</td>
<td>51 (17.6)</td>
<td>1 5.48 0.02*</td>
</tr>
<tr>
<td>8. Encourage parents to make opportunities for these friendships.</td>
<td>113 (17.22)</td>
<td>89 (30.8)</td>
<td>1 21.98 0.00*</td>
</tr>
</tbody>
</table>

Note. Items ordered by frequency of American student responses; df = degrees of freedom; *p ≤ .05.
### TABLE 5
Student Perceptions of How Parents Can Facilitate Friendships with Students with Severe Disabilities

<table>
<thead>
<tr>
<th>Parent Action</th>
<th>American (n = 656)</th>
<th>Iranian (n = 289)</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (Percentage)</td>
<td>Number (Percentage)</td>
<td>df</td>
</tr>
<tr>
<td>1. Have a positive attitude toward such friendships at home.</td>
<td>367 (55.94)</td>
<td>161 (55.8)</td>
<td>1</td>
</tr>
<tr>
<td>2. Invite students, including those with disabilities, to their homes.</td>
<td>331 (50.45)</td>
<td>127 (43.9)</td>
<td>1</td>
</tr>
<tr>
<td>3. Work with the schools and teachers to think of ways to help these friendships form.</td>
<td>330 (50.30)</td>
<td>210 (72.6)</td>
<td>1</td>
</tr>
<tr>
<td>4. Organize/attend parent support groups.</td>
<td>268 (40.85)</td>
<td>76 (26.3)</td>
<td>1</td>
</tr>
<tr>
<td>5. Provide transportation for students with disabilities to after school activities.</td>
<td>227 (34.60)</td>
<td>86 (29.8)</td>
<td>1</td>
</tr>
<tr>
<td>6. Serve as leaders in youth organizations (for example, be a scout leader).</td>
<td>190 (28.96)</td>
<td>63 (21.8)</td>
<td>1</td>
</tr>
<tr>
<td>7. Let teachers know they want these friendships to be made at school.</td>
<td>170 (25.91)</td>
<td>72 (24.9)</td>
<td>1</td>
</tr>
<tr>
<td>8. Make friends with adults who have disabilities.</td>
<td>140 (21.34)</td>
<td>57 (19.7)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. Items ordered by frequency of American student responses; df = degrees of freedom; *p ≤ .05

### TABLE 6
Student Willingness to Take Actions That Facilitate Friendships with Students with Severe Disabilities

<table>
<thead>
<tr>
<th>Action</th>
<th>American (n = 656)</th>
<th>Iranian (n = 289)</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (Percentage)</td>
<td>Number (Percentage)</td>
<td>df</td>
</tr>
<tr>
<td>1. Be a peer tutor or buddy to a student with severe disabilities.</td>
<td>458 (70.78)</td>
<td>146 (50.5)</td>
<td>1</td>
</tr>
<tr>
<td>2. Work in a team with a student with severe disabilities.</td>
<td>447 (69.08)</td>
<td>149 (51.6)</td>
<td>1</td>
</tr>
<tr>
<td>3. Learn more about disabilities and share what I know with others.</td>
<td>428 (66.50)</td>
<td>117 (61.2)</td>
<td>1</td>
</tr>
<tr>
<td>4. Be part of a group of students who regularly spends time with students with severe disabilities.</td>
<td>411 (63.52)</td>
<td>143 (49.5)</td>
<td>1</td>
</tr>
<tr>
<td>5. Visit the home of a student with disabilities.</td>
<td>350 (54.09)</td>
<td>122 (42.2)</td>
<td>1</td>
</tr>
<tr>
<td>6. Spend time after school with a student with severe disabilities.</td>
<td>334 (53.16)</td>
<td>138 (47.8)</td>
<td>1</td>
</tr>
<tr>
<td>7. Spend some time on weekends with a student with disabilities.</td>
<td>316 (48.84)</td>
<td>124 (42.9)</td>
<td>1</td>
</tr>
<tr>
<td>8. Invite a student with severe disabilities to my home.</td>
<td>315 (48.68)</td>
<td>119 (41.2)</td>
<td>1</td>
</tr>
<tr>
<td>9. Stay overnight at the home of a student with severe disabilities.</td>
<td>198 (30.60)</td>
<td>36 (12.5)</td>
<td>1</td>
</tr>
<tr>
<td>10. Visit the home of a student with disabilities on a regular basis.</td>
<td>195 (30.13)</td>
<td>44 (15.2)</td>
<td>1</td>
</tr>
<tr>
<td>11. Have a student with disabilities stay overnight at my house.</td>
<td>194 (29.98)</td>
<td>55 (19.0)</td>
<td>1</td>
</tr>
<tr>
<td>12. Invite a student with disabilities to my home on a regular basis.</td>
<td>157 (24.26)</td>
<td>53 (18.3)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. Items ordered by frequency of American student responses; df = degrees of freedom; *p ≤ .05
the other hand, Iranian students are significantly less likely to select reasons that pertain to talking about one’s self such as I am understanding and I have a good attitude. Similarly, when a benefit is to one’s self (e.g., It could be fun.), there is a significant reduction in Iranian student responses. Although total frequencies differ, American and Iranian students order 7 of 10 items in the same most-to-least sequence. (Items 4, 7, and 9 are out of sequence.)

Finally, difficulties for friendships are presented in Table 8. Forty percent or more American students identify six barriers to friendships, while Iranian students only identify two items, “I wouldn’t know what to say or do,” and “They couldn’t do the things I like to do,” at a rate of 42% to 34%, respectively. Both groups emphasize not knowing how to behave as a main barrier or difficulty. Overall, the two groups differ significantly on 8 of 10 items, all of which American students select more fre-
quently than Iranian students. Compared to Iranians, American adolescents more often indicate that they would be nervous or uncomfortable, do not want to be teased, think the student with a disability would not fit in with their friends, and that they might be physically hurt. Approximately 10% of both groups feel that the student with a disability is “not as smart or intelligent as me” and that their families would not agree with having such a friendship.

Discussion

This investigation of the attitudes and perceptions of American and Iranian secondary students pertains to forming friendships with students with severe disabilities and offers a preliminary comparison of western and Middle Eastern adolescent perspectives and values. Striking similarities and differences emerge that in part may be explained in relation to experience in inclusive settings (Van Laarhoven et al. 2006), friendship functions and developmental progression (Bierman, 2004), the education and training of teachers (Cameron & Cook, 2007; Hamre-Nietupski et al. 1994) and paraeducators (Malgren & Causton-Theoharis, 2006) as well as cultural factors (Bui & Turnbull, 2003; Edeh, 2007; Koh et al., 2003). As in past research, the current study supports the conclusion that forming friendships, in this particular case, friendships with students with disabilities, is a complex process, that outcomes should not be casually generalized across populations (Way & Chen, 2000) and that heterogeneity within cultures must not be overlooked (French, Bae, Pidada, & Lee, 2006). Since most friendship and disability research focuses on preschool through middle school students, this investigation of adolescent views extends the literature and has implications for the post-school lives of individuals with severe disabilities whose personal relationships often are limited to family and caregivers (Pottie & Sumarah, 2004).

Are friendships with students with severe disabilities possible? Secondary students in America and Iran view friendships with students with severe disabilities to have pros and cons, similar to previous research results with American students (Bunch & Valeo, 2004; Hendrickson et al., 1996; Siperstein et al., 1997). Both American and Iranian secondary students in inclusive high schools agree that it is possible to have friendships with students with severe disabilities and that there are benefits to students with disabilities. (To a lesser extent both groups perceive benefits to students without disabilities.) Neither group agrees with the statement that friendships are easy to form. American students feel significantly more strongly than Iranians that such friendships are not easy. This perception of the increased difficulty in forming friendships may be an outcome diverging educational and societal expectations. Propelled by IDEA (1999, 2004) many preschool- and primary-aged American students are likely to have social contact, become acquainted with, and/or develop friendships with students with disabilities within inclusive educational settings (Fryxell & Kennedy, 1995; Lee, Yoo, & Bak, 2003). The rate of social interaction, however, is rather abruptly diminished in the school life of adolescents regardless of the nature of the inclusive practices. Such factors as the increasing difficulty of subject matter, the assignment of individual paraeducators to students with severe disabilities (Malgren & Causton-Theoharis, 2006), and societal pressures to achieve (e.g., district wide assessments in the U.S., preparation for college entrance exams in Iran) create distinct curricular tracks for students with disparate intellectual capabilities. These realities in turn mitigate against the development of friendships.

Educational setting. American and Iranian students indicate that the regular class for the entire day is their highest rated choice of an educational setting for facilitating friendship. Similar to the earlier Siperstein and colleagues’ (1997) study of middle school students, American secondary students do not appear to strongly support full inclusion. American students indicate significantly less concordance with the policy of students with severe disabilities being placed in the regular class for the entire day ($M_{\text{Am}} = 2.79$ vs. $M_{\text{Ir}} = 3.28$). Both groups, however, express relatively strong disagreement with the placement of students with severe disabilities in special schools. Iranian students view special schools significantly less favorably than American students. These data suggest that Iranian adolescents may envision a more idealized service
The roles of schools and families in facilitating friendships. The argument for the interconnectedness of adolescent socialization, friendships, family relationships, and peer relationships is supported in the literature (Shams, 2001). We know that Iranian families are similar to Asian families (see Bui & Turnbull, 2003) in that a vertical, hierarchical family structure is the general cultural norm; the father and adult members of the family are shown respect and perceived as authority figures. Furthermore, there are fewer professionals (other than regular education teachers) in Iranian schools, and the specialists (e.g., school psychologists) who are associated with any school are highly regarded. Therefore it is not surprising to find that Iranian youths in the current study are significantly more likely than American youths to perceive adults in professional positions (e.g., social workers, school psychologists, school counselors) as playing critical roles in the facilitation of friendships. In contrast, Americans are significantly more likely to expect youth clubs—venues that are not commonly available in Iranian communities, to facilitate friendships.

The majority of American and Iranian students recommend the same two top strategies for teachers and schools, that is, use ways of teaching that have students work together and arrange social activities in which all students may participate. These two strategies conceptually align with research that suggests that opportunity for interaction is an important variable in relationship building (Han & Chadsey, 2004) and that inclusive settings can positively affect outcomes for students with disabilities (Bunch & Valeo, 2004; Dymond, Renzaglia, & Chun, 2008). Iranian students (compared to Americans) are significantly more likely to perceive the role of educators as conveyors of information on disabilities and as instrumental in encouraging parents to facilitate friendships. In contrast, American students are more likely to recommend tutoring, a common and successful practice across populations and grade levels in U.S. schools (Turnbull et al., 2007) and an uncommon practice in Iran. We also want to point out that approximately 30% of both American and Iranian adolescents agree that it is important for educators to (a) teach students how to interact, (b) teach the importance of such friendships, and (c) organize a circle of friends on behalf of the student with a severe disability. That is, a significant minority of students view educators as proactive transmitters of knowledge, values, and skills. They perceive social domain objectives as legitimate content for secondary educators to teach.

With regard to the role of parents and families, over 55 percent of both American and Iranian students report that a positive attitude at home is essential to friendship formation. This adolescent majority viewpoint echoes the opinions of educators and related service personnel who are long-time advocates of the role of parents and the importance of communication and collaboration between home and school (Turnbull et al., 2007). American adolescents are significantly more likely to indicate that parents should take leadership roles in the community (e.g., form support groups, work in youth organizations), actions well-established and frequently advocated by schools (e.g., Parent-Teacher Association), community agencies (e.g., United Way, Boys and Girls Clubs of America), and professional organizations (e.g., The Arc). Consistent with traditional Iranian cultural values (e.g., authority of adults, high esteem for persons with professional credentials), Iranian adolescents are significantly more likely to recommend that parents work with and through schools to design strategies for developing friendships.

Adolescent Willingness to Act and Opinions Regarding Benefits and Challenges of Friendships

Willingness to take action. The results of this study show significant differences on 10 of 12 items related to student willingness to actively participate in forming friendships with students with severe disabilities. Exclusive focus on these statistical differences, however, could be misleading, so we first wish to underscore the fact that over 75% of American and Iranian students indicate that they themselves
should initiate the friendships, and 50% of the adolescents are willing to be a peer tutor, work on a team with a student with a severe disability, learn and share information about disabilities, and be part of a group that spends time with students with severe disabilities. These results suggest an open attitude on the part of adolescents to spending time with peers with severe disabilities, particularly during the school day. Second, the four actions chosen least by both Americans and Iranians are consistent with prior research suggesting students without disabilities do not want to socialize and engage in extra-curricular activities with students with disabilities after school (Siperstein et al., 1997). In our study, adolescents least frequently indicated a willingness to stay overnight, visit the other student’s home, invite the student to their home, or have the student stay overnight at their home. However, the statistical differences related to home visit items may in large part be cultural differences in that it is very uncommon for Iranian friends to stay overnight at one another’s homes while it is not unusual for American friends to do so. Examination of the 10 items showing statistically significant differences, shows American students to be more likely to be willing to engage in a range of specific actions (e.g., tutor, work on a team regularly, visit outside of school, stay overnight) than Iranian students. This action orientation on the part of U.S. adolescents may be explained in part by experiential (e.g., a longer history of inclusive education in the U.S., more youth services in the community) and cultural factors (e.g., increasing demonstration of independence expected as the American student ages; reliance and trust in family authority and family members continues in the Iranian adolescent’s life). Other cultural factors also appear to contribute to some of the differences found. In a secular nation such as the U.S., student motivations based on a survey conducted at school may or may not reflect religious values, whereas in an Islamic country such as Iran, religious principles and practices have a high profile and are seamlessly interwoven with school activities.

Reasons for friendships. A large majority (i.e., ≥ 74%) of American and Iranian students perceive two main reasons for developing friendships with peers with severe disabilities: They need friends, too, and I like to help people. Both of these responses seem to indicate an altruistic motive for friendships formation, as well as the underlying assumption of reciprocity (i.e., equal give and take) in friendships. A relatively high percentage of both student groups (i.e., 48% to 72%) also note that the student with a disability would feel better with a friend, that students without disabilities would feel good about themselves, that students with and without disabilities might have common interests, and that students without disabilities could learn about disabilities. Despite similarities in terms of the distribution of American and Iranian student responses, a significant difference is evident in seven of 10 reasons for being a friend with the largest contrasts seen in “It could be fun,” followed by “Because I have a good attitude,” “Because I am understanding,” and “I would have another friend.” Iranian social conventions do not endorse adolescent, or adult, actions merely because the action would benefit the individual. In the more collectivistic society of Iran, it is likely that Iranian students do not value or did not feel comfortable thinking about friendships in relation to what they as individuals would gain. The more solemn and serious Iranian society (Haghighatgou & Peterson, 1995) may discount “fun” as frivolous or even consider “fun” a negative goal.

Barriers to friendships. Statistically significant differences are seen on 8 of 10 items related to the difficulty of forming friendships. Generally speaking, Iranian students do not voice their objections or potentially negative thoughts about the difficulties of befriending a peer with a severe disability. The highest percent of Iranians, approximately 42% and 34%, respectively, did report that they wouldn’t know what to say or do or that they believe that the student with a disability could not do the things that they like to do (compared to American responses of 67% and 55%, respectively). On the other hand, American adolescents appear to be more comfortable expressing their feelings (e.g., I would feel awkward or embarrassed), outspoken about limitations of the activities in which they could engage (e.g., They couldn’t do the things I like to do), and/or more self-oriented (e.g., I have too many other commitments) in relation to the challenges of developing friendships with peers with severe
disabilities. These differences in particular seem to be linked to cultural expectations in the American individualistic, self-oriented society versus the Iranian collectivistic, group-oriented society.

Limitations and future research. Caution must be employed interpreting and generalizing the results of this preliminary investigation of American and Iranian secondary students’ perceptions about forming friendships with students with severe disabilities. As noted earlier, one cannot automatically assume homogeneity of the populations of different countries or cultures. The current survey involves a non-random sample of students which limits our ability to generalize the results. Survey data have an inherent weakness, that is, the correspondence between the opinions and behavior of respondents is not necessarily one-to-one. Actions in which the adolescent might be willing to engage to befriend peers with severe disabilities are likely to vary depending on the immediate context.

Based on open-ended questions asked of students in the U.S., Hendrickson and colleagues (1996) created-closed response items pertaining to actions students would be willing to take, reasons for friendships, and difficulties of friendships. If Iranian students were to be asked open-ended questions, it is likely that they would discuss the importance of the role of religious leaders and institutions associated with religion in the supporting of friendships. The U.S. has a tradition and constitution that separates “church and state” whereas Iran’s government and social order is closely tied to the Muslim faith. Although religious affiliations and principles affect government policy in the U.S., in Iran the clergy and the mosque are interwoven in the daily lives of Iranians. A modified version of the SFPS (Hendrickson et al.) that includes response items based on Iranian student answers to open-ended questions would allow a more robust examination of the data.

A fuller understanding of a complex phenomenon such as friendship, especially the development of friendships between adolescents with and without severe disabilities, is best approached with a multimodal methodology and data triangulation. In this regard, structured and semi-structured interviews with students, including students with disabilities (Day & Harry, 1999) are recommended. The viewpoints of adults, especially parents, professionals, and community leaders (e.g., clergy, youth organization leaders) would add perspective and context to investigative efforts. The benefits of direct observation must be noted in that such data (quantitative and qualitative) can allow examination of behavioral sequences, exchanges, and nuances that cannot be achieved via questionnaire data. Ultimately, developmentally and culturally appropriate interventions must be designed and evaluated if evidence-based practices are to be identified and validated.

Conclusion. Interpersonal relationships arguably are the bedrock of society and impact the quality of life of individuals, families, and communities. Although inclusive education is advocated internationally, comparative study of friendship, disability, and adolescence is in its infancy. Our preliminary data indicate that secondary students in the U.S. and Iran are receptive to the possibility of developing relationships with students with severe disabilities. They believe that the attitudes and stewardship of schools is critical to friendship development, and they appear to be hopeful that challenges to such friendships can be overcome. Addressing social domain challenges in the lives of secondary students with severe disabilities is an objective worthy of international attention.

References
Bui, Y., & Turnbull, A. P. (2003). East meets west:


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Long-term Outcomes of Services in Inclusive and Self-Contained Settings for Siblings with Comparable Significant Disabilities

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Abstract: A major goal of special education services is to prepare graduates for productive and rewarding lives as adults in the community. Follow-up studies, however, consistently have indicated very poor post-school outcomes for special education graduates. While there has been a wealth of research related to the effectiveness of services in inclusive general education settings for students of school age, few studies have investigated the impact of inclusive educational services on long-term outcomes for students with significant disabilities. The purpose of this study was to describe how two brothers with similar diagnoses involving significant disabilities and who had a 10-year age difference functioned in their natural settings as young adults after receiving services in the same rural one-building district. The older brother received special education services in self-contained settings throughout his school career, while the younger brother received special education services in inclusive general education settings. Qualitative data were collected through records, interviews, and field notes of observations. Findings suggest that the brother who received special education services in the school’s inclusive general education settings achieved more positive long-term outcomes. Implications are discussed for future research and provision of educational services.

Many benefits of inclusive education for students with significant disabilities have been documented. A comprehensive list of the research in support of those benefits would be lengthy and reveal increases in appropriate social behaviors, increased interactions with others, more positive affect, increased friendships, and improved communication skills, as well as increased acquisition and use of academic content and an increased likelihood of participation in other inclusive settings (McLaughlin, Ryndak, & Alper, 2008). In contrast, although we have found literature that presents critiques of various studies about inclusive education and arguments that suggest that inclusive education may have a negative impact upon learners (e.g., Sandler, 1999), we have found no research related to inclusive education for students with significant disabilities that provide learner performance data in support of those arguments. (For a summary of research regarding inclusive education see Fisher and Ryndak (2001); McGregor and Vogelsberg (1998); Ryndak and Fisher (2003).)

Fisher, Sax, and Jorgensen (1998) noted that in the United States the education system is expected to contribute to the preparation of children for the demands of adult life (p. 30) (see also Lipsky & Gartner, 1997). The expectation is that when students with disabilities exit school they will be prepared for successful and rewarding lives as adults, as consistently has been reflected in the literature (Alper, 2003; Fisher et al.; Karagiannis, Stainback, & Stainback, 1996; Kliwer, 1998; Ryndak, Morrison, & Sommerstein, 1999).

Unfortunately, the results of follow-up stud-
ies of graduates of special education consistently reveal dismal outcomes. For example, following graduation, students with significant disabilities typically: (a) are isolated socially, with little contact with persons who do not have disabilities; (b) experience long periods of inactivity; (c) experience a low level of employment and, even when employed, seldom work full time and earn very low wages; (d) live with a parent, guardian, or relative; and (e) rarely are involved in activities outside of the home (e.g., Edgar, 1987; Haring & Lovett, 1990; Johnson et al., 1995). These results are consistent with findings from a comprehensive longitudinal report issued by the National Center on Disability and Social Security Administration in 2000.

With an emphasis on access to general education settings and curricula, accountability, valued membership in peer groups, and facilitation of friendships that may lead to natural support networks, inclusive education has been considered a practice that not only is consistent with civil rights, but also is a way to alleviate the discouraging outcomes for adults with significant disabilities. Although existing research indicates that inclusive education can benefit students with significant disabilities on a short term basis (e.g., Fisher & Meyer, 2002; Ryndak et al., 1999), there have been no follow-up investigations of the lives of adults with significant disabilities who experienced inclusive education for lengthy periods of time. Given the lack of long-term follow-up investigations, it is difficult to determine whether or not persons lead more satisfying lives as a function of educational services in inclusive or segregated settings. This investigation addresses this question by studying how two brothers with similar early diagnoses of significant disabilities functioned through age 17, although they received educational services in different types of settings in the same rural one-building school district.

Method

Two brothers with significant disabilities participated in this qualitative study. These individuals and the methods used to describe their experiences, services, and outcomes across time are described below.

Participants

Prior to this study, the first author had an ongoing relationship with the brothers and their family for approximately 11 years through the parents' advocacy for the development and implementation of effective services for their sons in inclusive general education settings. Mark and Jim were part of a family of seven (i.e., five children and two parents) who resided in a small town in a rural area of a northeastern state. All five children attended the same one-building public school district in their home town. The brothers had a 10 year age difference and received special education services in different types of settings – the older brother received services in self-contained special education settings until age 17, while the younger brother received services in inclusive general education settings until age 17. Because of their family relationship, initial diagnoses, and residence in a rural one-building school district, these brothers presented a naturally-occurring opportunity to study the long-term outcomes of special education services provided in different types of settings within the same family, community, and district contexts.

The first brother, Mark, was the eldest of five siblings. At age 3 Mark was considered to be at-risk of having disabilities and began to receive preschool services. At age 4 he was diagnosed as having significant disabilities and received services in self-contained special education settings through age 16. Through-out this time Mark's records indicated minimal to no access to peers without disabilities. However, while in high school at age 17 his access to high school students without disabilities increased to part of the school day. This access continued until the age of 21 when he exited school. Throughout his educational career, Mark was labeled as having mild to moderate cognitive disabilities. At the end of this study, Mark was 28 years old, labeled as having significant disabilities, and receiving job-related and personal support through the Medicaid Waiver Program.

The younger brother, Jim, was the fourth of the five siblings. He was identified at birth as being at-risk of having disabilities and thus received early intervention and preschool services starting at four months of age. During
his years in preschool he spent part of the week in a self-contained special education class and part of the week in a regular preschool class. From kindergarten through age 17 he continuously was included in general education settings. Throughout his educational career Jim was labeled as having multiple disabilities or moderate cognitive disabilities.

Data Collection

When Jim was 17 and Mark was 28, four of the co-authors used three qualitative methods to collect information related to their educational experiences and Mark’s current performance and support as an adult. First, the co-authors worked with the brothers and their parents to obtain archival data relevant to their educational and adult services, as well as descriptions of the brothers’ performance levels over time (Hammersley & Atkinson, 1995; Mason, 1996). These data included records of observations of both brothers periodically conducted by the first author over eleven years, school records, health records, and anecdotal records of numerous school personnel and adult services providers. Second, the co-authors used semi-structured interview protocols to interview the brothers, their parents and, when possible, their current service providers (Kvale, 1996; Mason; Rubin & Rubin, 1995; Strauss & Corbin, 1998). The current service providers for Mark included a paid adult services caregiver, while for Jim this included members of his special education team at school. Third, the co-authors conducted observations of the brothers in their naturally-occurring contexts (Bogdan & Taylor, 1975; Mason; Patton, 1990; Strauss & Corbin). Observations were conducted of Mark with his adult services caregiver in the community, of Jim across school contexts, and of both brothers with their parents at home.

Data Analysis

The records for each brother were organized chronologically. The set of records for each brother then was read several times by two of the co-authors, and codes were developed related to the content of the records (Kvale, 1996; Rubin & Rubin, 1995; Strauss & Corbin, 1998). These two co-authors independently coded the content of the records, and then met to compare their codes. When differences were found in the manner in which specific content was coded, the two co-authors discussed the differences and agreed upon how the content would be coded (Kvale; Rubin & Rubin; Strauss & Corbin). This sometimes resulted in the addition of a new code, or in clarification of the meaning of an existing code. Once these two co-authors agreed on how the content was coded, the content and codes were shared with two of the other co-authors. If questions arose about any of the codes, these four co-authors met to discuss the issue and reach consensus on the relevant codes for the content. When all of the records were coded, sections with similar codes were grouped and analyzed for meaning (Kvale; Rubin & Rubin; Strauss & Corbin).

Interviews were conducted and audiotaped by four of the researchers. While some interviews were conducted with one individual (e.g., a brother or a service provider), other interviews were conducted with more than one person present. For instance, the brothers’ parents participated in a joint interview. Some interviews took two to five hours to complete and were conducted over two to three days. Other interviews (e.g., interviews with the brothers) took one to two hours to complete. Interviews were conducted using guiding questions established in an initial protocol (Creswell, 2003; Kvale, 1996; Rubin & Rubin, 1995; Strauss & Corbin, 1998), but with several probing points per question to encourage the interviewees to give complete answers with meanings that were delineated clearly. Whenever possible, the interviewees were encouraged to expand their answers, give examples that illustrated a point, and reiterate answers in another way in order to clarify their points (Kvale; Rubin & Rubin; Silverman, 1993). The audiotapes then were transcribed and submitted to the interviewees for verification and edits of the content. Changes then were made to the initial transcripts, reflecting the interviewees’ feedback. The content of the final transcripts then was coded (Kvale; Rubin & Rubin; Strauss & Corbin) for analysis, using the same coding procedure used with the records.

Field notes were taken during and after
observations of the brothers by one to three of the co-authors (Hammersley & Atkinson, 1995). When observations were conducted with multiple observers present, each independently took notes. Current observations were conducted on multiple days, across multiple contexts, across two weeks. After these observations, the observers finished their independent notes and then discussed what they had observed. The observers then returned to their independent notes and made additional comments when appropriate (Hammersley & Atkinson). The same two co-authors who coded the records and interviews also coded the field notes using the same coding procedure used with the records and interviews (Hammersley & Atkinson; Kvale, 1996; Silverman, 1993).

Once the coding procedures and analyses were completed for the content of each set of data (i.e., records, interviews, field notes of observations), the co-authors used triangulation strategies across the data sets to increase the trustworthiness of the data analysis methods (Hammersley & Atkinson, 1995; Kvale, 1996; Mason, 1996; Silverman, 1993) and overall findings were articulated. These findings were sent to the brothers’ parents for review (Mertens, 2005) and the parents were provided the option of reviewing the findings with the brothers. In either case, the parents were encouraged to make suggestions about edits, additions, and deletions that would either ensure that the findings were accurate or clarify any confusing points. This feedback was used to modify the findings.

Findings

School and district personnel in the brothers’ one-building school district were stable over the years, resulting in many of the same professionals working in the school during the educational careers of both young men. In fact, some of the general and special education teachers in the high school had taught both brothers and the director of special education had held that position throughout each brother’s attendance. In addition, the parents were very active in the education programs for all of their children and, therefore, had ongoing interactions with many of the school and district personnel.

In the following sections Mark’s and Jim’s educational experiences and progress are described in age-related categories, including the early years, the kindergarten and elementary years, the middle school years, and the high school and transition years. Tables 1 and 2 provide descriptors of the brothers across these age-related categories. Note that since Mark, the older brother, progressed through school 10 years ahead of his brother, Jim, occasionally his chronological age does not match the typical age at which most students have experiences in elementary, middle or high school. Where this occurs, clarifications have been provided in the sections below.

The Early Years: Birth Through Five Years of Age

Mark birth through five years of age. Mark was the eldest child in the family and was born after a normal nine month pregnancy and with no noted birth abnormalities. Although his mother stated that she was not aware of all aspects of child development when Mark was born, she did not notice a problem with Mark’s overall development until he was three years old. She described Mark as an easy baby with some minor medical issues (e.g., ear infections) during his first year. Mark often was described as a tense toddler who cried frequently. In retrospect, after raising five children and having the knowledge learned from that, his mother stated that she should have noticed that Mark developed skills later than his peer group. For example, he started walking when he was 15 months old, and began toilet training after the age of three years. Given her later understanding of child development, his mother indicated that if Mark had not been her first born child she may have requested that her pediatrician test him earlier for developmental delay. However, since Mark showed no serious medical signs of disability, she believed he was a normally developing child. At the age of three years, Mark was labeled as being at-risk for developmental delays and was enrolled in a private preschool program that included children with disabilities. Though records during this time were incomplete, Mark’s mother stated that he received occupational, physical, and speech therapy in a daycare setting. As Mark prepared
## TABLE 1

### Summary Descriptors of Mark Across Years

<table>
<thead>
<tr>
<th>Early Years: Birth to 5 Years</th>
<th>Kind &amp; El Yrs 5–11 Years</th>
<th>Middle School Years: 11–14 Years</th>
<th>High School and Transition Years: 15–21 Years</th>
<th>Adult Life: 28 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal pregnancy; no birth abnormalities</td>
<td>Anxiety documented annually; 1:1 counseling annually for coping skills</td>
<td>Self-contained special education classes outside of school district annually</td>
<td>Self-contained special ed classes outside of school district for 2 years</td>
<td>Lived with parents and siblings</td>
</tr>
<tr>
<td>Described as a “tense toddler”</td>
<td>Easily frustrated with tasks; cried easily; difficulty changing routine</td>
<td>Counseling for developing relationships, coping with frustration, adjusting to changes in routines, decreasing self-injurious behaviors</td>
<td>At 17 accessed peers without disabilities in homeroom, lunch, and physical education; remaining time in self-contained class</td>
<td>Worked less than 15 hours per week</td>
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<td>Walked at 15 months; toilet training begun after age 3 Began OT, PT, Speech at age 3</td>
<td>Slow academic progress; some IEP objectives repeated 5 consecutive years</td>
<td>OT, PT, Speech services provided primarily in segregated isolated settings Academic skills remain at K to 1st grade level</td>
<td>At 18 began attending general education classes; remaining time in community-based instruction Counseling and SLP to develop relationships (esp. with males) and decrease anxiety</td>
<td>Relationships with family and paid caregivers – female only Remained anxious, wary of others, protective of belongings</td>
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<td>Age 3 labeled at-risk of developmental delays Initial IQ score of 46; labeled with cognitive disability</td>
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to leave preschool services he was evaluated for disabilities and records indicate Mark had an intelligent quotient (IQ) score of 46. No specific reference, however, was made to the tests used to determine this score. Subsequently he was labeled as having a cognitive disability. The school district recommended a self-contained special education Kindergarten class that was directed by a regional special education cooperative and was located in a classroom rented in one of the surrounding school districts. His mother questioned the appropriateness of a self-contained class that was located 90 minutes away from his home. Alternatively she requested that Mark attend Kindergarten in his one-building home school district, believing it would be more appropriate. Her request was denied by Mark’s school district and he was placed in the self-contained special education Kindergarten originally recommended.

Jim birth through 5 years of age. Ten years later Jim was born after a normal and uneventful nine month pregnancy and was the fourth of five children. He was diagnosed with a cleft palate, failure to thrive, microcephaly, and possible cortical blindness. In addition, his records indicated early concerns regarding

### TABLE 2
Summary Descriptors of Jim Across Years

<table>
<thead>
<tr>
<th>Early Years: Birth to 5 Years</th>
<th>Kind &amp; El Yrs: 5–11 Years</th>
<th>Middle School Years: 11–14 Years</th>
<th>High School &amp; Transition Years: 15–21 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal pregnancy with numerous birth abnormalities – cleft palate, microcephaly, possible cortical blindness, gastrointestinal tube feeding</td>
<td>1st year in Kindergarten – no special ed support; 7 months growth in receptive language (most growth to date)</td>
<td>Described as flexible; exhibited few anxiety-related behaviors</td>
<td>Navigated school independently; attended to tasks in classes; demonstrated curiosity of new tasks and content</td>
</tr>
<tr>
<td>Labeled as multiply impaired; Early intervention at 4 months with OT, PT, Speech intervention</td>
<td>2nd year in Kindergarten – coordinated OT, PT, Speech, special educator support; a 1.9 year increase in receptive and 1.1 years in expressive language; reduced anxiety</td>
<td>Tolerated mild changes in routine without disruption; preferred set routines</td>
<td>“Hung-out” with classmates before, after, and during school; mirrored social cues; demonstrated flexible demeanor; comfortable interactions with numerous peers and adults</td>
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<tr>
<td>Self-contained pre-K in AM; day care with nondisabled peers in PM</td>
<td>Labeled with cognitive disability</td>
<td>OT, PT, Speech in both general education and pull-out settings</td>
<td>IEP focused on functional academics and communication with peers</td>
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<td>A few months growth per year</td>
<td>2nd grade – stopped services for anxiety</td>
<td>IEP goals focused on functional academics and keyboarding</td>
<td>Played drums in school band; participated on track &amp; field team; played bells in church bell choir</td>
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<tr>
<td>Age 3 and 5 IQ scores of 40</td>
<td>IEP goals focused on participation in general education science, social studies, reading, and math</td>
<td>Participated in extra-curricular activities, with support when needed</td>
<td>9th grade – dismissed from OT and PT</td>
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<td>Significant delay at age 4 assessment of coping skills (2.6 year level)</td>
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<td>Academic skills remained at K–2nd grade level; IQ score of 46</td>
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possible signs of Pierre Robin syndrome. Medical appointments and therapy sessions became part of Jim’s daily life. He was labeled as having multiple impairments and began to receive early intervention services at home at four months of age, focusing on language and physical development. In addition, Jim was fed through a gastrointestinal tube prior to the repair of his cleft palate when he was two years old.

When he was 3 years old, Jim was labeled as having multiple disabilities and placed in a self-contained preschool program run by the regional special education cooperative. During his second year of preschool services Jim attended two programs — mornings he attended a self-contained language-based preschool program through the special education cooperative; afternoons he attended a general education preschool in his home town. When he was three and five years old Jim was formally evaluated for disabilities, resulting in a reported overall IQ score of 40 for both evaluations. Similar to his brother Mark, no specific tests were referenced in the records to indicate the original source for this intellectual score. In addition, Jim was assessed for anxiety with his coping skills evaluated to be at a 2 year 6 month level.

When he was exiting preschool services, Jim’s mother again requested that her son be placed in a general education Kindergarten in his one-building home school district. As 10 years earlier with Mark, this request was denied by the school district. At this time the district stated that (a) Jim’s intellectual abilities and coping skills were too low for him to demonstrate any benefit from being in an inclusive general education Kindergarten, and (b) his need for total communication strategies could not be met in a general education Kindergarten. Jim’s parents invoked their due process rights, and refused to sign the IEP developed by the district, ensuring that he would be placed in general education classes until the disagreement was settled through a due process hearing.

The Kindergarten and Elementary Years

Mark 5–11 years of age. Throughout his Kindergarten and elementary school years Mark received special education services in self-contained special education classes administered by the regional special education cooperative. His psychologists, therapists, and special educators reported that Mark was an anxious child, especially in new situations. Because of this he performed best during set routines. Mark was known to cry easily, seek adult reinforcement continuously, and become frustrated easily during demanding tasks. Records also indicated that Mark needed an adjustment period at the beginning of each school year before he spoke at school. By 7 years of age (i.e., 2nd grade) he was evaluated in relation to his anxiety and each year he received either one-to-one or small group counseling to facilitate the development of coping skills.

In addition to addressing anxiety and coping skills, Mark’s early IEPs focused on the development of academic and social interaction skills within his special education classes. Although some IEP objectives were repeated over 5 consecutive years, the most consistent concern over time appeared to be Mark’s level of anxiety, especially with males. He also remained nervous, cried frequently, and obsessed about changes in his routine. Most of his service providers, however, reported they were pleased with his incremental progress and repeatedly recommended that he continue in self-contained classes.

Jim 5–11 years of age. Ten years later, when Jim was in Kindergarten and Mark was in middle school, Jim’s parents filed two due process complaints against the school district requesting that both Mark and Jim receive services in their one-building home school district alongside their neighborhood peers who did not have disabilities. While the impartial hearing for Jim was underway, the school district moved him from preschool to a general education half-day Kindergarten. His time in the Kindergarten was limited, however, because he was removed from the class for occupational, physical, and speech/language therapy, as well as resource room support. Records and interview transcripts verified an overall lack of coordinated support for Jim and no integration of related services in the Kindergarten class or activities. Jim’s parents won their impartial hearing and he attended general education Kindergarten for a second year, but for both the morning and afternoon
sessions. During this second year his services were slightly more coordinated and professional development activities were provided for his educational team by an outside consultant. This was the only time in his educational experience that Jim spent more than 1 year at a grade level.

During his second year in Kindergarten, Jim’s IEP focused on independent functioning and success in the general education environment, as well as on reducing his anxiety. In addition to support from a special educator, therapists, and a paraprofessional, Jim received one-to-one counseling weekly to address his anxiety. Although he was identified as having higher than normal levels of anxiety, Jim’s education team believed the anxiety was due partially to his learning style. Interviews and reports indicated that Jim often would watch his classmates participating in a new activity before he began to participate, especially when the activities required motor involvement. Progress reports from his early intervention and preschool programs indicated that Jim consistently demonstrated growth of only a few months per year. Despite the lack of coordinated special education services during his first year of Kindergarten, records revealed that Jim made 9 months of progress in receptive language as measured by the Preschool Language Scale Profile (Zimmerman, Steiner, & Pond, 1969), while his expressive language level remained relatively unchanged. It was during his second year in Kindergarten that Jim made his greatest growth. Specifically, his receptive language level increased by 1.9 years and his expressive language level increased by 1.1 years. His end-of-year speech-language report stated that Jim no longer required the use of total communication strategies, as he was communicating effectively without those accommodations. Additionally, the end-of-year counseling report indicated that his level of anxiety had reduced significantly across all situations.

Following his second year in Kindergarten, Jim continued his elementary education in general education classes with 1 year per grade. His disability label changed from multiple disabilities to cognitive disability. Beginning in third grade, his IEPs focused on acquisition of academic content across all areas of the general education curriculum. Although all curriculum areas were modified for him, the focus of his program became one of participation to the greatest extent possible in general education science, social studies, math, and reading. Similar to his older brother Mark, Jim continued to receive speech and language services, occupational and physical therapy, and counseling. Many of these services, however, were delivered in Jim’s general education classroom, and counseling was removed from his IEP by second grade.

The Middle School Years

Mark 11–14 years of age. Mark continued to receive special education and related services in self-contained classes outside of his home district through the regional special education cooperative. Anxiety continued to be a concern for Mark and he continued to receive counseling in one-to-one and small group sessions throughout his late elementary and middle school years. His annual IEP goals related to counseling focused on increasing meaningful interactions with peers (i.e., both male and female peers, although interactions with males were of more concern), sharing experiences with peers, improving communication skills when faced with frustrating tasks, accepting changes in routine, and identifying and coping with social situations that caused him discomfort. Though IEP updates indicated that Mark made progress in these areas, subsequent IEPs continued to focus on them. In addition, Mark’s IEPs included goals for decreasing unspecified self-injurious behavior, although records never indicated that he demonstrated such behaviors.

At the age of 13, when he was chronologically a 7th or 8th grader, Mark’s reading and math scores remained at the Kindergarten to 1st grade level. Though his previous IEPs had focused primarily on acquiring basic math, literacy, social/behavioral, and language skills, Mark’s IEP for this year demonstrated a significant change in the focus of his overall education program. Although functional reading and math were still part of Mark’s educational program, his IEPs now had a very strong emphasis on the development of specific work skills, communication skills within vocational environments, and independent
living skills. When evaluated for vocational potential Mark was determined to be unemployable at an independent level and to have numerous deficits, including fine motor skills (e.g., pulling tabs off cans), sorting, matching, and collating. The vocational evaluation indicated that Mark would require extensive practice to acquire new vocational skills. Other concurrent reports predicted that Mark would require supported living services as an adult. His IEPs incorporated content such as: (a) mixing soil for plants in a greenhouse, (b) developing knowledge of floral designs, (c) using a phone in a vocational setting, (d) developing work-related behaviors, (e) reading help wanted advertisements in a newspaper, (f) counting 10 objects, (g) making simple sandwiches, and (h) cutting vegetables. It was also during this year that Mark began to attend a highly supervised segregated special education vocational setting, where he remained for 3 years.

Throughout his middle school years Mark continued to receive speech, occupational and physical therapy, and counseling. Over several years his speech and occupational therapy services increasingly were delivered in the segregated vocational setting, while his physical therapy continued on a pull-out basis, focusing on isolated activities to develop strength and coordination.

Jim 11–14 years of age. Throughout his middle school experiences ten years later, Jim continued to receive related services in general education contexts. Overall, his IEPs focused on functional academic skills, including the use of keyboarding skills and the development of 1st grade skills in reading, writing, and math. In addition, his IEPs addressed participation across school contexts, speech articulation, and overall length of meaningful communication with peers without disabilities. Jim also continued to receive occupational and physical therapy. Though some therapy sessions were held in pull-out situations, all of his services were designed to assist Jim in being successful in the general education curriculum and contexts. For example, his work on the development of keyboarding skills was related to Jim’s meaningful writing in classes, and his work on fine motor skills related to his completion of class projects that required manipulation of materials, including writing im-

plements. Jim was described as a flexible young man who exhibited few, if any, anxious behaviors. He tolerated mild changes in his routine, although he worked best under, and preferred, a set routine. Essentially Jim demonstrated steady progress through his middle school years and no specific academic or behavioral concerns were identified by his educational teams.

When Jim was in 5th grade his parents requested and were provided information regarding school-sponsored extra-curricular activities. Jim began to participate consistently in those activities. All classes and extra-curricular activities in which Jim participated were regularly scheduled for his same-age classmates who did not have disabilities; supports, however, were provided for him during those activities. Throughout middle school Jim developed many positive relationships with his classmates and other peers who did not have disabilities. He did not, however, develop any close personal friendships that extended beyond school contexts.

The High School and Transition Years

Mark 15–21 years of age. After four years with a strong IEP emphasis on vocational training in the segregated setting, Mark turned 17 years of age. At that point his parents were dissatisfied with his level of educational progress and with the lack of connection between the content of his educational program and the life they envisioned for him after school. At that point they requested that Mark attend general education high school classes for part of the school day in his one-building home school district. Mark began to have access to high school students who did not have disabilities on the bus, during lunch, in 10th grade homeroom, and in 10th grade physical education. For the remainder of the school day Mark received 1:1 support either in a self-contained special education class in the same school or during community-based instruction. The following year his parents then requested that Mark attend only general education classes and community-based instruction and the district agreed. When he was 18 years of age Mark attended 11th grade general education classes, including biology, com-
puter applications, health, study hall, and physical education.

During this time there appeared to be confusion about the outcomes desired for Mark and, therefore, about his learning priorities. For instance, consistent with his placement in general education classes the content of his IEPs shifted dramatically toward the acquisition of general education curriculum content. Unfortunately, however, his special education support in general education classes was inconsistent in its effectiveness to facilitate meaningful access to the general education curriculum and instructional activities. In addition anecdotal records and reports from outside providers still focused on preparing Mark for noncompetitive employment in a sheltered workshop and group home services upon exiting school services. Consistent with this, Mark continued to receive community-based vocational training for two hours per day. His speech and language therapy and counseling services continued to focus on developing positive social relationships with both male and female classmates who did not have disabilities. While a counseling report emphasized Mark’s increased ability to interact with female classmates, it reiterated concern about his continued nervousness around, and reluctance to interact with, all males.

Two years later, when Mark was 19 years of age, his IEP focused on developing language, social, and academic skills within general education courses, including English 12, social studies 12, consumer math, physical education, and driver’s education. While in driver’s education Mark did not actually learn to drive, but participated in all other aspects of the course. An IEP was developed for each general education subject area, delineating the level of participation and content acquisition expected of Mark in each unit per subject area. Mark also continued to receive vocational training from a job coach in community-based work sites (i.e., a local grocery store, video store). In spite of this support records continued to indicate that Mark was unable to work independently, and that he required constant supervision from the job coach or another employee. Mark’s vocational goals and objectives also focused on his social interactions in the workplace and his ability to work with a variety of supervisors. In addition, anxiety continued to be addressed throughout Mark’s educational experience and he continued to receive one-to-one counseling for his anxiety through his high school years.

It is noteworthy that the content of the quarterly comments and yearly updates during Mark’s high school years reflected a second major shift. For the first time school personnel focused on Mark’s participation in general education courses and contexts, curriculum modifications, and level of engagement throughout school contexts with peers who did not have disabilities. Prior to that time no comments related to these variables were evident in Mark’s records.

As Mark exited the education system, his formal evaluations indicated that he demonstrated an overall IQ of 61, an age equivalent score of 8 years 1 month on the Peabody Picture Vocabulary Test, and a 2nd grade reading level. His transition from school to adult life consisted of continuing to live with his parents and four younger siblings, and continuing to be unemployed. With the assistance of a job coach, he eventually was employed at a grocery store chain but was released from the position after two years, without indication as to cause.

Jim 15–21 years of age. Ten years later, when Jim was 15 years old and Mark had transitioned to adult services, Jim spent his first three years of high school included in general education courses with special education support for modifications in curriculum content, materials, instruction, and assessment. His IEPs continued to focus on functional academics and communicating effectively with peers. Of particular interest to him were classes and experiences related to music and chorus. This interest extended to after school hours when he played the drums in the high school band and participated in a bell choir at his church. Outside observers who conducted ecological assessments remarked on Jim’s ability to navigate the school, freely interact with peers, focus on class assignments, and act upon his curiosity about new experiences. By the end of his 9th grade year he no longer received either occupational or physical therapy.

The IEP for his junior year reflected approximately 1.5 hours a day of special education support in his general education classes.
There was, however, a clear contradiction between on-site observations and the IEP. Although Jim had been served in general education in past years and the current IEP stated that special education services were to be provided within general education classes, his special education teacher stated that she was not in favor of inclusive education and had decided to provide instruction for Jim in the special education classroom during the 1.5 hours per day he was to receive support. During an interview with one of the co-authors the special education teacher stated that while she had limited knowledge of Jim’s brother and his outcomes upon exiting school, she believed that Jim should receive services in a segregated classroom, just like his older brother.

In spite of this discrepancy, Jim participated in school-sponsored extra-curricular activities, including marching band, track and field, and student clubs (e.g., Students Against Driving Drunk). Except for the undocumented time that the special education teacher removed Jim from his general education classes during his junior year, Jim’s high school experience had focused on participating in meaningful ways with chronological age peers who did not have disabilities in general education contexts. He received no separate instruction related to vocational preparation or transitioning to adult life in the community. Data collection for Jim stopped with his junior year in high school, when he was 17 years old. No data, therefore, is provided for Jim from the ages of 18–21 years.

Final Observations

Mark in adult life. At the age of 28, Mark continued to live with his parents and 4 siblings. He later was employed less than 15 hours per week in the kitchen of a pizzeria. His mother had found this position for Mark, as well as procured support from a job coach. He was described as anxious in most situations, and demonstrated this anxiety during observations by three of the co-authors in naturally-occurring settings, even with family members present. For instance, Mark: (a) shifted his focus between people and objects quickly; (b) watched others in the setting in a surreptitious manner, as if wary of what they were going to do; (c) removed and hid his possessions that initially were evident in the environment; and (d) frequently questioned what people in the environment were doing, especially in relation to him and his possessions. Mark engaged in conversations only when they were initiated by others, and he limited his responses to a sentence or two. At numerous times Mark commented that he did not enjoy working or interacting with men. While Mark had received counseling for this throughout his educational experiences, it continued to be of concern both to him and to those with whom he interacted. When at home, Mark preferred either to (a) be alone in his room where he listened to music or watched his own videos, or (b) work alone outside with his family’s chickens and ducks.

Although Mark had a part time job, he had very few other activities in which he participated outside of the home. Support from adult services provided him with a paid female caregiver for six hours a week. She facilitated Mark’s participation in activities both in the home and in the community. With her support Mark shopped for groceries, cooked meals, and went bowling weekly. The fact that the paid caregiver was female was an important factor, since Mark continued to be more wary of, and less responsive to, males. When asked if he would enjoy more social activities, Mark stated that he was very busy and could never find the time to do things, in spite of needing only 2 hours per week for his job and time with his paid female caregiver. Mark completed only tasks written on a calendar of daily tasks.

At the time of this study, the state agencies were erecting an apartment building for a supported living program for approximately 10 adults with disabilities. The advocacy for this program had been initiated by Mark’s parents when he was of middle school age. Their advocacy resulted in Mark being on the waiting list for this program and it was expected that he would move into this program as soon as the building was completed. In addition, Mark’s parents anticipated that he would continue to work part-time in the community throughout his adult life.

Jim in 11th grade. As indicated in the previous section, during 11th grade Jim officially was included in general education courses
with special education support for modifications, although his special education teacher provided that support in a segregated special education class for 1.5 hours per day. In addition Jim participated in numerous school-sponsored extra-curricular activities. Speech-language therapy services had been decreased to twice a week for 30 minutes. His last reported IQ score was 46 on the WISC III (Wechsler, 1991) and he performed academically at a K-2nd grade level. His Medicaid Waiver evaluation during 11th grade described his involvement with numerous clubs at school and in the community, and the level of ease he demonstrated when interacting with peers and adults throughout the school. When observed Jim spent unstructured time with his peers who did not have disabilities, joined groups of students outside the school building and, just like his peers, “hung out” until the school bell rang for students to enter the school and prepare for homeroom. During this time he joined a group of students from the school’s marching band. Although his interaction with each peer was short, he exchanged “high-fives,” smiles, and verbal greetings with several students. When the other students were engaged in informal conversation, Jim laughed at appropriate times and mirrored the body movements of his peers. Essentially, Jim blended into the social milieu of his peers, so that an observer would not have identified him as having disabilities without prior information. Jim joined his peers in independently entering the school, finding and using his locker appropriately, and proceeding to homeroom. Throughout these activities Jim appropriately greeted both school personnel and other students in the hallways, blending into the social context.

Upon entering classrooms, Jim continued to demonstrate an awareness of and appropriate response to the expectations within each context. He prepared for and participated in class activities in ways that matched his peers who did not have disabilities (e.g., gathering materials, copying information from the blackboard, following verbal instructions), although his instructional goals and materials were modified.

General Findings

For the findings discussed above to be meaningful, the educational experiences and performance of Mark and Jim need to be reviewed and analyzed over time. These reviews and analyses are briefly discussed for each brother in the following sections.

Mark’s experiences and performance over time. Unfortunately, Mark’s overall performance on academic, social, and vocational skills did not appear to change significantly over time. Initially, he was described as an irritable baby who cried often. While the crying behavior diminished with age, other related behaviors (i.e., anxiety; nervousness) were manifested during his middle school, high school, and adult years. Though counseling to address his anxiety occurred throughout his educational career, Mark continued to display uneasiness in social situations into his adult life. He continued to live with his family, though he was making plans to live in an apartment of a supported living program in his home community. Beyond his activities with family members, his social or networking activities were with one female caregiver who was paid through the Medicaid Waiver.

Although his early standardized testing indicated a moderate level of cognitive disability with an overall IQ of 46 (i.e., six points higher than that of his brother), Mark’s last set of tests reported an overall IQ of 61, which was 15 points higher than that of his brother. While his reported IQ score increased over time, Mark’s assessed reading and math levels continued at or below a 2nd grade equivalency level.

Jim’s experiences and performance over time. Jim’s performance changed significantly over time. He demonstrated an increase in independence and participation in daily life at his school, in his community, and at home. Although when compared with his older brother, Mark, more physical complications
were evident at Jim’s birth (i.e., a cleft palate, a gastrointestinal tube for feeding, demonstration of failure to thrive, microcephaly, possible cortical blindness), these challenges were overcome and did not appear to have long-term impact on his involvement in the general education curriculum and extra-curricular activities at school. Though his overall standardized academic scores remained far lower than those of his older brother, Jim was more able to follow large group routines, use environmental supports and peers to seek answers to questions, and engage in a meaningful way in instructional activities related to the general education curriculum.

Although both Jim and his older brother were identified early in life as having high levels of anxiety, Jim’s services and goals related to anxiety completely faded from his IEPs and records by 3rd grade. Though when in 11th grade Jim still preferred consistent routines, he was able to tolerate schedule changes. In addition, he attended to the cues of others regarding social behavior, and demonstrated social competence when moving about his school, community, and home. This was a marked contrast from his older brother’s behavior across environments and situations.

Jim’s educational files did not reflect any specific vocational goals or objectives. Nor were there any predictions as to Jim’s ability or inability to be competitively employed in the future. Though it is too early to study Jim’s educational outcomes related to vocational skills, employability, independent living skills, or social networks in the community as an adult, the progress he demonstrated by the age of 17 was significantly more substantial than his brother’s progress.

Discussion

One argument that has been provided for developing inclusive education practices for students with significant disabilities has been that inclusive education practices are consistent with the students’ civil rights, focusing on equal opportunity for access to general education curriculum, instruction, materials, and activities. This access has led to the inclusion of students with significant disabilities in state and district assessments and accountability systems, and has facilitated development of friendships with same-aged peers who do not have disabilities, leading to equal membership in peer groups and more extensive natural support networks. Finally, it has been hoped that through access to general education, accountability systems, and membership with peers in natural support networks the long-term outcomes for students with significant disabilities would be more positive than has been indicated in past follow-up studies.

The purpose of this study was to compare the long-term outcomes of services for two siblings with significant disabilities who had similar early diagnoses. While the brother who had attended inclusive school settings seemed poised for more positive post-school outcomes, the results must be viewed in light of the following limitations. First, descriptive data were collected and analyzed on only two individuals using case-study methodology. This small set of participants and methodology do not allow for generalization of findings to other individuals with significant disabilities. Second, while the authors collected data over time from multiple sources, no causal relationships between school placements and long-term outcomes are implied. We are aware that there are a myriad of individual student characteristics, setting characteristics, attitudes, and expectations of family members that surround any individual that may interact to influence post-school outcomes. The comparisons of outcomes addressed in this study occurred naturally in the lives of the two brothers. No effort was made to control for other variables that might account for the differences found. For instance, limited information was gathered in relation to the services provided in either the self-contained special education classes or the inclusive settings. No attempts were made during this study to influence the quality, type, or amount of those services, nor the availability or quality of the adult services.

In spite of these limitations, the brother who received inclusive services in general education contexts demonstrated more skills that were critical both to interacting with peers and adults who did not have disabilities, and to functioning independently across contexts, including at school, at home, and in the community. In addition, this brother acquired
and used knowledge and skills in meaningful naturally-occurring contexts. As he became a young adult, he developed and maintained a life that more closely approximated that of his same-age general education classmates, even though his IQ and achievement test scores were lower than those of his older brother who received special education services in self-contained classes until he was 17 years of age.

It could be argued that the presence of a deeply involved parent advocate who over time had learned about child development, inclusive education, and the rights of students with disabilities could have accounted for differences between the educational experiences and progress made by her two sons. In his classic studies of adults with disabilities who had moved from institutional to community living environments, Edgerton (1967, 1978, 1984) discussed the influence of a “benefactor” on the lives of those individuals. This study seems to support that concept. Undoubtedly, the fact that the brothers’ parents increasingly called for inclusive educational services over the years and exercised their due process rights when not satisfied with their sons’ educational services impacted the nature and quality of services received by their younger son. Their role as advocates argues for the ongoing involvement of parents and others as benefactors who ensure that special education and related services, as well as adult services, provided for individuals with significant disabilities reflect each individual’s needs and assist each individual in acquiring and maintaining a high quality of life. While most often advocates are students’ parents, other family members, or guardians, any interested individual (e.g., teacher, paraprofessional, counselor, family friend) might serve in this role (see, for example, Alper, Schloss, & Schloss, 1995). In addition, the expectations of adult service providers, including vocational and home living personnel, appear to have become more positive. At one time expectations for adults with significant disabilities remained restricted to congregate care residential placement, adult day care, and sheltered, if any, employment. Today, it is more the norm for adult service providers to strive for the goals of independent or semi-independent living in the community and supported employment, as we have learned about the capabilities of persons with significant disabilities when appropriate training and supports are provided (Rizzo, 2002; Wehman 2006; Wehman, Brooke, Green, Hewett, & Tipton, 2008; White, 2004). Additional research is required, however, to understand the influence of the presence or absence of a “benefactor” in the lives of individuals with significant disabilities.

Another variable that might have influenced the outcomes achieved by the younger brother in this study was access to and participation in activities that fostered the development of self-advocacy and self-determination. While not specifically considered in this study, Jim, who was included in general education contexts, had access to role models without disabilities who were developing and using self-advocacy and self-determination skills in their daily lives. The mere access to these role models may have facilitated development of these skills. Additional research, however, is needed to assist in our understanding of the influence of such models in inclusive settings.

It would be simplistic to argue that placement in inclusive settings in and of itself leads to more positive outcomes. Post-school adjustment is undoubtedly determined by a complex set of interrelated factors. It seems likely that best practices in inclusive education, the presence of on-going benefactors/advocates who hold high expectations, and instruction in self-advocacy and self-determination skills all work in harmony to yield positive outcomes.

While the findings of this case study suggest that, when compared with services in self-contained special education settings, providing special education and related services in inclusive general education settings may lead to better outcomes for students with significant disabilities, these results must be viewed with caution. Considerably more research that involves many more individuals with significant disabilities over multiple years is needed before widespread conclusions can be derived about the efficacy of services in these settings. Until such research is conducted, however, this study offers encouragement that the current trend to include students with significant disabilities in general education contexts can lead to positive long-term outcomes.
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Mild Intellectual Disabilities: Legacies and Trends in Concepts and Educational Practices

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Abstract: Intellectual disability has been considered a high incidence disability in special education since the inception of the field in the United States. The purpose of this article is to evaluate current educational programs and practices for students who historically and commonly have been referred to as having mild mental retardation. The article examines mild intellectual disabilities within the context of historical trends, current developments, and future directions in terminology, definition, prevalence, educational environments, and transitional services. Recommendations for educational practices and future research directions are discussed.

The field of mild intellectual disabilities (ID) has provided a foundation for the broader field of special education. A significant amount of the initial research and program development done in the field was concerned with individuals who were labeled at the upper end of the mental retardation or intellectual disabilities spectrum. Further, many of the leaders who shaped the field of special education initiated their work in this area (Polloway, 2000).

Forty-two years ago, Dunn (1968) published his seminal work challenging educational practices for this population. He focused his attention on the practices that had enabled a segregated service delivery system to develop in which students with intellectual disabilities were educated in isolation from their peers in general education. In addition to drawing attention to practices related to individuals termed at that time educable mentally retarded, his article also served as the touching off point for subsequent discussions of mainstreaming, the least restrictive environment, and ultimately school inclusion.

Fifteen years after the publication of the Dunn (1968) article, Polloway and Smith (1983) further assessed the state of the field by addressing considerations related to population, programs, and perspectives. In their article, these authors relied on federal data that provided a national perspective on the prevalence of intellectual disabilities within public schools, and served as a basis for an examination of placement and educational programs.

Since Polloway and Smith (1983) presented their analysis of the field, significant changes have occurred. This period of time has seen the implementation of numerous educational initiatives impacting students with disabilities in general, such as those related to: the development of inclusive classroom settings; the creation of a multi-tiered intervention model for reconsidering education for all students; the emphasis on providing access to the general education curriculum; and the tenets of No Child Left Behind and successive reauthorizations of the Individuals with Disabilities Education Act (IDEA). Nevertheless, in spite of these advances and initiatives impacting special education in general, Tymchuk, Lakin, and Luckasson’s (2001) use of the term “the forgotten generation” continues to have merit for considering in particular the population of individuals who have mild intellectual disabilities.

The purpose of this article is to assess cer-
tain aspects of educational programs and practices for students with mild ID. The paper focuses on terminology, definition, prevalence, school placement, transition and school exit patterns by providing an historical basis, an analysis of current data, and a discussion of the implications for specific future patterns. The article relies in part on federal data that address questions related to the prevalence of individuals served within categorical programs, the educational environments in which services are delivered, and several key transitional concerns including exit from school and/or from special education. In doing so, we use population data for ‘mental retardation’ in order to generalize about specific trends and practices related to ‘mild mental retardation’. Because of the use of the generic “mental retardation” in certain databases, we endeavor to separate out when possible the population of individuals considered mildly intellectually disabled from this broader population. We conclude with a general discussion of recommendations for educational practice and further research.

**Terminology and Definition**

**Historical Considerations**

For over 50 years, the most frequently used term to refer to individuals with intellectual disabilities was mental retardation. This term reflected widespread and long-term use in the wake of the elimination of the labels of feeblemindedness, moron, imbecile, and idiot (Polloway & Lubin, 2009). Sandieson (1998) reported in his survey that, of the 66 terms found in the international literature of the field, mental retardation was the most frequently used. Despite the negative connotation associated with the term, it was the most widely used descriptor among educators and parents as well as researchers in the field. For example, Denning, Chamberlain, and Polloway (2000) reported that 26 state departments of education continued to use the term mental retardation.

Some of the terms that have been used to refer to individuals with ID have caused some confusion. In the United Kingdom, “learning disabilities” is the term of choice for mental retardation. This same term was promoted by Dunn (1973) as well when he proposed terminology that used these designations: general learning disabilities (referring to intellectual disabilities) and specific learning disabilities (referring to those to whom are referred to in the U.S. as having a learning disability). This system never became widely accepted in the United States due in large part to the prolific growth of the field of learning disabilities and the widespread use of this term in its more specific application.

A related consideration has to do with the definitions used in the field and their implications for people with mild retardation. (See Greenspan & Switzky, 2006, for a comprehensive discussion of the evolution of terminology and definitions). In the Denning et al. study (2000), 44 states reported using the definition from the American Association on Mental Retardation (AAMR) (Grossman, 1983) while 4 states used the adapted version of that definition from the AAMR manual. The AAMR 1992 manual (Luckasson et al., 1992) had not significantly impacted the state guidelines in general. Many states still were using the definition of mental retardation in the regulations of the Individuals with Disabilities Education Act (IDEA) that was generally derived from Grossman (1983) and did not make modifications, reflective of changes in the field, as recommended by the AAMR.

**Current Data**

Polloway, Patton, Smith, Antoine, and Lubin (2009) replicated the studies of Frankenberger (1984) and Denning and colleagues (2000) concerning state terminology and definitions. These researchers reported that 27 states use the term mental retardation, which actually represented a slight increase from the Denning et al. (2000) study. Bergeron, Floyd, and Shands (2008) confirmed those findings as they reported that the term mental retardation was used by 53% of the states. Thus, while the professional field of intellectual disabilities continues to explore terminology and definitional changes in the field, it is apparent that the implementation of these changes varies dramatically across the states. Some of the other terms used by states, as reported by Polloway et al., included: cognitively disabled,
cognitively impaired, intellectually disabled, intellectually impaired, and mentally disabled.

Smith (2006) noted that “the 2002 AAMR manual authors acknowledge the problems with the term mental retardation but concluded that there was no acceptable alternative term, despite its technical shortcomings” (p. 58). However, since 2002, the term intellectual disabilities is being used much more often professionally in the field (previously internationally and now to a greater extent in the United States). Nevertheless, according to Polloway et al. (2009), it had not yet taken root in state departments of education guidelines and was the accepted term in only four states.

In terms of definition, Polloway et al. (2009) noted that 34 states continued to depend on the Grossman (1983) mental retardation definition. In its stead, they noted evidence of increased use of the most recent AAMR (now the American Association on Intellectual and Developmental Disabilities, AAIDD) definition (Luckasson et al., 2002) as well as alternative definitional approaches. They further reported that in terms of the intellectual assessment component of the definition, 34 states required a cut-off score or range; most commonly, the ceiling level for mental retardation was stated as either approximately IQ 70 or two standard deviations below the mean. Bergeron et al. (2008) substantiated that fact as they noted that “the majority of states use IQ cutoff at least two SDs below the normative mean” (p. 125).

In the second key definitional domain, adaptive behavior (AB), Polloway et al. (2009) reported that all states noted that they required assessment in this area. Twenty-three states highlighted that specific AB practices were to be followed. In terms of developmental period, 33 states (64.7%) did not specify any specific ceiling age for the developmental period although few students are initially identified as mentally retarded later in their school years.

Future Patterns

The use of the term “intellectual disabilities” to describe the population—whether school-age or adult—to whom the profession typically referred as having “mental retardation” is clearly increasing (Schalock et al., 2007). This change is reflected in organizational names (AAIDD), journal titles (e.g., Intellectual and Developmental Disabilities), and professional book titles. Although some governmental agencies are moving slowly to change terminology (i.e., terms used in state education codes), the professional community is embracing this term at a quick pace.

MacMillan, Siperstein, and Leffert (2006) underscored the need for a new term and supported the use of intellectual disability when they stated:

the precipitous decline in the application of the term mental retardation in school settings is, to a significant extent, attributable to its pejorative connotation. . . . if mental retardation is to serve as a unifying concept that includes [mild mental retardation], a new term needs to be adopted that is less stigmatizing and more palatable to educators, parents, and the individuals themselves. In our view, a term such as intellectual disability, which is increasingly becoming a standard term outside the United States, cognitive impairment, or general learning disability would be more acceptable (p. 215).

Changes in terminology can impact on a number of areas. In school settings, such a name change may not be as important as how it is defined and which criteria are used to determine eligibility. However, term change may very well have important implications for individuals within the context of non-school settings, such as in the legal arena. In this domain, being diagnosed as having “mental retardation” is just beginning to be understood to some degree, particularly in the light of the attention given to this diagnostic label in the wake of the Supreme Court decision in the Daryl Atkins death penalty case (see Patton & Keyes, 2006). Changing terminology will undoubtedly create some confusion and consternation in the criminal justice system. The name change could also have an impact on other adult service areas (e.g., Social Security eligibility) until such time as state codes are revised to reflect the use of intellectual disability. Finally, as Polloway and Lubin (2009) have noted, terminology continues to evolve, as the term feebleminded gave way to
the concept “mental retardation”, which then yielded to “intellectual disabilities”.

**School Prevalence**

*Historical Considerations*

For many years a common observation was that approximately 3% of the school population would likely be identified as mentally retarded (MacMillan, 2007). While this figure was often cited, and became a basis for public policy initiatives and governmental support, this prevalence rate was not generally confirmed in research. Rather, the best historical predictor of national prevalence in the 1960s and 1970s was closer to 2%.

With the advent of the annual reports to Congress on the Individuals with Disabilities Education Act, a national database was established, which has subsequently provided a foundation for tracking prevalence trends in the public schools. Of particular note is that, subsequent to the passage of the Education for All Handicapped Children Act in 1975, there was a steady and significant decline for about 20 years in the number of individuals identified as mentally retarded. These data indicated that neither the 3% nor the 2% figures were accurate portrayals of the school population and rather the actual numbers were substantially lower. This impact resulted primarily from decreases in the number of individuals who earlier would have been considered to have mild intellectual disabilities.

Polloway and Smith (1983) discussed the diminishing number of individuals who were being identified as mentally retarded and stressed that further changes were likely to occur regarding those individuals identified with mild ID. Specific considerations and hypotheses included changes in definitional standards (e.g., increased emphasis on adaptive behavior), the impact of key litigation on minority over-representation within this population (especially in court cases in California), professional reluctance to use the label “mentally retarded,” and the possible beneficial effects of early intervention programs on prevention.

**Current Data**

The 27th Annual Report to Congress on the Education of Individuals with Disabilities Education Act (USDOE, 2007) provides a database for determining current practices on both a national level as well as an analysis at the individual state level. While the data are always delayed in publication for several years (for example, the 2007 document includes data from the 2003–04 academic year), this document nevertheless provides a comprehensive foundation for analyzing data trends within and across years.

Table 1 provides percentage data on prevalence figures for the overall population, ages 6–21, across disability categories. These trend data provide a 10-year perspective on special education. As can be noted in the table, the national figures for mental retardation (as rounded within the table) have shown virtually no variance on an annual basis during this timeframe and consistently reflect a trend that slightly less than one in a hundred school-age children nationally might be identified as mentally retarded. Further, the data reveal that four times as many school-age individuals are identified as having a learning disability. Nevertheless, by comparison with other disability areas, one would still conclude that ID remains a high incidence disability.

The most compelling finding related to prevalence in the field of intellectual disabilities is the significant variance across states. A total of 13 states report prevalence rates in excess of 1.2%, including two states that report prevalence figures above 2% (West Virginia: 2.47% and Wyoming: 2.25). On the other hand, there are 19 states that report prevalence rates that are below 0.6%; these include New Jersey, New Hampshire, and Maine, each of which report a prevalence figure of 0.34% (USDOE, 2007).

For the states that report high prevalence figures, it might be concluded that the population being served is not dissimilar to that which was commonly identified 30 or more years ago under the label mental retardation, and would likely include a sizable number of individuals with mild disabilities. On the other hand, for those states who reported serving approximately 0.4% or less of their population, it could probably be concluded that this population, so identified, would include only individuals with more significant disabilities, given the fact that this prevalence figure is commonly cited in epidemiology studies as.
TABLE 1
Percentage of the Population Ages 6 Through 21 Receiving Special Education and Related Services, by Disability Category: Fall 1993 Through Fall 2003

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific learning disabilities</td>
<td>4.1</td>
<td>4.2</td>
<td>4.3</td>
<td>4.3</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.3</td>
<td>4.3</td>
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<td>Speech or language impairments</td>
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<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
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<td>1.6</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Mental retardation</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Emotional disturbance</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Multiple Disabilities</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Other health impairments</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
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<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Autism</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
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<tr>
<td>All disabilities</td>
<td>8.1</td>
<td>8.2</td>
<td>8.4</td>
<td>8.5</td>
<td>8.5</td>
<td>8.6</td>
<td>8.7</td>
<td>8.7</td>
<td>8.8</td>
<td>8.9</td>
<td>9.1</td>
</tr>
</tbody>
</table>


The most likely predictor of the number of persons with severe disabilities within a given population (e.g., Abramowicz & Richardson, 1975; MacMillan, 2007). It remains an important question to determine if states with lower prevalence rates are serving any students that might be considered mildly intellectually disabled under this category, if these individuals receive no special education services, or if they are simply labeled differently, therefore skewing federal report data.

The data on ID can be placed in broader context by also considering individuals identified as “developmentally delayed”—a categorical designation under IDEA that states may choose to use for students between 3 and 9 years of age. Although the state variance for this category is again noteworthy (California and New Jersey, for example, reported no school-age individuals so identified while a significant number of states report in excess of 0.20), it is instructive to note that the number of individuals identified nationally as developmentally delayed, ages 6–9, increased dramatically between 1997 and 2003. Figure 1 provides a graphic representation of this increase to above a prevalence rate of 0.40 (USDOE, 2007). It is reasonable to consider that some of the children identified as developmentally delayed will meet the identification criteria for intellectual disability once the age of nine is reached and the term developmental delay is no longer acceptable for usage under IDEA.

One interesting data set that speaks to the question of prevalence is the US Department of Education (2007) summary of the percentage of elementary students who are declassified from special education. Providing data from 1999–2002, this federal report indicated that only 2% of students identified as mentally retarded were declassified during this period, compared with 9% for learning

disabilities and 10% for emotional disturbance. Based only on these data, it might be cautiously concluded that once the label of mental retardation (or intellectual disabilities) is given, it is more likely to continue to be applied, no doubt influenced in part because of the presence of those with more significant disabilities within this category.

**Future Patterns**

The implications of trends in terms of the prevalence of intellectual disabilities within the schools, as well as an extrapolation of the likely trends in terms of mild ID, suggest that this category will not increase in numbers. Rather, ten years of consistent data represent a strong case for the fact that the number of students identified will remain relatively static. Based on the assumption that approximately 0.4% of individuals in a given population may be identified as having severe or significant disabilities, it seems reasonable to conclude that approximately 0.5% of the school population nationwide could be identified as mildly intellectually disabled. Again, the variance across states would lead one to continue to assume that for some states with low prevalence rates virtually no individuals would be so identified while in other states approximately 1.5–2.0% would likely be considered mildly intellectually disabled. The use of the category “developmentally delayed” may continue to increase in usage, as it provides a less stigmatizing way to describe individuals who may demonstrate delays such as in cognitive and linguistic functioning.

**Educational Environments/Placement**

**Historical Considerations**

The historical image of special education in the 1960s and 1970s was often based on the profile of programs for students with intellectual disabilities. Much of the attention given to special education and school placement reflected the common finding that the majority of these students were in self-contained special education classrooms and spent limited time in integrated settings with peers who were non-disabled (Polloway, 1984). These perceptions were consistent with the reports by Dunn (1968) and Polloway and Smith (1983) who confirmed that such placements were most often the reality in the schools.

Two major types of classes were commonly found in schools throughout the nation in the 1960s and most of the 1970s: classes for students considered to be educable mentally retarded (EMR)—i.e., mild intellectual disabilities—and for those considered to be trainable mentally retarded (TMR)—i.e., moderate-severe intellectual disabilities. The so-called efficacy studies of the 1950s and 1960s sought to research the relative effectiveness of self-contained vs. inclusive school environments for the former population; the research can best be summarized as equivocal because of the numerous confounds within the research methodology as well as the question of determining what should be studied as the key indicators of effectiveness (Stanton & Cassidy, 1964).

**Current Data**

In spite of the fact that the trend toward increased inclusion in schools has moved forward for three decades, the data on inclusion of students with intellectual disabilities (USDOE, 2007) indicate that placement of those students into programs outside of general education is still predominant, both on a national level and in most states. Table 2 presents data on selected categories of disabilities per the relative amount of time spent outside of general education settings. As can be noted in the table, mental retardation (11.7%) is substantially lower than most other disabilities in terms of the likelihood of being placed within general education for more than 21% of the school day. In other words, this group was in more segregated settings for 88.3% of the time. It must be noted of course that the “mental retardation” category also includes a large number of individuals who have more significant challenges in addition to those with mild ID, thus likely biasing the data toward more restrictive settings.

The data are most significant when compared to data for students across all disabilities, students with specific learning disabilities and for those with emotional disturbance (see Table 2). These federal data indicate that a total of 58.3% of students with intellectual
disabilities are in environments that are removed from the general education classroom at least 60% of the day (51.8%) or are in separate environments such as special day schools and residential programs (6.3%). Placed in a broader context of time, Williamson, McLeskey, Hoppey, and Lenz (2006) noted that placement of this group of students in general education-based programs increased from 27.3% to 44.7% in the 1990s but that this increase essentially reached a plateau after 1997–1998. The data from the USDOE (2007) essentially confirm this plateau effect for students with intellectual disabilities (i.e., 11.7% outside the general education class- room less than 21% of the day plus 31% of time, for a total of 41.9%). Smith (2007) noted that the percentage of students with intellectual disabilities served in the most inclusive setting (i.e., <21% outside of regular class) declined between 1997–98 and 2002–03 in 34 states.

As with prevalence data, the data on educational environments reflect a high degree of interstate variation. Thus, for example, the state of Vermont reports that 59.1% of students with mental retardation are served in general education classes greater than 79% of the day while data for Utah indicates that only 2.55% of students are so placed (USDOE, 2007).

When considering the interaction of prevalence rates and educational placements, it is intuitively attractive to presume that states with low prevalence rates are very likely serving a population that is more significantly disabled and that consequently one would expect to find that those students are more likely to be educated in more restricted settings. In a parallel sense, it might also be assumed that states serving a larger percentage of students under the label intellectual disabilities are likely to be educating more individuals with mild disabilities and consequently may be more likely to provide services in general education-based settings. However, the US Department of Education (2007) data reflect the fact that there is significant variance in the utilization of general education-based educational environments by states, in a number of cases irrespective of state prevalence figures. For example, Utah reflects what might be considered to be a common pattern in that it serves a very low prevalence of individuals with ID (0.48%) and educates only 2.55% of these students in general education-based programs more than 79% of the time. The other predicted pattern is seen in several

<table>
<thead>
<tr>
<th>Disabilities</th>
<th>&lt;21 percent</th>
<th>21–60 percent</th>
<th>&gt;60 percent</th>
<th>Separate environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific learning disabilities</td>
<td>48.8</td>
<td>37.3</td>
<td>13.0</td>
<td>0.9</td>
</tr>
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<td>Speech/language impairments</td>
<td>88.2</td>
<td>6.8</td>
<td>4.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Mental retardation</td>
<td>11.7</td>
<td>30.2</td>
<td>51.8</td>
<td>6.3</td>
</tr>
<tr>
<td>Emotional disturbance</td>
<td>30.3</td>
<td>22.6</td>
<td>30.2</td>
<td>16.9</td>
</tr>
<tr>
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<td>12.1</td>
<td>17.2</td>
<td>45.8</td>
<td>24.9</td>
</tr>
<tr>
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<td>51.1</td>
<td>30.5</td>
<td>15.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Autism</td>
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<td>17.7</td>
<td>43.9</td>
<td>11.6</td>
</tr>
<tr>
<td>Developmental delay</td>
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<td>28.2</td>
<td>18.6</td>
<td>2.0</td>
</tr>
<tr>
<td>All disabilities</td>
<td>49.9</td>
<td>27.7</td>
<td>18.5</td>
<td>3.9</td>
</tr>
</tbody>
</table>

high prevalence states emphasizing general education-based programs. This is illustrated by Iowa and Kentucky with high prevalence rates of individuals served with intellectual disabilities (1.80; 1.98) educating 35.9% and 26.3%, respectively, of these students in the most inclusive programs.

On the other hand, several states reflect different and perhaps less expected patterns. For example, Vermont reports a prevalence of 0.90 for intellectual disabilities (that is, at the national average) while serving 59.11% of these students in general education for 79% or more of the school day, a figure that is more than five times greater than the national average. The District of Columbia, with a relatively high prevalence rate of 1.63, reports that only 2.58% of the students are served in general education programs (greater than 79% of the time). In these two examples, there is on the one hand a strong commitment in Vermont to the apparent inclusion of students with more significant disabilities in general education in juxtaposition to DC, which would appear to identify more students with mild disabilities and to serve them more often in pull-out programs.

**Future Patterns**

The national data indicate that a plateau was essentially reached in late 1990s in terms of the trend toward increased inclusion of students with mental retardation. Data through the 2003–04 academic year confirmed that approximately 42% of students with intellectual disabilities were being served in general education programs, inclusive of those individuals who were outside of the regular classroom less than 20% of the time as well as those outside between 21–60% of the time. Nevertheless, the continuing increased emphasis on inclusion and access to the general curriculum may yet be reflected in subsequent federal reports.

Any trend toward inclusion is inescapably linked to how well the general education setting is prepared to handle students who will require differentiated strategies in terms of content, instructional materials, instruction, assignments, testing, products, setting, and management (Hoover & Patton, 2005, 2008). In a multi-tiered model of providing intervention that also has implications for eligibility determination, the need for general education teachers to be equipped to address the needs of a wide range of students, including those with mild intellectual disabilities, is imperative. Thus, efforts continue to provide skills to general education teachers to differentiate instruction and implement educational programs supported by collaborative arrangements with special educators and other school-based personnel.

Schools that operate within a multi-tiered system also are creating a change of roles for special education personnel as well (Hoover & Patton, 2008). Teachers who have responsibility for individuals with mild intellectual disabilities must become more than primarily responsible for direct instruction in pull-out programs and rather also must be expected to work collaboratively in preventive efforts typically associated with Tier I instruction (enhanced instructional delivery in general education programs) as well as supportive efforts often associated with Tier II instruction (ongoing collaboration in general education programs).

At the same time, a number of issues remain in terms of ensuring that educational practices result in quality programs for students with ID. Bouck (2007) has used the term “lost in translation” to refer to the challenges faced by teachers in addressing federal laws while constructing effective programs for this population that “promote the greatest academic and social experiences for each individual student” (p. 85). Wehmeyer (2006) provided a blueprint for considering effective inclusive efforts by identifying aspects consistent with a universal design for learning approach to making general education classrooms more responsive to the learning needs of this group of students.

There also remains the question of the contributions of relevant and contemporary research to educational programs for students with mild intellectual disabilities. Several individuals (e.g. Polloway, 2005; Bouck, 2007) have highlighted the relative absence of recent research on educational interventions for this population. While changes have been occurring over the last 20 years in the students who are being identified as intellectually disabled, the field has not received the level of attention
that has been accorded to other areas of exceptionality (e.g., learning disabilities, severe/significant disabilities, autism, emotional and behavioral disorders). As a consequence, many of the judgments about this group have been generalized from much older research or research done with other populations (most commonly, students with learning disabilities). In this regard, it is worth considering the recommendations of the President’s Committee for People with Intellectual Disabilities (2007) who indicated that an important aspect of policy in the future would be: “strengthening information bridges from the Federal Government to state and local departments of education, schools, teachers, and parents by providing current, research-based strategies and best practices related to students with intellectual disabilities” (p. 14).

**School Exit Patterns and Transition**

**Historical Considerations**

If there is one group that has benefited from activities related to transition planning and services for the longest period of time, it is students with mild intellectual disabilities. Work-study programs have been recommended for, and implemented with, this group since the 1950s and concerns about what would occur when school ended were on the minds of secondary-level staff well before the onset of more formal transition planning requirements and services in the 1980s. In Kolstoe and Frey’s (1965) description of high school work-study programs, it is clear that recognition of the importance to future outcomes was given not only to job performance skills but also to academic, personal, and social skills.

Over the years, most students with mild intellectual disabilities stayed in school through to the completion of high school, although frequently they left without a high school diploma, receiving a certificate of some type (i.e., attendance, completion of program). Some of these students remained until they “aged-out” at 22 or later, dependent on state guidelines (Edgar, 1987, 1988).

A series of critical events have had an impact on the transition services for students with intellectual disabilities. The first was the funding provided in 1984 by the federal government of projects that focused on transition of youth with disabilities. The second was the reauthorization of IDEA in 1990 when transition services were mandated for all students who were receiving special education services. Subsequent reauthorizations of IDEA have modified some of the elements of transition services; however, the main intent has endured.

**Current Data**

Two key sources of data provide a contemporary perspective on the nature of the transition process for students with mental retardation. The first source is USDOE (2007) previously cited in this paper while the other is the National Longitudinal Transition Study–2 (NLTS-2) (Wagner, Newman, Cameto, Garza, & Levine, 2005). This latter resource is the second study that has been conducted to follow up after school with students who were previously receiving special education. The NLTS-2 report provides the most comprehensive picture of what happens to students after high school.

In Table 3, we present federal data on student dropout rates across areas of disability that provide a 10-year retrospective. As can be noted, the dropout rates for mental retardation (or intellectual disabilities) are generally consistent but show somewhat of a decline, to 28.6%. These numbers are comparable to data for learning disabilities and emotional disturbance although twice the rate for students with autism. By any interpretation, it is clear that a substantial number of students are not completing school as defined within the federal data base.

Complementary data reflect graduation rates with a regular diploma (see Table 4). As can be noted, only 36.9% of the individuals with mental retardation (or intellectual disabilities) receive regular diplomas; those numbers have been generally stable with only a small increase noted since 1993–94. Across this 10-year period, students identified as having intellectual disabilities were consistently less likely to graduate than were students with learning disabilities, speech and language impairments, other health impairments, autism, and notably multiple disabili-
ties. Only students with emotional disturbance were less likely to graduate among these selected categories of exceptionality.

The federal data on school exit patterns are not easily interpreted because of the multiple categories reflected in possible school exit. Therefore, individuals who are intellectually disabled are also represented significantly in the population of those who do not complete diplomas but complete school through some alternative means of school exit (such as through receipt of a certificate) as well as those who age out of school. In addition, the federal data include the category “moved, not

### TABLE 3

<table>
<thead>
<tr>
<th>Disability</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific learning disabilities</td>
<td>43.1  44.7  44.4  43.4  41.3  40.2  39.9  38.6  35.4  31.6</td>
</tr>
<tr>
<td>Speech/language impairments</td>
<td>49.3  51.4  50.4  48.0  44.5  40.9  39.4  39.3  35.8  31.2</td>
</tr>
<tr>
<td>Mental retardation</td>
<td>35.4  37.9  38.0  38.2  36.3  34.9  33.7  34.2  31.2  28.6</td>
</tr>
<tr>
<td>Emotional disturbance</td>
<td>67.8  69.2  69.9  69.2  67.2  65.5  65.2  64.9  61.2  55.92</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>24.6  35.1  27.4  27.7  26.3  28.1  25.8  26.7  25.9  24.2</td>
</tr>
<tr>
<td>Other health impairments</td>
<td>37.4  38.1  36.8  37.8  34.9  36.3  35.1  36.1  32.7  29.5</td>
</tr>
<tr>
<td>Autism</td>
<td>25.9  29.5  23.8  24.0  19.2  22.8  23.7  20.6  17.6  15.5</td>
</tr>
<tr>
<td>All disabilities</td>
<td>45.1  47   46.8  45.9  43.7  42.3  42.1  40.9  37.6  33.6</td>
</tr>
</tbody>
</table>


### TABLE 4

<table>
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<tr>
<th>Disability</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific learning disabilities</td>
<td>49.1  47.7  48.2  48.8  51.0  51.9  51.6  53.7  56.9  57.4</td>
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<tr>
<td>Speech/language impairments</td>
<td>42.9  41.7  42.2  44.8  48.1  51.2  53.2  52.7  55.7  59.2</td>
</tr>
<tr>
<td>Mental retardation</td>
<td>35.0  33.8  34.0  33.0  34.3  36.0  34.4  35.0  37.8  36.9</td>
</tr>
<tr>
<td>Emotional disturbance</td>
<td>27.0  26.0  25.1  25.9  27.4  29.2  28.6  29.1  32.1  35.4</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>36.1  31.4  35.3  35.4  39.0  41.0  42.3  41.5  45.2  45.3</td>
</tr>
<tr>
<td>Other health impairments</td>
<td>54.6  52.6  53.0  53.1  56.8  55.0  56.5  56.2  59.2  59.0</td>
</tr>
<tr>
<td>Autism</td>
<td>33.4  35.3  36.4  35.9  38.7  40.5  40.8  42.0  51.1  50.5</td>
</tr>
<tr>
<td>All disabilities</td>
<td>43.5  42.1  42.4  43.0  45.3  46.5  46.1  47.7  51.1  51.9</td>
</tr>
</tbody>
</table>

known to continue”, certainly suggestive of school dropout.

The NLTS-2 report (Wagner et al., 2005) provides an extended picture of the transition process for students with ID. Wagner et al. gathered data at different points in time from students, parents/guardians, and school personnel. Table 5 summarizes some of the major findings of the study in relation to students with intellectual disabilities (referred to as “mentally retarded” for preparing them to achieve their transition goals.

<table>
<thead>
<tr>
<th>Area</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Transition Services | • Many students (60%) had transition planning begun by age 14  
• 48.7% of the students did not provide input in discussing their transition plans  
• Very few individuals (3.3%) took a leadership role during the transition process  
• General educators’ involvement in transition process was minimal  
• Few individuals (9.8%) chose postsecondary education as a transition goal  
• 51.4% of the students chose living independently as a transition goal  
• 75.8% received instruction specifically focused on transition-related topics  
• The school program provided for most students (79.5%) was identified as “very or fairly well suited” for preparing them to achieve their transition goals |

| Table 5 Summary of NLTS-2 Findings: Students with Intellectual Disabilities |

<table>
<thead>
<tr>
<th>Area</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes Area:</td>
<td>Percentage</td>
</tr>
<tr>
<td>Postsecondary School Enrollment:</td>
<td></td>
</tr>
<tr>
<td>○ any postsecondary school</td>
<td>15.4</td>
</tr>
<tr>
<td>○ postsecondary vocational, business, or technical school</td>
<td>11.0</td>
</tr>
<tr>
<td>○ 2-year/community college</td>
<td>5.1</td>
</tr>
<tr>
<td>Current Employment</td>
<td>24.8</td>
</tr>
<tr>
<td>Living Arrangements</td>
<td></td>
</tr>
<tr>
<td>○ with parents</td>
<td>72.2</td>
</tr>
<tr>
<td>○ on own, with spouse, roommate, or in college dorm</td>
<td>16.3</td>
</tr>
<tr>
<td>Post-school Independence: Have a...</td>
<td></td>
</tr>
<tr>
<td>○ driver’s license/permit</td>
<td>20.7</td>
</tr>
<tr>
<td>○ checking account</td>
<td>10.1</td>
</tr>
<tr>
<td>○ charge account or credit card</td>
<td>6.9</td>
</tr>
<tr>
<td>Leisure Time:</td>
<td></td>
</tr>
<tr>
<td>○ watching TV/videos</td>
<td>41.0</td>
</tr>
<tr>
<td>○ using a computer</td>
<td>13.5</td>
</tr>
<tr>
<td>○ listening to music</td>
<td>18.7</td>
</tr>
<tr>
<td>○ doing hobbies, reading for pleasure</td>
<td>4.7</td>
</tr>
<tr>
<td>○ talking on the phone with friends</td>
<td>9.2</td>
</tr>
<tr>
<td>○ playing sports</td>
<td>16.3</td>
</tr>
<tr>
<td>Friendship Interactions: in past year, saw friends outside of school or work at least weekly</td>
<td>46.3</td>
</tr>
<tr>
<td>○ percentage communicating by computer at least daily</td>
<td>21.9</td>
</tr>
<tr>
<td>Participation in Community Activities: in the past year, took part in...</td>
<td></td>
</tr>
<tr>
<td>○ community group (e.g. sports team, club, religious group)</td>
<td>23.8</td>
</tr>
<tr>
<td>○ volunteer or community service activity</td>
<td>22.7</td>
</tr>
</tbody>
</table>

perception of their child’s functional skills. Table 6 lists these perceptions of parents across disability categories. The table provides a picture of five important areas: self-help skills, functional cognitive skills (e.g., making change), social skills, everyday communication, and health. From examining these data, it is evident that young adults with intellectual disabilities continue to face major challenges in dealing with the demands of everyday life in the community. Particularly notable are the fact that a relatively low percentage of individuals were rated “high” on functional cognitive skills that are essential to everyday life, few individuals were given a rating of “high” and a much larger number of individuals were rated “low” on social skills, and a sizable percentage were noted as experiencing difficulties in communicating effectively with others.

Current transition practices have resulted in a more systematic approach to assessing the needs of students. Increased attention also has been given to improving the self-determination skills of students with intellectual disabilities in recent years and instilling the value of student-centered planning. IDEA 2004 introduced the requirement that students be provided a summary of performance when they exit school. When used to advantage, this document has become a valuable resource for students and families as they take on the challenges of a postsecondary world. More programs are also being developed for students with intellectual disabilities in postsecondary education, often as dual enrollment programs (Hart, Zimbrich, & Parker, 2005).

**Future Patterns**

The IDEA mandate for transition planning certainly is likely to continue to be emphasized in the future. The most important issue will be the quality of the transition services that students and their families receive. Wagner et al. (2005) highlighted these key areas related to transition:

- Identifying and implementing evidence-based transition practices
- Instituting techniques for starting the transition process earlier in a student’s school career, such as through a number of informal procedures
- Empowering students so that they are more involved in their transition process and are able to advocate for themselves when school is completed
- Increasing efforts to empower parents/guardians by providing them with critical information about the transition process and various aspects what to expect when school is finished for their sons and daughters
- Being vigilant to cultural and family values
- Increasing opportunities for students with intellectual disabilities in terms of further

### TABLE 6

**Functional Skills of Out-of-School Youth, by Selected Disability Category**

<table>
<thead>
<tr>
<th></th>
<th>Learning Disability</th>
<th>Mental Retardation</th>
<th>Emotional Disturbance</th>
<th>Autism</th>
<th>Multiple Disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percentage rated by parents “high” on:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-care skills</td>
<td>98.5</td>
<td>84.2</td>
<td>97.5</td>
<td>66.0</td>
<td>56.3</td>
</tr>
<tr>
<td>Functional cognitive skills</td>
<td>80.4</td>
<td>42.3</td>
<td>83.6</td>
<td>72.2</td>
<td>44.5</td>
</tr>
<tr>
<td><strong>Percentage with social skills rated:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>19.1</td>
<td>7.3</td>
<td>5.4</td>
<td>3.1</td>
<td>17.7</td>
</tr>
<tr>
<td>Low</td>
<td>17.4</td>
<td>26.0</td>
<td>45.8</td>
<td>28.1</td>
<td>25.9</td>
</tr>
<tr>
<td><strong>Percentage with health reported to be:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>41.2</td>
<td>30.4</td>
<td>36.0</td>
<td>47.0</td>
<td>27.3</td>
</tr>
<tr>
<td>Fair or poor</td>
<td>8.1</td>
<td>12.1</td>
<td>13.5</td>
<td>5.9</td>
<td>18.5</td>
</tr>
</tbody>
</table>

education and training, especially in post-secondary institutions

As Katsiyannis, Zhang, Woodruff, and Dixon (2005) noted, research is needed “to examine the link between the transition process and specific post-school outcomes” (p. 115). Moreover, transition professionals need to validate many of the transition practices that are used in schools today and develop sound practices that school personnel can use effectively and efficiently.

Discussion

The purpose of this article has been to provide an analysis of trends related to the selected aspects of the education of students with intellectual disabilities, with a focus on mild disabilities. Certain summative observations appear warranted. First, there is a modest trend away from the term mental retardation and toward intellectual disabilities, which we anticipate will accelerate in the coming years. Second, there is inconsistent use of more recent definitions of mental retardation by state departments of education and a continued reliance on the 25 year old definition developed by Grossman and his colleagues (1983). If extrapolation can be made from Polloway et al. (2009), there does seem to be a limited trend toward the adoption of more contemporary definitions.

Third, there remains tremendous variance across states in terms of students identified as mentally retarded. In general, it can be concluded that a number of states appear to be serving virtually no students who might be considered mildly intellectually disabled (based on these prevalence data) while a number of other states serve a substantial percentage of their school population (1.5% or greater) under this label and therefore likely a substantial number of students with mild intellectual disabilities.

Fourth, there is also significant variance in terms of the educational environments in which these students are educated. The practices across states are widely variant in terms of the apparent commitment to inclusive vs. pull-out services for students with mild intellectual disabilities. Fifth, the data on school dropout rates, graduation rates, and adult outcomes provide limited reason for confidence that these students are well-positioned for successful transition.

Beyond these summative statements, there are a number of issues that emerge directly and indirectly from the existing data on mild ID. First, a reading of trends in terms of state practices certainly underscores the fact that changes in the philosophies of professional organizations and resulting revisions in terminology and definitional manuals do not automatically result in rapid changes within state policies. Thus, there continues to be a significant gap between contemporary thinking within the field of intellectual disabilities and national and state legislation governing educational programs. As a consequence, it becomes difficult to assess the impact of such recommended changes on practices until a significant number of years have elapsed. Nevertheless, it can be posited that advocacy for such changes cannot be limited to professional organizational documents and rather must be accompanied by concerted efforts at the national and state level if changes are to occur. At the same time, it remains to be demonstrated if key changes, such as in terminology, will have a positive impact on the education and lives of students with mild intellectual disabilities.

A second consideration has to do with public school outcomes for individuals who have substantial learning challenges in the schools but are not identified within the population of 0.90% of students nationally identified as intellectually disabled. If we can accept the assumption that the additional perhaps 1% of the school population might have, at other times in history, been identified as mild ID, we might then conclude that there remain a substantial number of students who are likely to be what MacMillan and Borthwick (1980) once referred to as “marginal achievers” in the schools, including those that Shaw (2008) identified as “students with diverse learning needs” or “borderline intellectual functioning”. Advances in general education instructional strategies within inclusive settings will be critical for these students as well as those formally identified.

Third, the apparent plateau in the educational environments in which students with intellectual disabilities are being served should
cause professionals to look more carefully at the challenges associated with successful inclusive educational practices. While the higher incidence of learning disabilities has generated significant attention to such questions, there has been far less attention given to this unique population, and particularly to individuals with mild ID once they reach the secondary school level (Bouck, 2004, 2007). A key aspect of this resolution will be the effectiveness with which school programs are able to address the state standards consistent with the general education curriculum while also providing for functional instruction that prepares individuals for successful adult lives (Hoover & Patton, 2005).

Fourth, with graduation rates low for individuals with ID and with dropout rates relatively high, there remains need for an increased commitment to retention in school and successful completion. Benz, Lindstrom, and Yobanoff (2000) concluded that the key components that result in improved school outcomes (and, thus presumably, in enhanced adult outcomes) include direct support within general education programs, paid work experiences that relate to specific career interests, instruction in functional academic areas along with vocational education and related transition content, and the completion of transition goals that are consistent with student preferences and choices.

While persons with mild intellectual disabilities have been described as members of a “forgotten generation” (Tymchuk et al., 2001), they warrant the continued attention of educators. An emphasis on research related to this population and the further development of validated, successful educational practices remains paramount.

References


ID Practices / 67


An Examination of the Effects of a Social Communication Intervention on the Play Behaviors of Children with Autism Spectrum Disorder

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DePaul University

Lesley A. Craig-Unkefer  
Middle Tennessee State University

Abstract: This study examined the effect of a social-communication intervention on the play behaviors of children with autism. Six children between the ages of five and eight participated in this study that employed a single-subject, multiple baseline design. Children recruited from an urban Midwestern public school system participated in an intervention that utilized a plan-play-report format. A post hoc analysis was conducted to determine the effect of the intervention on peer communication, play behaviors and joint attention to determine if these behaviors were impacted by the intervention even though they were not specifically targeted. Results indicated that children demonstrate increases in their rates of the above behaviors. Discussion of results in light of known research in autism is highlighted.

Play is a medium through which children first begin to explore their environment. Babies explore by grabbing and mouthing toys and as children grow and develop, they begin to imitate what they see around them (Berk, 2000). These early skills lead children to the all important development of play. Play is means through which children develop language, social interaction and even literacy skills (Bodrova & Leong, 2003; Guralnick & Neville, 1997). It is a means for children to learn about the customs and cultures that surround them (Goncu, 1999) and it helps them to make sense of what they see in their environment and allows them to reenact scenes from their everyday life that may be confusing (Alvarez & Philips, 1998). Most importantly, play provides a context through which children can practice interaction skills.

Children with autism have difficulty with play behaviors. Lack of make-believe or social-imitative play is one of the diagnostic criteria listed in the DSM-IV (American Psychiatric Association, 1994). Characteristically, children with autism play in unusual ways. They may prefer to play in isolation or to use objects in a manner in which they were not intended. For example, a child with autism may take a plastic dinosaur and flip it back and forth in front of his face, manipulating the tail rather than having the dinosaur chase other animals or eat vegetation from a plastic tree. There are several theories as to why play and social interactions are difficult for children with autism including problems with theory of mind, interfering stereotypes, and low language skills (Baker, Koegel, & Koegel, 1998; Baron-Cohen, Baldwin, & Crowson, 1997; Lord & Pickles, 1996).

Although children with autism do engage in play, spontaneous pretend play seems to be lacking and children instead may engage what is referred to as sensorimotor play (Libby, Powell, Messer & Jordan, 1998). This type of play, as opposed to play where children use objects as they are intended (functional play), is seen when children use toys in a way that disregards their function and is often repetitive in nature (Roger, Cook, & Meryl, 2005). For example, a child may take building blocks or cars and bang them together or line them up end to end instead of building things or racing the cars around the floor. Libby et al. (1998) suggest that the reason children with autism produce less functional play than typically developing children may be because they
lack the underlying categorical and conceptual knowledge that makes these toys have a function in the first place. Therefore, it would make sense that their immature play would mirror that of an infant who has yet to build concepts with which to interact with the toys in a more sophisticated way.

Play and language are not isolated skills. Language levels and social communicative behaviors in children with autism are linked in several ways. Lord and Pickles (1996) found that children with autism who demonstrated very little language usage also had more pronounced deficits in play and social behaviors than children with autism who used phrases (here defined as three word utterances) or had a greater command of language use. These authors also found children with autism frequently displayed some of the hallmarks of the disorder regardless of language use. That is, problems with eye gaze, facial expression and attending were visible in children regardless of language level or use. These findings are consistent with other studies of this type.

Another reason children with autism may have difficulty with social interactions and play could result from the difficulty involved in simultaneously demonstrating two novel skills. In a study comparing the play behaviors of preschool children with and without pervasive developmental disorders, Pierce-Jordan and Lifter (2005) found that when children were engaged in emerging play or trying out new play skills that were difficult for them, they were less likely to be socially interactive with their peers. When the children were engaged in social interaction in these situations, the interactions were not likely to be coordinated. This finding was evident for all children in the study supporting the idea that combining social interaction and coordinating play may be too taxing when both are areas of need. Children may need to become competent in one area prior to development in the other.

Despite the aforementioned concerns, children with autism can learn needed social and play skills through peer-mediated sessions (Sawyer, Luiselli, Ricciardi, & Gower, 2005), typical peer models (Garfinkle & Schwartz, 2002), adult priming (Zanoli & Daggett, 1998), video modeling, and script fading (Sarokoff, Taylor, & Poulson, 2001) techniques.

Given the relationship between play and language in children with autism, this study examined whether an intervention which successfully increased peer-directed commenting, language complexity and diversity in dyads of children with autism (Loncola & Craig-Unkefer, 2005) also had an effect on play behaviors; specifically joint attention, talk with their play partner, and different developmental levels of play. This study is unique because two children with autism were paired together and provided the intervention at the same time. The following research questions were addressed in this inquiry: 1) What effect does a social communication intervention have on joint attention? 2) Were there changes in the amount of peer talk from baseline to intervention across participants? 3) What types of play behaviors did the participants engage in and were more interactive play behaviors observed from baseline to intervention?

Method

Participants

Six children between the ages of five and eight years-old participated in this study. To determine eligibility for participation, an initial screening assessment was completed by the classroom teachers. In order to participate in the study, a child needed to be between the ages of five- and eight-years-old, have a diagnosis of mild/moderate autism, and passed the Chicago Public Schools annual hearing assessment. Once a child met the initial criteria, they were further assessed on language and adaptive behavior functioning. The three criteria relative to language and adaptive behavior included: 1) a score of at least one standard deviation (SD) below the mean on measures of expressive and receptive vocabulary based on the Peabody Picture Vocabulary Test–III [PPVT-III] (Dunn & Dunn, 1997) and the Expressive Vocabulary Test [EVT] (Williams, 1997); 2) a score within two stan-
standard deviations of the mean innonverbal cognitive ability as measured by the Leiter International Performance Scale-Revised (Roid & Miller, 1995); and 3) a deficit in at least one subscale measured by the Vineland Adaptive Behavior Scales: Classroom Edition (Sparrow, Balla, & Cicchetti, 1985).

Children were excluded from the study if they met one or more of the following exclusion criteria: 1) a diagnosed hearing impairment, 2) a diagnosis of severe/profound autism, 3) a primary diagnosis other than autism, 4) a secondary diagnosis of mental retardation, serious emotional disturbance, hearing loss, or low vision, 5) were under the age of five years, one month or over the age of eight years, 1 month, or 6) English was not their primary language. No participants were excluded based solely on sex, race, or ethnic group. Characteristics of the participants are described below.

Child A1 was a 6-year-old Hispanic girl with very low language and social skills and an average IQ. On the PPVT, her age equivalent was below 1-9 and on the EVT she scored an age equivalent of 2-1. She scored 2 SDs below the mean on the communication, daily living, and socialization sections of the Vineland Adaptive Behavior Scale. Her brief IQ as measured by the Leiter yielded a score of 85. Both Spanish and English were spoken in the child’s home and the teacher indicated that Child A1 understood and spoke both languages. During classroom activities, Child A1 needed frequent redirection to attend to tasks. In free play activities she would approach other children and take desired toys, but did not interact with other children or use spoken language despite a large, single word vocabulary. Teacher reports indicated that the child only used spoken language when prompted or very upset. Child A1 regularly attempted to run from the classroom and the child’s classroom door was gated at all times to prevent her from running from the room. She was included with the regular education kindergarten for physical education and library.

Child B1 was a 6-year-old Arabic male with below average language scores, deficits in daily living skills, and an average IQ. On the PPVT, her age equivalent was below 1-9 and on the EVT she scored an age equivalent of 2-1. She scored 2 SDs below the mean on the communication, daily living, and socialization sections of the Vineland Adaptive Behavior Scale. Her brief IQ as measured by the Leiter yielded a score of 85. Both Spanish and English were spoken in the child’s home and the teacher indicated that Child A1 understood and spoke both languages. During classroom activities, Child A1 needed frequent redirection to attend to tasks. In free play activities she would approach other children and take desired toys, but did not interact with other children or use spoken language despite a large, single word vocabulary. Teacher reports indicated that the child only used spoken language when prompted or very upset. Child A1 regularly attempted to run from the classroom and the child’s classroom door was gated at all times to prevent her from running from the room. She was included with the regular education kindergarten for physical education and library.

Child A2 was a 6-year-old Caucasian male with low language skills, an average IQ, and deficits in adaptive behavior. In tests of Expressive and Receptive vocabulary, Child A2 received age equivalent scores of below 1-9 and 2-8 respectively. According to the Vineland, adaptive behavior deficits were noted in areas of communication, daily living, and socialization, and brief IQ was measured at 80. English was the only language Child A1 utilized. One and two word utterances were used to get his needs met; however, he did not use language in social situations with children other than as an initial greeting. Child A2’s spent the morning in a self-contained class for students with autism and the afternoon he was included in a regular education kindergarten. He preferred to play with adults and his communication skills with adults were perceived as better than with children.

Child B1 was a 6-year-old Arabic male with below average language scores, deficits in daily living skills, and an average IQ. His scores on the PPVT and the EVT were the highest of all study participants with age equivalent of 3-3 and 5-1 respectively. Results of the Vineland assessment indicated that he had a score that was 2 SDs below the mean in only one area; daily living skills. Child B1’s brief IQ was measured at 77. Of the six children included in the study, Child B1 was the most competent communicator. He was fluent in both English and Arabic and despite low language scores, communicated well in both English and Arabic. Child B2 spent the morning in a self-contained class for students with autism and was included in the regular education kindergarten in the afternoon. He consistently used language and frequently kept a running commentary on what was going on around him, often talking over others and ignoring their responses to questions. He had problems with syntax and made most statements into questions by adding, “okay?” at the end.

Child B2 was an English speaking 8-year-old African American male who had an undisclosed medical condition that affected his gross and fine motor skills and confined him to a wheelchair. Testing revealed age equivalents of 3-1 and 4-5 on the PPVT and EVT. Scores on the Vineland were 2 SDs below the mean in communication, daily living skills, and socialization while his brief IQ as measure by the Leiter was 73. Child B2 was educated in a full day, self-contained class for students with autism and was included with his first grade classmates for physical education and music. He would have been included for Library and
Computer, but these classes were located on the second floor of his school building which was not wheelchair accessible. Despite low language scores, Child B2 had many words and could communicate in full sentences when prompted. He would use as few words as he could, unless prompted for more, and phrased most spontaneous statements in the form of a question. For example, at snack time he would say “more cookies” and when he the teacher did not respond, he would say “I want more cookies, please.” When referring to a picture he drew, Child B2 would ask questions such as, “Is this a dragon?” rather than stating “This is a dragon.” Finally, Child B2 had many unintelligible verbal stereotypes and would often revert to clicking and squealing noises.

Child C1 was a 7-year-old Caucasian male. He spoke English at school and Polish at home and both of his parents were fluent in English. Child C1 had low language scores with age equivalents of 3-0 and 2-7 on the PPVT and the EVT, deficits in all areas of adaptive behavior, and an average IQ measured at 87. He was educated in a full day, self-contained autism classroom and was included with the first grade for physical education and music. Child C2 was heavily dependent on visual schedules for working and transitions and although Child C1 used language infrequently in social exchanges, he talked his way through all of the steps on his visual schedules. He also gave himself verbal reminders such as, “snack is finished, time for reading.” Child C1’s spontaneous language was very repetitive and repeatedly used a few scripted phrases. He seemed very interested in playing with other children, but did not seem to know what to communicate to peers.

Child C2 was a 7-year-old boy of Hispanic descent who spoke only English. He had low language scores, deficits in adaptive behavior, and a low-average IQ. On the PPVT, Child C2 had an age equivalent of 2-5 and the EVT his age-equivalent was 3-7. He displayed deficits in areas of communication, daily living, and socialization on the Vineland and his brief IQ was 70. He was placed in a full day, self-contained autism classroom and was included with the regular education first grade for Library, Physical Education, Music, and Computer. Child C2 had a full time assistant assigned to him and, prior to the beginning of this study, Child C2 had been removed from school for two weeks while his parents and doctor attempted to get his aggressive behavior under control. Child C2 used language only when prompted and typically used only one word utterances. He had little interest in socializing with peers or adults and if left unattended, would sit quietly and look at books for hours. All children in the study received related services for Speech and Language and Social Work.

Children participants were paired into three dyads; one mixed gender dyad and two same gender dyads. As autism affects more boys than girls, it was not possible to recruit enough girls for three mixed gender dyads and no child was excluded on the basis of gender. Children were paired according to scores on the PPVT and EVT and according to schedule availability. An attempt was made to pair a child with lower language scores and a child with slightly higher language scores, although all study participants showed significant delays in expressive and receptive vocabulary.

Setting

The study was conducted at a public elementary school located in a large Midwestern city. The school’s population consisted of preschool through 8th grade children and included programs for both general education and special education students. Special education programs at the school served students with visual impairments, children with physical disabilities, and housed self-contained programs for students with autism. Demographic information for the school indicates the racial/ethnic breakdown of the school was 53.4% Caucasian, 27% Hispanic, 10.5% Asian/Pacific Islander, 5.4% African American, and 3.6% Native American. Forty-six percent of the students enrolled at the school at the time of the study had low-income status and 15.3% were considered Limited English Proficient (LEP) and qualified for transitional bilingual programs.

Baseline and Intervention sessions occurred in a sectioned off area of a large hallway in the school. Two accordion style dividers were constructed each measuring 8 feet long by 4 feet high. These dividers were placed in an
L-shape against a wall sectioning off a “U” shaped space that measured 8 feet by 8 feet enclosed on three sides with the camera and tripod at the open end of the U. The area contained a table and two chairs.

**Materials**

Materials used in the baseline and intervention sessions were representative of play materials commonly found in classrooms of young children and consisted of dramatic play items including themes (e.g., grocery store, kitchen) and role playing materials (e.g., doctor, veterinarian). Manipulative items such as blocks and cars were also used. Materials were grouped into seven different play themes: Doctor, Vet/Zoo, Construction, Grocery Store, Farm, Housekeeping/Kitchen, and Airport. The doctor play theme consisted of white shirts, play doctor kits, an x-ray machine, ace bandages, and telephones. The vet/zoo theme had stuffed animals, blocks for building the zoo walls, a veterinarian kit, and assorted vegetables for feeding the animals. When playing with the construction theme, children had access to plastic construction hats, a plastic tool kit, plastic blocks, screws, bolts, dump trucks and assorted dolls. Grocery store items were comprised of a cash register, wallets, pretend money, plastic and boxed food, grocery cart, and McDonald’s® play food. In the Farm theme, children could play with a Fischer Price® barn, plastic vegetables, straw hats and bandanas. Housekeeping/kitchen, the most popular theme with the children, had a plastic sink and stove, plastic dishes, utensils, and cups, a microwave, assorted foods, a vacuum, feather dusters, and phones. Finally, the airport theme contained an airport block set, airplanes, helicopters, trucks, and emergency vehicles. All themes except the farm and veterinarian contained assorted dolls.

**Experimental Design**

This study utilized a multiple baseline design to determine the result of an intervention designed to promote social communication skills in young children with autism (Kazdin, 1982). Each dyad in the study remained in baseline until a stable or decreasing baseline was demonstrated for at least five sessions. The first dyad with a stable baseline was identified as Dyad One and the other two dyads remained in baseline until a clear treatment effect was visible for the second dyad, identified as Dyad 2, and so on. Following the multiple baseline design discussed above, the intervention was then introduced to Dyad Two and once effects were evident in the second dyad, the intervention was introduced to the third. The two experimental conditions for this study were baseline and intervention. All children received at least five baseline sessions and between 10 and 12 intervention sessions.

*Baseline.* Baseline sessions were conducted three times per week. During the baseline sessions, 10 minutes of play were videotaped and subsequently coded. The Interventionist brought the two children in each dyad to the area designated for project use. The Interventionist told the children to play with the toys arranged on the carpeted floor or table. The toys consisted of a play theme randomly selected from those discussed above and rotated throughout the baseline sessions. One play theme was randomly chosen to start the baseline sessions and then taken out of the next random selection. Selection continued in this manner until all play themes had been used once. All play themes had at least two rotations in the selected order. During Intervention, some children began to request certain play themes and the order was dropped. In the baseline sessions, the Interventionist did not prompt language or prohibit any behaviors except those that were harmful to the peers or materials (e.g. mouthing materials, hitting lockers).

*Intervention.* An intervention that incorporated the cognitive-social learning model (Ladd & Mize, 1983) was used as a means to promote social communication skills for children with autism. The intervention had three components: 1) a play organizer session, 2) a ten minute play session, and 3) a review session. The first component, the advanced play organizer, lasted approximately five minutes. During this component, the Interventionist described the toys, how to play with toys, how to share toys, and how to get your partner’s attention specific to a play theme designated for the session. Children were encouraged to contribute to this discussion. The same play
themes used in the baseline sessions were used in the intervention sessions.

The second component was a 10-minute play session. During this component, the children played with the toys and materials provided. The Interventionist sat away from the play area, watching the children, and used verbal redirects and reflective statements to sustain and maintain the children's play interaction. The Interventionist did not prompt or comment while the dyad was engaged in an interaction, but redirected children when they were engaged in inappropriate or isolating behaviors. The Interventionist determined the types of redirects to use based on the degree of support needed by the child and the particular play situation. During this phase, the Interventionist also made reflective statements and comments about the toys, the themes, or the children's play. Reflective statements did not specifically prompt child actions or model language. The purpose of reflective statements was to keep the children focused on the play theme by suggesting an appropriate activity within the play theme (e.g. “The baby wants to be fed.”).

The third component of the intervention, the review session, took place immediately following the play session and lasted approximately 5 minutes. In this phase of the intervention, the Interventionist reentered the play area and sat near the children. The Interventionist and the children discussed the play that occurred in the preceding component including what the children had played with and what scenarios they had enacted. If the children were not forthcoming with specifics, the Interventionist reviewed what was done, thanked the children for participation, and gave verbal praise for language and play skills. A complete description of the intervention is provided Loncola and Craig-Unkefer (2005).

**Interventionist.** One Interventionist collected all baseline, and intervention data. The Interventionist was a doctoral candidate in Special Education. She had a master’s degree in Special Education and six years experience teaching young children with autism. The Interventionist trained for this study according to the Peer Language and Behavior Code: Manual and Coding Protocol (Craig-Unkefer, Williams, & Kaiser, 1998). First the interventionist transcribed at least eight minutes of previously videotaped interaction using the Systematic Analysis of Language Transcripts (SALT: Miller & Chapman, 2000) as the transcription program. Next all transcripts were verified for accuracy. The transcripts were then coded and at least one code was assigned to the end of each line of a word or phrase. Finally a summary of the coded data was provided for each speaker. The interventionist also reviewed tapes of a previous study (Craig-Unkefer & Kaiser, 2002) and discussed technique with the first author.

**Data collection.** Baseline and intervention sessions were videotaped by the Interventionist using a Sony DCR-TRV17 digital camcorder. These sessions were then transferred to DVD for coding. In order to determine if there were changes across measures as a result of the intervention, the last three baseline and intervention sessions were coded utilizing the criteria below. This procedure is consistent with those established by Craig-Unkefer and Kaiser (2003).

**Measures**

Different types of children’s play were coded according to the Peer Play Code (Craig-Unkefer et al., 1998). The Play Code was developed from Parten (1932) and Rubin (1989). Six categories of play were observed: aggression, solitary, onlooker, parallel play, associative play, and cooperative play. The coding categories can be seen in Table 1. A graduate student in Educational Psychology completed all of the coding. Coding was completed with pen and paper and the coder watched 15-s of video and then recorded for 5-s. Categories were assigned when the coder noted 8-s of continuous play behavior thus excluding the possibility that more than one type of play could be observed in any one interval. Each interval was also coded for peer talk if the child talked to their peer for at least 10-s of the interval. Given the nature of autism, codes were modified to take into account both echolalia, stimming and singing. Echolalia and singing were coded as no peer talk and stimming behaviors were coded as solitary play.

In addition, the intervals that children attended to their play partner were also coded. Joint attention was coded when both peers were observing or attention is focused in same
TABLE 1
Coding definitions for Play Behaviors

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Aggression</td>
<td>Aggression refers to non playful physical with another child. It is almost antagonistic in nature. Acts of aggression include hitting, kicking, and grabbing.</td>
</tr>
<tr>
<td>Solitary</td>
<td>The child is within the physical vicinity of peer, the child does not interact with the peer for at least 8 seconds. Solitary play is coded when the child is isolated from the play area or wanders without noticing the peer. Code solitary when the child is obtaining visual or auditory information form an object (physical manipulation of component of a toy—rolling a wheel on a car).</td>
</tr>
<tr>
<td>Onlooker</td>
<td>The child is watching the peer for at least 10 seconds but does not engage in play or interactive activity. The child may talk to the peer (offer suggestions or asking questions) but does not overtly enter into the play activity of the peer. In this play category the child is definitely observing the peer.</td>
</tr>
<tr>
<td>Parallel Play</td>
<td>The child plays independently but with toys that will bring him or her closer to the peer. The child plays beside but not with the peer. The child plays with toys as he/she sees fit, and does not seem to influence or modify the activity of the peer. There is no attempt by the child to control the activity of the peer.</td>
</tr>
<tr>
<td>Associate Play</td>
<td>The child plays with the peer. There is an exchange of materials. A conversational; exchange occurs about common activity which has the potential to bring the other peer into the activity, but each child engages as he/she wishes. There is no division of labor and no organization of the activity towards the development or creation of a mutually contrived project or play theme.</td>
</tr>
<tr>
<td>Cooperative Play</td>
<td>Both children engage in an organized and purposeful activity. The child directs the activities of other peers the play interaction for some purpose necessitating a division of labor and an organization of roles. The play is goal driven so that efforts of one peer are supplemented by those of the other peer.</td>
</tr>
<tr>
<td>Peer Talk</td>
<td>Child is talking for at least 10 seconds of the interval to their peer. Peer talk does not include echolalic behavior or singing.</td>
</tr>
<tr>
<td>Joint Attention</td>
<td>Both peers are observing the same object or attention is focused in the same direction for at least 5 seconds. The commencement of joint attention starts after a peer has requested the attention of the other peer either by pointing, showing or a verbal comment.</td>
</tr>
</tbody>
</table>

Interobserver Agreement of Play Behaviors

Reliability data were collected on 20% of the play sessions using the Peer Play Code (Parten, 1932; Rubin, 1989). The sessions were independently viewed and coded by the second author. Interobserver reliability was assessed using an exact agreement formula in...
which the total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. Reliability was assessed separately for play and joint attention. The overall IOA for peer play was 90%. The range for all sessions was 70–98%. The overall reliability for joint attention was 84% with a range of 65–97%.

**Amount of Joint Attention between Peers**

The mean percentage of intervals of joint attention displayed by dyads is presented in Figure 1. Dyad Two attended to each other more than their peers in the other dyads having the greatest number of intervals of joint attention in the baseline with approximately 5% increase in the average number of intervals from baseline to intervention. Dyad Three also demonstrated gains from baseline to intervention with an average 10% of the intervals during baseline to 15% of the intervals during intervention. Dyad One remained stable across phases with a minimal increase of 1% on average of joint attending from baseline to intervention.

**Intervals of Peer Talk**

The mean percentage of peer talk is displayed in Figure 2. All dyads had increases from baseline to intervention. Dyad Two had the greatest gains with an average of 50% of the intervals where the children engaged in talk during baseline to 75% of the intervals in the intervention phase. Dyad Two averaged 7% of the intervals in peer talk with increases to an average of 24% during the intervention phase. Dyad One averaged 20% of their sessions in peer talk during the baseline phase. During the intervention phase, they average 39% of intervals of peer talk.

**Peer Play**

Individual play behaviors as well as categories of play behaviors are reported. Four of the six children (A1, A2, C1, C2) increased the percentage of intervals they spent in solitary or onlooker play from baseline to intervention. Only the two children in Dyad Two decreased solitary and onlooker behaviors from baseline to intervention. Given the increases in solitary and onlooker behaviors for the four children, there were also decreases in parallel and associative play behaviors from baseline to intervention. Only the children in Dyad Two (B1 and B2) had a mean increase of 3.8 mean intervals to 6.6 mean intervals engaged in more complex play.

To characterize the play of the dyads beyond discrete behaviors, the six individual play behaviors were grouped into three play classes. Isolate play is the combination of aggressive and solitary play. Independent play is a combination of onlooker and parallel play. Interactive play is a combination of cooperative and associative play. Table 2 displays the mean percentage of intervals of these play categories for the three dyads. Dyad Two decreased in isolate play and increased in independent play primarily with minimal increases in interactive play from baseline to intervention. Dyad Three decreased in the average number of intervals of isolate play and conversely increased in independent play with no
occurrence of interactive play in either phase. Dyad One increased in their isolate play behaviors and decreased in their independent play behaviors on average from baseline to intervention. There was no change in interactive play across the phases.

Discussion

The purpose of this study was to determine how an intervention to promote social communication skills with children with Autism Spectrum Disorder changed the play skills of the participants. In order to determine if the intervention did affect the play of the participants, the amount of joint attention, talk, and specific play behaviors were measured. Results from this study indicated that a social communication intervention can increase joint attention in children with autism. Children increased the amount of intervals they engaged in peer talk. Increases in interactive play were also seen from baseline to intervention.

One of the primary characteristics of this population is the absence of joint attending to others. Given the relationship between joint attention and expressive language development (Mundy et al., 1990), the need to promote this skill increases the likelihood that language development may occur. For the children in this study there were increases in joint attending, particularly for Dyads Two and Three. Conversely, there were increases in peer talk for all three dyads. Changes in play behaviors were also apparent.

Several conclusions can be drawn from the results of this investigation. First, the children in this study all engaged in joint attending. Two of the dyads (Dyads Two and Three) increased their levels of joint attending from baseline to intervention while one remained stable (Dyad One). Joint attention has been defined as the ability of two children to coordinate social activity and engage with another partner, and is often measured via responses to shifts in eye gaze and pointing (Dawson et al., 2002; Mundy et al., 1996). In this study, joint attention was coded when both children focused on the same object or activity for at least 5-s. The fact that all children displayed joint attending behaviors during baseline and increases in joint attending for two of the dyads occurred is notable, especially given that both children in the dyad were diagnosed with autism. Jones and Carr (2004), in an extensive review of the literature on joint attending, suggested that changes in joint attention will only be “modestly improved by relatively simple manipulations of social and play contexts.” (p. 17). The results of this study do support previous findings, but with an added dimension. While most changes in joint attention have been seen in adult directed interactions, the findings of the present study suggest

<table>
<thead>
<tr>
<th>Dyad</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
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<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td>Dyad 1</td>
<td>Isolate</td>
<td>89.9</td>
</tr>
<tr>
<td></td>
<td>Independent</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>Interactive</td>
<td>1</td>
</tr>
<tr>
<td>Dyad 2</td>
<td>Isolate</td>
<td>83.9</td>
</tr>
<tr>
<td></td>
<td>Independent</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>Interactive</td>
<td>2.9</td>
</tr>
<tr>
<td>Dyad 3</td>
<td>Isolate</td>
<td>95.5</td>
</tr>
<tr>
<td></td>
<td>Independent</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>Interactive</td>
<td>0</td>
</tr>
</tbody>
</table>
that these changes may also be observed in child-directed interactions even when both children have autism.

Changes in the amount of time children spent talking to each other were evident in all three dyads. These increases occurred across dyads and indicate that all children were more engaged in social conversation during the intervention period. While types of language use and skill level among the different children is not analyzed in this study, a previous study (Loncola & Craig-Unkefer, 2005) indicated that not all children conversed at the same level. Children in Dyads One and Three demonstrated very basic levels of conversation while children in Dyad Two had more advanced levels of conversation and the greatest diversity in word use. These differences may be helpful in understanding the data related to play behaviors and will be discussed momentarily.

All dyads displayed changes in the types of play they engaged in from baseline to intervention, though only one of the dyads (Dyad Two) displayed increases in more advanced and interactive play behaviors. Dyads One and Three displayed increases in more isolate play during the intervention. This information is best interpreted in light of the changes in language for the children as initially discussed in Loncola and Craig-Unkefer (2005).

Results from Loncola and Craig-Unkefer (2005) indicated that the intervention was successful in increasing social communicative behaviors such as commenting in all children. Further, increases were also seen in language complexity and diversity. The children in Dyads One and Three initially used the least amount of language, while the children in Dyad Two had more variation and used more complex language. A comparison of the results of both analyses revealed that during intervention sessions, the children in Dyads One and Three made gains in language, but increased the amount of isolated play. That is, they were talking to each other, but not playing together. Children in Dyad Two both increased the amount of language they used and were able to engage in more interactive play. The differences between the dyads may be explained by their language levels at the onset of the study. The children in Dyad Two were already relatively comfortable using language in social settings, thus they were able to simultaneously use language and engage in play. The children in Dyads One and Three may have concentrated on improving language and were not able to simultaneously use new language and engage in more interactive forms of play.

Results of a study conducted by Peirce-Jordan and Lifter (2005) substantiates this finding indicating that children with autism may have difficulty engaging in social and communicative actions at the same time because they compete for the same cognitive resources. A child who is learning language may not be able to also utilize higher levels of play. Likewise, a child engaging in more sophisticated play may not be able to use more sophisticated language during that play session. Given these findings, it is understandable that the children in Dyad Two might increase the amount of interactive play as they were learning new language. Play was not a drain on cognitive resources because they already had some skill in that area. On the other hand, the children in Dyads One and Three were not able to sustain more advanced levels of play because there cognitive resources may have been dedicated to absorbing and practicing new attention and language skills. These children reverted to a more comfortable level of isolate play as they used new language.

Another possible explanation for the increases in isolate play observed in Dyads One and Three is related to the coding scheme. The coding method may not have been sensitive enough to changes given the coding scheme. The coding method may not have been sensitive enough to changes given the coding scheme. Koegel, Werner, Vismara, and Koegel (2005) used 30 second intervals for analyzing play interactions between children with autism and typical peers. Extending the intervals from 15-s to 30-s may have produced different results. Additional time may have been needed to allow for the participants to gain momentum and sustain the play behavior.

Limitations

This study had several limitations related to time constraints, external validity and generalization of behavior change. Because the in-
tervention was conducted near the end of the academic year, there was not time to conduct a maintenance or generalization probe. Further one interventionist conducted all the sessions and though fidelity of treatment was performed, it is possible that there was something outside of the protocol and in the interventionist’s repertoire that contributed to the results. Finally, for the purposes of coding, joint attention was operationally defined as two children focused on the same object or activity for at least 5 s. Limitations in camera angle precluded the use of eye gaze or direct eye contact as a measure of joint attending which would have allowed for a more comprehensive look at this area. Additional detail on the limitations of this study, can be found in Loncola and Unkefer (2005).

**Conclusion**

This study contributes to the field in several unique ways. First, it establishes that, when paired together, children with autism can engage in social behaviors with minimal prompting. Second, this research indicates that promotion of social communication skills can also result in positive changes in other areas such as joint attention and play complexity. Third, the authors have identified an effective intervention technique that has multiple opportunities for children to practice skills, is peer mediated with intermittent adult support and occurs in a naturalistic environment. Finally, this study adheres to the Division for Early Childhood of the Council for Exceptional Children (DEC) recommended practices. Specifically, by employing single subject methodology, there was the opportunity to systematically individualize the intervention for each of the participants; taking into consideration a child’s current behavior and individualizing and adapting practices to meet the child’s changing needs (Wolery, 2000).

**References**


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Abstract: An archival study was conducted to document (a) types of challenging behavior, and (b) functional assessment outcomes, for a sample of persons with developmental disabilities who were referred to community-practicing behavior analysts for assessment and treatment of challenging behavior. Functional assessment reports, prepared by 17 behavior analysts, were obtained on 174 individuals who presented with total of 536 challenging behaviors that were assessed separately. The most frequent topographical class of behavior was physical aggression, followed by verbal aggression, noncompliance, property destruction, inappropriate verbal and social behavior, and self-injury. Functional assessment yielded a single hypothesized function for 53.2% of all behaviors, but multiple functions for 41.0%. Attention was the most commonly hypothesized function for most topographies of behavior. This finding may be attributable to sample characteristics, or to the use of informant-based functional assessment methods for a majority of sample cases.

Many people with developmental disabilities engage in one or more forms of challenging behavior, which has been defined as “destructive, harmful, disruptive or otherwise unacceptable behaviors that occur with sufficient frequency and/or severity to be of major concern” (Sigafoos, Arthur, & O’Reilly, 2003, p. 7). Prevalence estimates have varied widely (Bruininks, Olson, Larson, & Lakin, 1994). However, recent data from England (Emerson et al., 2001) and Norway (Holden & Gitlesen, 2006) indicate that the overall prevalence of challenging behavior may be 10 –15% among persons with developmental disabilities who reside primarily in community settings, as does the majority of this population in the United States (Prouty, Smith, & Lakin, 2006).

Behavioral techniques have long been applied successfully to the treatment of challenging behavior. A behavioral intervention is typically designed by a behavior analyst or other professional based on the outcome of a functional assessment. The goal of functional assessment is to identify environmental variables that contribute to the occurrence of challenging behavior, such that their influence may be minimized or removed. The primary focus of the assessment is generally on immediate antecedents and consequences of behavior. The outcome of the assessment thus typically includes an identification of one or more potential maintaining behavioral contingencies, which may be roughly classified as social-positive reinforcement, social-negative reinforcement, and nonsocial contingencies. A number of functional assessment techniques are available. Experimental functional analysis (Carr & Durand, 1985; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) involves the manipulation of antecedents or consequences of a particular target behavior. Descriptive as-
Assessment involves direct observation of naturally occurring antecedents and consequences of the target behavior (e.g., Freeman, Anderson, & Scotti, 2000; O’Neill et al., 1997), and informant-based methods can take the form of interviews (e.g., O’Neill et al., 1997) or rating scales (e.g., Durand & Crimmins, 1988).

Several researchers have published summaries of functional assessment outcomes across large numbers of clinical cases (Asmus et al., 2004; Derby et al., 1992; Iwata, Pace, et al., 1994; Reese, Richman, Zarcone, & Zarcone, 2003). One purpose of these analyses has been to provide data on the prevalence of different behavioral functions. Such data may provide information on the variables that most commonly contribute to the development of challenging behavior, which in turn may have important implications for prevention and treatment strategies (see Iwata, Pace, et al.; Reese et al.). In addition, the availability of large-scale functional assessment data can benefit practitioners who might need to defend the need for conducting functional assessment before prescribing an intervention, and influence decision-making regarding the training of professionals.

Iwata, Pace, et al. (1994) summarized the outcomes of 152 experimental functional analyses of self-injury. The participants, more than half of whom resided in institutions, had been referred to the authors for assessment, which took place either in a pediatric hospital or in a state residential facility. A single behavioral function was identified in 90.1% of all functional analyses. Social-negative reinforcement, such as escape from task demand, was found to be the most common maintaining consequence (38.1%), followed by social-positive reinforcement (attention and tangibles; 26.3%) and nonsocial contingencies (25.7%).

Two other studies (Asmus et al., 2004; Derby et al., 1992) have presented outcomes of large numbers of experimental analyses. Participants in both studies presented with various topographical classes of challenging behaviors, including physical aggression, self-injury, stereotypy, property destruction, disruption (defined by Asmus et al. as at least two of “crying, screaming, stomping feet, flopping to floor” [p. 287]), and other behavior. Derby et al. summarized data from 79 individuals who had been evaluated at a university-based outpatient clinic, whereas Asmus et al. summarized data from 138 individuals with developmental disabilities who were admitted to an inpatient treatment program (the sample additionally included individuals without disabilities, but data from those individuals were analyzed separately). In both studies, as in Iwata, Pace, et al., social-negative reinforcement emerged as the most common function of challenging behavior, and nonsocial functions as the least common. However, a single behavioral function was identified in only 74% (Derby et al.) and 48% (Asmus et al.) of all cases in these studies.

Hanley, Iwata, and McCord (2003) summarized the results of all published experimental functional analyses identified in an extensive review of the literature to date. A large majority were analyses of self-injury and aggression (presumably physical). In spite of potential bias resulting from the inclusion of published data only, their analysis of functional analysis outcomes yielded results that were consistent with the other studies (Asmus et al., 2004; Derby et al., 1992; Iwata, Pace, et al., 1994; Reese et al., 2003). That is, a single reinforcement function was identified in 85.4% of all cases, and social-negative reinforcement was overall the most frequently identified func-
tion, although this was not the case for all topographies of behavior.

Overall, these studies strongly suggest that challenging behavior tends to be maintained by identifiable reinforcement contingencies, and that the maintaining contingency cannot be predicted on the type of challenging behavior (e.g., self-injury, aggression), underscoring the need for individualized functional assessment. They also suggest that socially mediated reinforcement is implicated in the majority of cases of challenging behavior of persons with developmental disabilities, and that this population may be particularly susceptible to developing challenging behavior maintained by social-negative reinforcement contingencies (e.g., escape from demand). It is important to note, however, that the samples employed in those studies may not necessarily reflect the broader population of persons with developmental disabilities who require treatment for challenging behavior. For example, 93.4% of participants in the Iwata, Pace, et al. (1994) study, and 52% of participants in the Derby et al. (1992) study were functioning in the severe to profound range of mental retardation. By contrast, persons with mild mental retardation constitute by far the largest group of all persons with developmental disabilities (American Psychiatric Association, 2000). Although epidemiological studies have found a positive correlation between degree of impairment and the presence of challenging behavior, challenging behavior has been found to be quite prevalent among persons functioning in the mild to moderate range of mental retardation (e.g., Emerson et al., 2001; Holden & Gitlesen, 2006).

In addition, epidemiological studies have identified forms of challenging behavior that may have been underrepresented in the functional assessment literature. For example, Emerson et al. (2001) reported generalized noncompliance, repetitive pestering, running away, stealing, and inappropriate sexual behavior as frequently occurring types of challenging behavior. Those forms of behavior have rarely been reported in the functional analysis literature (Hanley et al., 2003) and did not appear in any of the aforementioned case summaries (Asmus et al., 2004; Derby et al., 1992; Iwata, Pace et al., 1994; Reese et al., 2003). It is possible that persons exhibiting those behaviors are less likely to be referred for functional assessment and behavioral treatment than persons exhibiting behaviors that may be perceived as more physically harmful. However, it may be noted that each study described cases seen at university-affiliated clinics or inpatient programs, in which evaluation and treatment were overseen by Ph.D-level behavior analysts. By contrast, many professionals who provide functional assessment and treatment practice in community settings. It is conceivable that the characteristics and functions of challenging behavior encountered in those settings differ from those encountered in university-based settings, as the latter may offer a greater degree of expertise in handling treatment-resilient cases or cases of extreme behavior severity. If such differences were found, they might underscore a need for extending research on functional analysis and function-based treatment to additional types of challenging behavior.

In the present paper, we report the results of an archival study of 174 cases that were referred to community-practicing behavior analysts for functional assessment and treatment of challenging behavior. The purpose of the analysis was twofold. First, it was intended to document the topographical classes of challenging behavior that occasion referral for functional assessment by professionals practicing in the community. The second purpose was to document the hypothesized behavioral functions of challenging behavior observed, and compare this information with results of previous studies involving persons referred to university-affiliated programs.

Method

Database

The database consisted of all functional assessment reports that were submitted to a local ethics review committee in a southeastern state over a 54-month period (from 1/28/2001 to 7/27/2005). The committee was charged with reviewing behavior plans for all persons with developmental disabilities who received behavior analytic services to address potentially harmful behavior, and resided in the area served by a particular district office. All
behavior plans submitted to the committee were accompanied or preceded by a functional assessment report. A total of 200 functional assessment reports were submitted during the review period, by 17 behavior analysts who gave permission to use the reports for research purposes. Twelve were Master’s level Board Certified Behavior Analysts (BCBAs); two were Bachelor’s level Board Certified Associate Behavior Analysts working under the supervision of BCBAs, and three had other professional certification or licensure.

Three reports were unavailable for analysis due to electronic storage failure, and four reports were excluded from analysis because no challenging behavior was identified during initial contact with consumer or caregiver(s). The remaining 193 reports described functional assessment outcomes for 174 individual consumers of services. Two assessment reports from different time periods were available for 18 consumers, and three reports were available for one consumer. When two or more functional assessment reports were available for the same consumer, only the first report was included in the data analysis; thus, a total of 174 reports were included. Of this total, 158 reports (90.8%) were prepared by the 12 BCBAs.

The reports were written in narrative format, and sometimes included numerical data and graphs, but structure and content varied across behavior analysts and consumers. All reports contained some basic demographic information on the consumers. In most cases, information was provided about the consumers’ living arrangements and daily activities, and most reports included a list of current medications, including vitamins and supplements. Many reports included diagnostic information that had been obtained by the behavior analyst via interview or record review, but the level of detail with which this information was reported varied.

All reports contained a detailed description of the presenting behavior, a description of the methods employed to assess the function of each behavior, and information on assessment outcome, including statements about the hypothesized function of each topography of challenging behavior.

Procedure and Coding System

From each report, data were collected on demographic and other sample descriptors, current medications, type and severity of the presenting behavior, type of functional assessment conducted, and assessment outcome. All identifying information on consumers and service providers was removed from the reports before they were given to raters for coding.

Sample information. The age and sex of each consumer were recorded, and the consumer’s living situation was coded as family home; group home; supported living; independent living; or other. Other demographic information, such as race or marital status, was rarely included in the reports. For each consumer, it was noted whether he or she was reported to attend any of the following: school or preschool; adult training program; supported employment; or employment without support.

Diagnostic information was recorded, and it was noted whether any of the following were listed: (a) Autism or other pervasive developmental disorders, (b) one or more DSM-IV Axis I diagnosis (American Psychiatric Association, 2000), (c) seizures or seizure disorders, and (d) sensory impairment. The consumers’ level of mental retardation was rarely specified and was therefore not coded.

The consumers’ communication abilities were reported inconsistently, and results of standardized assessment of intellectual or language functioning were rarely included in the reports. Based on the limited information available, each consumer’s mode of communication was classified as (a) vocal language (if the report stated or clearly implied that the consumer primarily communicated in vocal language), (b) alternative or augmentative communication systems (based on reported use of e.g., PECS; sign language), or (c) unclear.

The names of all medications were recorded and classified with the aid of the MedlinePlus online database as an antipsychotic, antidepressant, anticonvulsant, anxiolytic, mood stabilizer, stimulant, or other. The number of medications in each category was then tallied for each consumer.

Presenting behavior. Each report listed one or more topographical classes of behavior that
were assessed separately. For each consumer, the number of behaviors assessed was noted. If more than five separate behaviors were assessed (which was the case for 10 consumers), only the first five behaviors listed were analyzed. Each behavior was coded into one of 13 topographical categories, based on the behavior analyst’s label and description of the behavior. The behavior categories and coding definitions are listed in Table 1. Behaviors that did not fall into any of the categories were coded as other, and the behavior analyst’s label written down.

Most reports provided some information on the frequency of each class of challenging behavior; however, the method by which frequency data were obtained (caregiver report, existing incident reports, direct observation) varied across reports and across behaviors within reports. For each consumer, it was noted whether at least one topography of challenging behavior was reported to occur at least once daily. Although more detailed frequency information was available in some cases, the format in which it was reported was inconsistent, preventing more fine-grained coding.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elopement</td>
<td>Behavior labeled elopement; other label/description implies that the behavior involves leaving an area without permission.</td>
</tr>
<tr>
<td>Inappropriate sexual behavior</td>
<td>Behavior labeled inappropriate sexual behavior; behavior labeled or described as public masturbation; other label/description implies behavior that may be interpreted as sexually motivated (e.g., touching others in private areas).</td>
</tr>
<tr>
<td>Inappropriate social or verbal behavior</td>
<td>Behavior labeled inappropriate social or verbal behavior; behavior described as consisting of bizarre or inappropriate but non-threatening verbal statements; behavior described as consisting of inappropriate but non-aggressive behavior towards others (e.g., standing too close to others).</td>
</tr>
<tr>
<td>Noncompliance</td>
<td>Behavior labeled noncompliance; behavior labeled or described as refusal or failure to follow instructions.</td>
</tr>
<tr>
<td>Physical aggression</td>
<td>Behavior labeled physical aggression; behavior labeled aggression and description makes clear that aggression is physical; other label/description that clearly implies potential for physical injury to others (for example, hitting others).</td>
</tr>
<tr>
<td>Pica</td>
<td>Behavior labeled pica; behavior labeled or described as consuming non-nutritive items.</td>
</tr>
<tr>
<td>Property destruction</td>
<td>Behavior labeled property destruction, or other label/description clearly implies potential for damage to physical environment (for example, throwing objects).</td>
</tr>
<tr>
<td>Screaming or disruptive vocalizations</td>
<td>Behavior labeled screaming; behavior described as disruptive or inappropriate vocalizations, but no verbal content of vocalizations reported.</td>
</tr>
<tr>
<td>Self-injury</td>
<td>Behavior labeled self-injury, or other label/description clearly implies potential for physical injury to the consumer (for example, head-banging or biting self).</td>
</tr>
<tr>
<td>Stealing</td>
<td>Behavior labeled stealing; behavior described as taking the belongings of others without permission.</td>
</tr>
<tr>
<td>Suicide threats or attempts</td>
<td>Behavior labeled or described as attempts to commit suicide; threats to commit suicide or suicidal talk.</td>
</tr>
<tr>
<td>Tantrums</td>
<td>Behavior labeled tantrum; coded if different response topographies comprising tantrum behavior were not assessed separately.</td>
</tr>
<tr>
<td>Verbal aggression</td>
<td>Behavior labeled verbal aggression; behavior labeled or described as cursing; behavior labeled or described as threatening others.</td>
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</table>
Additionally, it was noted whether any of the following adverse consequences of challenging behavior were reported to have occurred in the past: (a) tissue damage, including bruising, redness, and callusing; (b) physician care or hospitalization, (c) involuntary admission to a psychiatric facility, or (d) arrest.

Functional assessment components. The assessment methodology employed by the behavior analyst was coded by noting whether the report contained data obtained with the use of the assessment components listed in Table 2. The assessment components were coded separately for each behavior if multiple behaviors of the same consumer were assessed. If the behavior analyst had attempted to use an assessment component that involved direct observation, but less than two instances of the behavior were actually observed, the use of that component was not scored.

Assessment outcome. For each behavior, the reported hypothesized function(s) were coded as one or more of the following: (a) attention, (b) socially mediated access to tangible reinforcers, (c) socially mediated escape, and (d) nonsocial function. It should be noted that the nonsocial function category sometimes included tangible reinforcers (e.g., in the case of stealing). No attempt was made to separate non-socially mediated access to tangible reinforcers from hypothesized sensory or other non-tangible consequences due to inconsistencies in the reporting of these functions (e.g., access to tangibles as a result of theft was often described in terms of the sensory consequences that interaction with the item was hypothesized to produce).

Interrater agreement. A second rater independently coded 18.7% of all reports. Point-by-point agreement was assessed by comparing the two raters’ coding sheets for the same report, variable by variable. For variables that permitted the rater to code only one category (sex; living situation; mode of communication; behavior frequency), or required the rater to type in information (age), an agreement was scored if both observers coded the variable the same way, or typed in the same

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Interview</td>
<td>Report contains information about behavior, antecedents and consequences obtained via verbal communication with the consumer, caregivers, or other informants.</td>
</tr>
<tr>
<td>Rating Scales</td>
<td>Report contains data from one or more functional assessment informant rating scales.</td>
</tr>
<tr>
<td>Structured descriptive (ABC) assessment</td>
<td>Report contains data obtained via direct observation, during which the observer (the behavior analyst or another person) recorded behavior, antecedents and consequences by checking pre-defined options on a data sheet immediately when the behavior occurred.</td>
</tr>
<tr>
<td>Unstructured descriptive (ABC) assessment</td>
<td>Report contains data obtained via direct observation, during which the observer (the behavior analyst or another person) recorded a narrative description of behavior, antecedents and consequences immediately when the behavior occurred.</td>
</tr>
<tr>
<td>Informal direct observation</td>
<td>Report contains some information on the behavior obtained via direct observation by the behavior analyst, but the data are not presented as the outcome of either a structured or an unstructured descriptive assessment.</td>
</tr>
<tr>
<td>Scatter plot</td>
<td>The report contains a scatter plot that displays the occurrence of the behavior as a function of the time of the day across multiple days or weeks.</td>
</tr>
<tr>
<td>Experimental analysis</td>
<td>The report contains data from an experimental analysis that includes, at minimum, a test for one behavioral function and a control condition.</td>
</tr>
<tr>
<td>Unclear</td>
<td>The report contains data on the antecedents and consequences of behavior, but it is unclear how these data were obtained.</td>
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</table>
information, and a disagreement was scored if their records differed. For variables that permitted the rater to code multiple categories for each consumer (diagnoses; daily activities; medications; categories of presenting behavior; adverse consequences) or each behavior (functional assessment components; assessment outcome), an occurrence agreement was scored each time both raters checked the same category, and a disagreement was scored if only one observer checked a particular category, whereas categories that were left unchecked by both observers were not included the agreement analysis. Percentage agreement was calculated by summing the number of agreements across all reports, dividing the result by the number of agreements and disagreements, and converting this ratio to a percentage. Agreement percentages were as follows: 100.0% for age and sex; 92.9% for diagnosis; 88.9% for mode of communication; 90.3% for daily activities; 93.8% for medications; 85.6% for categories of presenting behavior; 86.1% for behavior frequency; 89.5% for adverse consequences; 89.5% for functional assessment components; and 85.3% for assessment outcome.

Results

Sample Description

Information on age ($M = 27.0$ years; range: 4–53 years) and sex was available for all consumers, and information on living arrangement at the time of first assessment was available for 169 consumers. This information is summarized in Table 3. At the time of their first assessment, 16.1% of the consumers were reported to have received diagnoses of autism or other pervasive developmental disorders, and 26.7% were reported to have Axis I diagnoses according to the DSM-IV (American Psychiatric Association, 2000). Seizures were reportedly experienced by 18.9% of the consumers, and 5.7% were reported to have hearing and/or vision impairments. It should be noted that diagnostic information may have been underreported, as the behavior analysts who wrote the report may not always have had access to accurate information.

It was reported or could clearly be inferred from the reports that 71.8% of the consumers communicated primarily in vocal language. It was reported that 8.6% used alternative or augmentative communication systems (e.g., sign language; PECS), but in the remaining instances, mode of communication was not clear.

Of children under 18, 91.3% were reported to attend school or preschool programs. Of adults 18 and older, 61.7% were reported to regularly attend adult training programs, 8.7% were reported to attend school, and 12.5% were reported to be employed full- or part-time, with or without support.

At the time of assessment, 127 consumers (73.0%) were reported to be using at least one form of psychotropic medication. One or more antipsychotic medications were used by 54.0% of the sample; 37.9% used anticonvulsants; 32.2% antidepressants, 14.4% antianxiolytic medications; 4.6% stimulant medications; and .6% mood stabilizers.

Topography of Presenting Behavior

For each consumer, the number of behaviors assessed ranged from one to eight ($M = 3.17, SD = 1.49; mode = 2$). For the 174 consumers, a total of 536 behaviors were identified for inclusion in the present analysis (a total of 549

<table>
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<th>TABLE 3</th>
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<tr>
<td>Sample Characteristics</td>
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<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Age in Years ($N = 174$)</td>
</tr>
<tr>
<td>10 or younger</td>
</tr>
<tr>
<td>11–20</td>
</tr>
<tr>
<td>21–30</td>
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<tr>
<td>31–40</td>
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<tr>
<td>41–50</td>
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<tr>
<td>51 or older</td>
</tr>
<tr>
<td>children under 18</td>
</tr>
<tr>
<td>adults</td>
</tr>
<tr>
<td>Sex ($N = 174$)</td>
</tr>
<tr>
<td>female</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>Living Arrangement ($N = 169$)</td>
</tr>
<tr>
<td>family home</td>
</tr>
<tr>
<td>group home</td>
</tr>
<tr>
<td>supported living</td>
</tr>
<tr>
<td>independent living</td>
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<tr>
<td>other</td>
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</table>
behaviors were assessed, but in the 10 cases in which six or more behaviors were assessed for the same consumer, only the first five listed were included in the analysis). Table 4 shows the frequency of each behavior category, and the percentage of consumers who exhibited behavior in each category. Physical aggression was by far the most prevalent topographical class, assessed in more than half of the reports. The second most frequent class was verbal aggression, followed by noncompliance, property destruction, inappropriate verbal or social behavior, and self-injury. A large number of behaviors fell into the “other” category. Descriptions of those behaviors varied widely and included, among others, feeding-related problems such as excessive consumption of food items or fluids, vomiting, inappropriate toileting (e.g., in public places), inappropriate use of items, disrobing, and stereotypy (one case).

In the case of 71 consumers (41.6%), the assessment report described at least one adverse consequence of the consumer’s challenging behavior that had occurred in the past. The most frequently reported consequence was tissue damage, which was reported in the case of 62 consumers (34.8%). Among consumers who displayed self-injury, tissue damage was reported as a consequence in 78.6% of all cases, and among consumers who displayed physical aggression, it was reported in 51% of all cases. Other consequences were reported less frequently, but overall, nine consumers (5.1%) had required physician care or hospitalization as a consequence of their behavior, nine consumers (5.1%) had been involuntarily committed to a psychiatric facility, and 13 consumers (7.3%) had been arrested.

Information on the frequency of challenging behavior was available for 167 consumers (96.0%), and 109 of those (65.3%) were reported to engage in at least one form of challenging behavior at least daily.

### Functional Assessment Methods and Outcomes

The analysis of functional assessment components revealed that informant-based assessment was in many cases the only assessment strategy used to arrive at a hypothesis of behavioral function. Specifically, the function of 396 behaviors (73.9%) was assessed either via interview alone (71.5%), or with the use of informant rating scales in addition to interviews (2.4%), but without the use of descriptive or experimental methods. In the remaining 140 cases (26.1%), the strategies employed in addition to informant-based methods included informal direct observation (14.0%), unstructured descriptive assessment (7.3%), structured descriptive assessment (2.0%), scatter plot (2.0%), experimental analysis (2.0%), and unclear methods (5.4%).

Table 5 shows data on the outcome of functional assessment. No hypothesized function was reported for 5.8% of all behaviors. A single function was hypothesized for 53.2% of the behaviors, most often an attention function, followed by escape, nonsocial, and finally tangible functions. Multiple functions were

| Physical aggression | 88 | 50.6 |
| Verbal aggression    | 64 | 36.8 |
| Noncompliance       | 59 | 33.9 |
| Property destruction| 58 | 33.3 |
| Inappropriate verbal behavior | 44 | 22.4 |
| Self-injury         | 42 | 24.1 |
| Elopement           | 33 | 19.0 |
| Screaming or disruptive vocalizations | 28 | 16.1 |
| Inappropriate sexual behavior | 19 | 10.9 |
| Stealing            | 15 | 8.6 |
| Tantrums            | 9  | 5.2 |
| Suicide threats or attempts | 5 | 2.9 |
| Pica                | 4  | 2.3 |
| Other behavior      | 68 | 28.2 |

*a Percentage based on 39 consumers who presented with behavior in this category (three consumers presented with more than one for a total of 44 behaviors).

*b Percentage based on 49 consumers who presented with behavior in this category (twelve consumers presented with more than one for a total of 68 behaviors).
hypothesized for 41.0% of all behaviors. In a large majority of those cases, attention was one of the hypothesized functions, whereas a nonsocial function was rarely hypothesized in conjunction with other functions.

As shown in the bottom four rows of Table 5, attention was overall the most frequently observed function, hypothesized to be a maintaining consequence of 62.9% of all behaviors, either alone (26.9%) or in conjunction with other functions.

As shown in the bottom four rows of Table 5, attention was overall the most frequently observed function, hypothesized to be a maintaining consequence of 62.9% of all behaviors, either alone (26.9%) or in conjunction with other functions. The second and third most commonly hypothesized functions were escape and tangible functions, respectively. Both of these functions were reported in conjunction with other functions much more often than they were hypothesized to be the sole maintaining variables. Nonsocial functions were hypothesized to be a maintaining variable in the case of only 11.6% of all behaviors; however, this function was reported as the sole maintaining contingency more often than it was reported as one of multiple functions.

Figure 1 shows the overall percentage distribution of hypothesized functions of the six most frequent categories of challenging behavior. Attention was the most commonly hypothesized function for all categories except noncompliance. In the case of inappropriate verbal and social behavior, attention was most often hypothesized as the sole maintaining variable, whereas for other classes of behavior, it was typically hypothesized to be one of multiple maintaining variables. Socially mediated escape was the most commonly hypothesized function of noncompliance, and the second or third most commonly hypothesized function of other behaviors. Tangible reinforcers were hypothesized to be the second most common maintaining consequence of self-injury, and the third most common function of other behaviors. Nonsocial reinforcement was hypothesized to maintain self-injury in a third of all cases (tied with escape), and was hypothesized to be the sole function of the behavior in 14.3% of all self-injury cases. Nonsocial functions were rarely hypothesized for the other behaviors shown in Figure 1.

As for the less frequently observed behavior categories, attention was the most frequently hypothesized function of suicide threats and attempts (100%), screaming and disruptive vocalizations (82.1%), inappropriate sexual behavior (73.7%), elopement (63.6%), and other behavior (39.7%). For tantrums, escape was the most commonly hypothesized function (77.8%) and nonsocial functions were most commonly hypothesized for pica (100.0%) and stealing (93.3%).

Discussion

In the literature on functional analysis, aggression and self-injury have emerged as the most commonly investigated topographical classes of challenging behavior (Hanley et al., 2003). The present results indicate that physical aggression and self-injury indeed commonly occasion referral to behavior analysts in community settings. However, other commonly observed topographical classes include verbal aggression, noncompliance\(^1\), inappropriate verbal and social behavior, and inappropriate sexual behavior; all of which have received less attention in the functional analysis literature. There is probably no reason to expect that functional analysis and function-based treatment strategies do not apply to those behaviors as well as they apply to others; however,
additional research on these types of behavior seems warranted. In addition, it is possible that the presence of some of these topographies is correlated with client characteristics that warrant special consideration. For example, it is not unlikely that behaviors such as verbal aggression and inappropriate verbal behavior are more prevalent among persons who have a higher level of functioning and greater verbal ability than the majority of those in previous case summaries (Asmus et al., 2004; Derby et al., 1992; Iwata, Pace, et al., 1994; Reese et al., 2003). Unfortunately, information on the level of mental retardation, or other information on language or intellectual functioning, was limited in the present database, which prevents a firm conclusion that members of the sample were, on the average, higher-functioning than those in previous studies. Anecdotally, however, a substantial number of reports either explicitly described the consumers as high-functioning, included information on their daily activities that implied that they functioned relatively independently, or described relatively sophisticated verbal behavior that was observed during the assessment.

Regardless of the topography of challenging behavior, functional assessment results typically suggested individual differences in behavioral function, as would be expected based on previous research (Asmus et al., 2004; Derby et al., 1992; Hanley et al., 2003; Iwata, Pace, et al., 1994; Reese et al., 2003) and the functional analysis literature in general. Although there appeared to be an asso-
Association between topography and behavioral function (see Figure 1), the hypothesized functions clearly could not be predicted solely on the basis of topography. The data on verbal aggression and inappropriate verbal and social behavior seem to suggest that, as in the case of more commonly studied topographies, challenging verbal behavior may be a function of different types of socially mediated reinforcement contingencies (although perhaps rarely of nonsocial contingencies). This conclusion must, however, be tempered by the fact that in a large majority of all cases, functional assessment was completed almost exclusively via informant-based methods, mostly interviews without the reported use of rating scales. Evidence exists that at least under some circumstances, structured or semi-structured interviews with informants may be valid predictors of behavioral function (Arndorfer & Miltenberger, 1994; Cunningham & O’Neill, 2000; Borgmeier & Horner, 2006; Yarborough & Carr, 2000). However, little is known about the extent to which the same is true of unstructured interviews. Although our coding system did not distinguish between unstructured interviews and structured interview formats (e.g., the Functional Assessment Interview by O’Neill et al., 1997), we did not frequently see mention of the latter.

Two notable differences exist between the overall outcomes of functional assessment in the present study and in previous reviews (Asmus et al., 2004; Derby et al., 1992; Hanley et al., 2003; Ivata, Pace, et al., 1994; Reese et al., 2005). First, multiple functions were hypothesized in a substantially larger proportion of cases than by Derby et al., and Ivata, Pace, et al., and overall in the published functional analysis literature (Hanley et al.). Second, attention was overall the most frequently hypothesized function, while previous studies have been in agreement that social-negative reinforcement is the most prevalent maintaining contingency for a variety of behavior topographies. When multiple functions were hypothesized, one of these functions was usually attention, and thus it appears that the addition of a hypothesized attention function accounted for a large proportion of the multiple-function outcomes.

It is possible that some characteristics of the sample were responsible for the large number of cases in which an attention function was hypothesized. For example, it is conceivable that persons with mild mental retardation are more susceptible to various forms of social attention as a reinforcer than are persons with more severe disability, and that the present database included a large proportion of persons in the former category. A possible alternative explanation is that the functional assessment methods employed contributed to this finding. In the natural environment, it is likely that challenging behavior is often followed by some form of attention, such as reprimands or statements of concern. In the absence of experimental analysis, it may be difficult to rule out potential reinforcing effects of such attention, and in fact, evidence exists that descriptive functional assessment methods may tend to overidentify attention as a maintaining contingency (Hall, 2005; Lerman & Iwata, 1993; Thompson & Iwata, 2007). Similar findings have not been obtained in studies that have compared the outcome of informant-based methods with experimental analysis (Arndorfer & Miltenberger, 1994; Borgmeier & Horner, 2006; Cunningham & O’Neill, 2000; Hall, 2005; Paclawskyj, Matson, Rush, Smalls, & Vollmer, 2001; Yarborough & Carr, 2000), and in addition, Reese et al. (2003) did not identify attention as a very common function using the O’Neill et al. (1997) interview. Nevertheless, the possibility that unstructured interviews are more susceptible to overidentifying attention cannot be dismissed.

It is unknown why functional assessment methods other than interviews were rarely employed, but constraints on time and labor resources are a likely reason. An interview can be completed in a relatively short amount of time and does not require additional staff besides the person who completes the interview. A thorough descriptive assessment, by contrast, requires long periods of observation, and typically requires training and cooperation of caregivers or others who are in a position to collect data in the consumer’s natural environment. Evidence exists that brief experimental analyses may be completed in as little as 90 minutes (Derby et al., 1992); however, experimental analyses require highly trained staff, and may therefore be difficult to complete by a privately practicing professional
who may not have access to trained staff to assist with assessment.

It is also possible that experimental analysis was sometimes excluded as an option because a consumer’s challenging behavior did not occur at sufficiently high rates. Although a majority of the sample was reported to exhibit at least one topography of challenging behavior at least once a day, in some of those cases it still may not have occurred at sufficient rates to consider experimental analysis. Functional analyses of low-rate behavior have been reported in the literature (Kahng, A., & Schoenbachler, 2001; Tarbox, Wallace, Tarbox, Landaburu, & Williams, 2004); however, the methods employed in those cases either required continuous or stand-by availability of trained staff throughout the day, and therefore appear impractical for privately practicing behavior analysts. Low-rate behavior, however, cannot be the sole reason why experimental analyses were not conducted more often, because numerous reports described behavior as occurring as often as multiple times per hour, and yet no experimental analysis was conducted.

In spite of potential limitations of the functional assessments methodology by which the present data were generated, we believe that the data contribute several pieces of information to the literature on functional assessment of challenging behavior among persons with developmental disabilities. First, they suggest types of challenging behavior that have received scarce attention in the experimental literature often occasion referral for functional assessment and treatment in the community. Second, the data suggest the possibility that among persons who are referred to community-based services, attention functions may be more prevalent than social-negative reinforcement functions. The functional assessment methods employed prevent a firm conclusion that this was the case, but future research might explore this possibility further, along with its implications for prevention and treatment strategies. Finally, the prevalent use of informant-based assessment methods appear to highlight a need for developing and effectively disseminating validated functional assessment methods that can be implemented with relative ease by practitioners in the community whose resources are limited.

References


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Abstract: The purpose of this study is to compare the effectiveness of consultation alone and consultation plus feedback on the proper use of positive behavior support strategies (PBS) on behaviors of three mothers with children with developmental disabilities. Results indicated that consultation plus feedback was more effective than consultation alone condition on the mothers' behavior. Also, results showed that when mothers implemented PBS procedures correctly, children’s problem behaviors decreased and remained at low rate. Students with disabilities frequently display problem behaviors (Carr, Taylor, & Robinson, 1991; Koegel & Koegel, 1996). The presence of problem behaviors in school settings is often associated with negative outcomes for students (e.g., segregation, punitive discipline, poor academic outcomes) (e.g., McLeskey, Henry, & Hodges, 1999; Sprague & Walker, 2000; Sugai et al., 2000). Problem behaviors can cause teacher stress and have adverse effects on peers as well (Emmer & Strought, 2001; Sterlin-Turner, Robinson, & Wilczynski, 2001). The negative impact of problem behaviors on the parents of children with developmental disabilities has also been reported (Fox, Vaughn, Watte, & Dunlap, 2002). Demands for caring a child with problems has been reported as a significant source of stress for the parents (Dunlap & Fox, 1999; Turnbull & Ruef, 1996). Furthermore, problem behaviors can cause disruptions in family routines and activities (Fox, Vaughn, Dunlap, & Bucy, 1997). Given the negative consequences of problem behaviors, problem behaviors should be prevented and reduced.

Positive behavioral support program (PBS) has been found as being one of the most effective methods to reduce problem behaviors. Positive behavior support (PBS) is a “collaborative assessment based on an approach to developing effective individulized interventions for people with problem behavior” (Lucyshyn, Horner, Dunlap, Albin, & Ben, 2002, p. 7). Principles of applied behavior analysis greatly contributed to the development of PBS. PBS evolved in the mid-1980s as an alternative to punitive approaches for the individuals with severe disabilities who exhibit severe problem behaviors (Hieneman, Dunlap, & Kincaid, 2005). It originally was defined as a non-aversive approach to replace the use of painful and stigmatizing consequent approaches (Hieneman et al.). PBS emphasizes the value of multi-component interventions that include teaching new skills, modifying the
environment, and providing consequences for positive and negative behaviors (Carr & Carlson, 1993). Over the past two decades, the use of PBS approach has expanded from being an individual student focused intervention, to one that meets the needs of whole classrooms and entire schools (Sugai & Horner, 2002). Furthermore its use has been adapted by many disciplines including mental health, school psychology, and general education (e.g., Clark & Hiemenz, 1999; Crone & Horner, 2003; Scott & Eber, 2003). Although the existing literature on PBS has contributed greatly to reducing the problem behaviors of individuals with developmental delays, the majority of studies examining effectiveness of PBS have been conducted in clinical settings by researchers (Carr et al., 1999; Nelson, Roberts, Mathur, & Rutherford, 1999; Reid & Nelson, 2002). To increase ecological validity of PBS, it is critical to implement PBS in natural settings by using those individuals who are indigenous to these environments (e.g., teachers and parents) (Carr et al.; Reid & Nelson).

Parent involvement is critical in planning and implementing PBS strategies for children with problem behaviors (Vaughn, Dunlap, Fox, Clarke, & Bucy, 1997). The rationale for including parents in PBS is that parents typically spend more time with their children than any others and have more information about the contexts in which problem behaviors occur (Dunlap & Fox 1999). Also, PBS is both child and family centered (Lucyshyn et al., 2002). Goals in PBS are defined in partnership with families and reflect their preferences based on their time and resources that are available for them (Lucyshyn & Albin, 1993). Thus, effective and efficient parent training methods are needed to train parents to manage their children’s problem behaviors.

A variety of training methods, including verbal instruction, modeling, rehearsal, and feedback have been shown to be effective in training parents as interventionist to implement behavioral interventions successfully (Dunlap & Fox, 1999; Dunlap, Newton, Fox, Benito, & Vaughn, 2001; Fox, Dunlap, & Philbrick, 1997; Lucyshyn et al., 2002, Vaugh et al., 1997; Symes, Remington, Brown, Hasting, 2006). However, few studies have compared the effectiveness among different components of a training package (Feldman et al., 1992) and many of intervention studies did not use parents as interventionists (Iwata et al., 2000; Moore et al., 2002). Therefore, the extent to which the training techniques will produce same results with parents is not clear.

The purpose of the current study was to replicate and extend this literature by examining the effectiveness of two intervention programs (Consultation meeting vs. consultation meeting plus feedback) on the parents’ implementation of antecedent and consequence procedures of PBS. Also, outcomes related to children’s problem behaviors are presented in both training package in this study.

**Method**

**Participants**

Prior to the study, an approval from Ministry of Education and an informed parental consent were received. Three parent-children dyad participated in the study. Participants were selected based on three criteria: (a) having a child with a developmental disability exhibiting problem behavior(s), (b) no prior experience and training in PBS, and (c) willingness to participate in this study. All of the children were toilet trained, and could perform self-help skills independently (e.g., grooming and dressing).

**Participant 1.** Davut is a 4-year 6 month old boy diagnosed with developmental disabilities. Davut is reportedly taking Risperdal, but his mother is unable to provide specific information about the dosage prescribed. He receives 20 hr per week of one-on-one behavior intervention in his school. He is nonverbal although he can repeat a few sounds following an adult model. The child answers questions with yes/no responses; maintains eye contact in social interactions. His parents have BA in education and work as primary teachers in a public school. Davut’s mother is concerned about his aggressive behavior. His aggressive behaviors include hitting, kicking and spitting at other children. She also reported that these behaviors result in peer exclusion during play. He engages in challenging behaviors when asked to participate in activities in playground. He frequently requests playing with
sand, and independently engages for short periods of time, but soon begins to spill sand on children playing in the playground. Davut's mother was concerned that these behaviors kept him excluded from peers.

Participant 2. Alp was 5 years 2 months at the beginning of the study and lived at home with his mother, father, and older and younger brothers. He was diagnosed with developmental disabilities. He communicates verbally through one to two-word phrases and gestures. Alp receives part-time special education services in a resource room for functional skills instruction. Alp’s father works as a medical doctor in a state hospital. Alp’s mother has Ph.D. in Medicine and works as an assistant professor in College of Medicine. Alp’s parents were concerned about Alp’s challenging behaviors during play time with his peers. When he plays with his peers, he hits, kicks, or pushes them. He also forcefully takes play materials from his peers. When given non-preferred tasks or activities, he refuses to complete the activity.

Participant 3. Yakup is a 5-year, 4-month-old boy who lives with his mother, father, and older brother. Yakup’s mother has a high school degree and does not have a job. His father has Bachelor’s degree and works as a faculty secretary in the university. Yakup does not attend preschool program but he receives 8 hr of one-on-one intervention in special education school weekly. Yakup primarily communicates his needs verbally using short phrases and completes short sentences. Yakup’s mother is concerned about Yakup’s problem behaviors during shopping at stores. Yakup always wants to buy multiple items requested without paying the cashier. When he is asked to put items back or buy only one item instead of multiple ones, he screams, hits and refuses to follow directions. His parents also reported that they avoid doing shopping because of his problem behaviors.

Setting

This study was conducted in the settings in which children show problem behaviors most frequently. For Alp and Davut, the setting was a neighborhood playground. There were typically four to six typically developing children and their parents in the playground. For Yakup, the setting was the shopping center in which Yakup’s parents regularly shop. Other customers and responsible people present in the environment. Shopping center had lots of checkout lanes and wide aisles.

The author served as primary interventionist throughout the study, conducting or coordinating research activities and collaborating with the family training and support activities. She has a doctoral degree in special education and extensive training and experience in the theory and practice of applied behavior analysis. Training sessions occurred in the park and community one to three times per week ($M = 1.3$ times per week) and lasted 15 to 25 min.

Experimental Design

An adapted within-subject alternating treatments design was used to examine which training package resulted in high accuracy of implementation of antecedent and consequence procedures by mothers of children with developmental disabilities. Also, to evaluate whether mother application of antecedent and consequence procedures resulted in progress by target children’s problem behaviors, the following analyses were conducted. First, level of children’s problem behaviors was compared between condition 1 (consultation alone) and condition 2 (consultation plus feedback).

An adapted within-subject alternating treatments design for instructional research was used to demonstrate experimental control (O’Reilly et al., 1992). Each mother was received one training package on antecedent procedure (consultation alone or consultation plus feedback), and the other training package that she was not exposed to (consultation alone or consultation plus feedback) on consequences procedure. In other words, Davut’s mother received condition 1 (consultation alone) on antecedent procedure and condition 2 (consultation plus feedback) on consequence procedures, whereas Alp’s mother received condition 1 (consultation alone) on antecedent procedure and condition 2 (consultation plus feedback) on antecedent procedures. Yakup’s mother received condition 1 (consultation alone) on antecedent procedure and condition 2 (con-
sultation plus feedback) on consequence pro-
cedures (see Tables 1 and 2). Training pro-
cedures (consultation meeting vs. consultation
meeting plus performance feedback) were
counterbalanced across consequences and an-
tecedent procedures across mothers. Once a
differential effect between two training pack-
ages (Condition 1 and 2) occurred for a
mother in the alternating treatment phase,
the more effective of the two training package
was implemented for both antecedent and
consequence procedures.

Prior to Alternating Treatment Phase
Prior to the start of the alternating treatment
phase, mothers were given theoretical and
practical information about PBS by using the
Individualized Intensive Interventions: Deter-
mining the Meaning of Challenging Behavior
Module and Individualized Intensive Inter-
ventions: Developing a Behavior Support Plan
Module (http://www.vanderbilt.edu/csefel/
modules.html) in a two-day workshop as a
group. These modules were translated into
Turkish by two special education faculty who
are fluent in both English and Turkish. In the
workshop, the case studied was used to pro-
vide experience of applying their knowledge
of PBS strategies to an actual case study child
in this phase.

Maintenance Phase
Maintenance sessions were employed 2, 4, and
6 months to examine the effect of interven-
tion after terminating sessions. Following each
maintenance session, feedback was provided
for correct implementation of target proce-
dures. Feedback was delivered immediately af-
after each maintenance session.

Target Behaviors for Mothers-Child Dyads and
reliability
Dependent variables: The following two tar-
get behaviors (dependent variable) were re-
corded in this study: Percentage of steps im-
plemented as written by mothers in both
antecedent and consequence procedures and
percentage of child problem behaviors.

To collect data on mothers’ behaviors a
data collection sheet was adapted from the
one used in Codding, Feinberg, Dunn, & Pace
(2005). Data sheet included (a) the type of
procedure (i.e. antecedent and consequence)

TABLE 1
Alternating Treatments Design Pattern Across Condition

<table>
<thead>
<tr>
<th>Condition 1</th>
<th>Condition 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Consultation Alone)</td>
<td>(Consultation plus Feedback)</td>
</tr>
<tr>
<td>Davut’s mother</td>
<td>antecedent procedures</td>
</tr>
<tr>
<td>Alp’s mother</td>
<td>consequence procedures</td>
</tr>
<tr>
<td>Yakup’s mother</td>
<td>antecedent procedures</td>
</tr>
</tbody>
</table>

Note. C1 = consultation with antecedent procedures, C2 = consultation plus feedback with consequence procedures, c1 = consultation with consequence procedures, c2 = consultation plus feedback antecedent procedures.

TABLE 2
Independent Variable (Parent Training) Condition Pattern Across Sessions

| Sessions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| Davut’s mother | C1 | C2 | C1 | C2 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C2 | C2 | C1 | C2 |
| Alp’s mother | c2 | c1 | c2 | c2 | c2 | c1 | c2 | c1 | c2 | c1 | c2 | c1 | c2 | c1 | c2 | c1 | c2 | c1 | c2 |
| Yakup’s mother | C1 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | C2 | C2 | C2 | C2 | C1 | C2 |
that was prescribed for the target child, (b) an operational definition of each component of the intervention (c) observer ratings the mothers implementation of each components using of the following levels, and (d) space for the observer to record comments or examples (Codding et al.). One of three levels of implementation was scored under the implementation rating section of the data sheet (a) implemented as written (i.e., the entire component was implemented every time the target behavior occurred or when the situation (b) not implemented as written, (i.e., sometimes implemented the entire component as written, implemented the entire component as written or did not employ the component as written), (c) no opportunity to observe (i.e., the target behavior did not occur, or the antecedent was not present) (Codding et al.). Percentage of correct implementation was calculated by dividing the number of mother behaviors implemented correctly by the total number of items in the data sheet.

Data on child target behaviors were recorded using a 15-s partial interval recording system and were reported as percentage of intervals in which problem behaviors occurred. A stopwatch was used to code behaviors from the videotapes. Problem behaviors were disruptive or destructive behaviors, which included throwing objects, and kicking or hitting peers.

Reliability data for dependent variables (correct implementation of antecedent and consequence procedures for parent’s behaviors, and children’s target behaviors) were collected during 20% of all experimental sessions. These sessions were selected randomly and recorded by a second observer. The second observer was a PhD candidate in special education and was naïve to the purpose of the study. Assigned sessions were observed independently by both researcher and the observer; then, agreement between researcher and the observers was calculated. Dependent variable reliability was calculated by using the point-by-point method with a formula of the number of agreements divided by the number of agreements plus disagreements multiplied by 100. Interobserver agreement scores for mothers behaviors were 94% for condition 1, ranging from 70% to 100%, and 98% for condition 2, ranging from 88% to 100%.

**Independent Variables**

Two types of training procedures were implemented: Consultation meeting alone and consultation meeting plus feedback.

**Consultation meeting alone.** Four 15 to 30 minute consultation meetings were provided individually to mothers. In the first consultation meeting, definitions of problem behaviors of his children were discussed by using functional assessment interview form for the second consultation meeting, mothers were asked to observe their children in home using The Home Observation Card (http://csefel.uiuc.edu/modules/module3a/handout3.pdf) until the third consultation meeting. In the third consultation meeting, mothers were expected to generate a problem behavior statement. At minimum, acceptable behavior statements had to be contained in one sentence and included at least two different components in the correct antecedent, behavior, consequence sequence. Based on these criteria, each Home Observation Card was carefully scanned and examined. Target problem behaviors were videotaped while parents were conducting direct observation in their home. Before fourth consultation meeting, detailed written descriptions of the tapes were prepared at each viewing to indicate the target student’s behaviors, antecedents and consequences of problem behaviors. These descriptions were later compared and rechecked until agreement between researcher developed and mother-developed hypotheses were examined. After agreement between these hypotheses was settled, the fourth consultation meeting was conducted.

At the fourth consultation meeting, mothers were asked to identify potential consequences and antecedent procedures for problem behavior of their children based on information they learned for pre-intervention workshop. Then, the individualized behavior support plans were created with mother-researcher collaboration (see Table 3, 4, 5, and 6). Mothers were expected to employ these behaviors based on the support plan under...
specific condition (consultation alone or consultation plus feedback) without further training. But mothers had written guidelines to follow about behavior support plan.

Consultation meeting plus feedback. During this condition, consultation meetings were implemented as stated above. Also, feedback was provided for each mother. Feedback was focused on (a) praise for correct implementation of target procedures, (b) corrective feedback on mothers’ performance, (c) addressing mothers’ question and comments. All sessions were videotaped by the mothers. Before feedback session, the researcher took careful notes while observing the session to be able to give feedback about correct or incorrect use of the procedures. Feedback was delivered immediately prior to the start of the next session. The researcher played the video tape and to discuss performance on the target condition for that session. These feedback sessions were conducted in a room in the Yakup’s and Davut’s home, and Alp’s mother’s office, and lasted approximately 10–15 min. When the mother showed an incorrect behavior while implementing the condition, the researcher stopped the video, indicated the error, and asked how to correct the behavior (e.g., “Zeynep, let’s review what you have done. What else we could use in this situation? When the mother gave a correct response to

### TABLE 3
Yakup’s Positive Behavior Support Plan

<table>
<thead>
<tr>
<th>Antecedent Strategies</th>
<th>Consequence Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Choice</strong></td>
<td></td>
</tr>
<tr>
<td>1. Given choice of 2 preferred items during shopping.</td>
<td>Give the preferred item.</td>
</tr>
<tr>
<td>2. Never finish a shopping without getting preferred item.</td>
<td></td>
</tr>
<tr>
<td><strong>Script story for shopping (see Table 5)</strong></td>
<td></td>
</tr>
<tr>
<td>1. Before going to shopping, review the script story with child.</td>
<td>Give the verbal praise (good boy, you listen the story, and then we can go the shopping).</td>
</tr>
<tr>
<td>2. Make eye contact with child.</td>
<td></td>
</tr>
<tr>
<td>3. Read a story with showing pictures to the child.</td>
<td></td>
</tr>
<tr>
<td><strong>Using cue card</strong></td>
<td></td>
</tr>
<tr>
<td>1. Gain child’s attention (e.g., look at me and I am going to show a picture).</td>
<td>If he has difficulty during shopping, anticipate the difficulty, and cue him to do what it is appropriate.</td>
</tr>
<tr>
<td>2. Show him the picture cue card along with simple verbal cue (e.g., walk through aisles, choice only one preferred item, stop, if your mother stop the section to find preferred items from the list, and wait until your mother pay cashier).</td>
<td>If he engages in appropriate shopping behaviors, mother will provides specific praise as an attention.</td>
</tr>
<tr>
<td>3. Wait 5 sec. for child to perform the correct behavior showed cue card.</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 4
Script Story

**Going to Shopping**

I like to go shopping. It is fun to go store. It is fun to buy what I want. Sometimes I feel like to buy everything. But I can choice one preferred item form shopping list. Sometimes I feel like running. But running inside of store could hurt me or other people. I will try to walk through the aisles and get one item. I will wait for mother to pay cashier.
TABLE 5

Alp’s Positive Behavior Support Plan

<table>
<thead>
<tr>
<th>Antecedent Strategies</th>
<th>Consequence Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of safety signal (say “We will be gone in 5 minutes.”).</td>
<td>If he has difficulty during playing into playground, and cue him to do what it is appropriate.</td>
</tr>
<tr>
<td>Using cue card</td>
<td></td>
</tr>
<tr>
<td>1. Gain child’s attention (e.g., look at me and I am going to show a picture).</td>
<td>If he engages in appropriate playing behaviors, mother will provide specific praise and give token for appropriate playing behavior. Tokens exchanges for preferred activities (i.e., go to McDonald’s).</td>
</tr>
<tr>
<td>2. Show him the picture cue card along with simple verbal cue (e.g., get permission from friends to use their toys, when I reminded you to go home, you finish playing).</td>
<td>Redirection strategies (Guiding a student toward a positive interaction with peer) Hands are for playing, eating, and hugging; use your words. Logical, natural consequences when problem behavior occurred (If he grasps a toy from other children without permission, the toy is unavailable for his use for 10 minutes).</td>
</tr>
</tbody>
</table>

this question, the session was continued to watch. When the mother gave incorrect or no response to this question, the researcher explained the correct response verbally (e.g., the

TABLE 6

Davut’s Positive Behavior Support Plan

<table>
<thead>
<tr>
<th>Antecedent Strategies</th>
<th>Consequence Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of safety signal (say “We will be gone in 5 minutes.”).</td>
<td>Logical, natural consequences when problem behavior occurred (If he grasps a toy from other children without permission, the toy is unavailable for his use for 10 minutes).</td>
</tr>
<tr>
<td>Using cue card</td>
<td></td>
</tr>
<tr>
<td>1. Gain child’s attention (e.g., look at me and I am going to show a picture)</td>
<td>If he has difficulty during playing into playground, and cue him to do what it is appropriate.</td>
</tr>
<tr>
<td>2. Show him the picture cue card along with simple verbal cue (e.g., get permission from friends to use their toys, when I reminded you to go home, you finish playing).</td>
<td>If he engages in appropriate playing behaviors, mother will provide specific praise and give token for appropriate playing behavior.</td>
</tr>
<tr>
<td>Differential reinforcement</td>
<td></td>
</tr>
<tr>
<td>If he engages in appropriate social interaction a play behavior with peer provide specific social praise.</td>
<td></td>
</tr>
<tr>
<td>Gives social praise if engaged in other appropriate behavior.</td>
<td></td>
</tr>
</tbody>
</table>
researcher told the mother that “As soon as the child exhibited appropriate behavior, you should have gone to next to him”. At the end of the feedback session, the researcher delivered specific verbal praise for the mother’s performance on the target condition, and asked to mother whether she had any questions or comment about that session or not.

Results

Figure 1 shows mothers’ percentage of correct implementation of antecedent and consequent procedures during condition 1 (consultation alone) and 2 (consultation plus feedback). Figure 2 shows percentage of intervals in which children showed problem behaviors during condition 1 and 2. Table 7 represents means and ranges of child and mother behaviors in each condition.

Parent Behavior

During condition 1 (consultation alone), percentage of the correct implementation of antecedent and consequence procedures were low for all parents: Davut’s mother’s percentage of the correct implementation of antecedent procedures ($M = 20,58$ with a range of 12% and 20%), Alp’s mother’s percentage of the correct implementation of consequence procedures ($M = 22,40$ with range of 15% and 30%); and Yakup’s mother’s percentage of the correct implementation of antecedent procedures ($M = 5$ with a range of 0% and 10%). Unlike other two parents, Yakup’s mother showed delay for 2 sessions to use antecedent procedures. Yakup’s mother had several sessions in which they performed all the antecedent procedures (9 of 12 sessions).

During condition 2 (consultation plus feedback), percentage of the correct responses increased dramatically for all parents: Davut’s mother ($M = 73,3\%$ for consequence procedures with a range of 45% and 90%), Alp’s mother ($M = 77\%$ for antecedent procedures with a range of 40% and 100%); and Yakup’s mother ($M = 67,50\%$ for consequence procedures with a range, 35% to 90%).

Child Behavior

During condition 1, level of problem behaviors was moderate for Yakup ($M = 28, 18\%$ of intervals; range, 5% to 52%), Davut ($M = 18,78\%$ of intervals; range, 0% to 35%), and Alp ($M = 17,09\%$ of intervals; range, 0% to 30%). During condition 2, the level of problem behavior decreased for Yakup ($M = 23, 20\%$ of intervals; range 0% to 48%) and ($M =$ Davut 17, 10% of intervals; range, 0% to 32%), and Alp ($M = 15, 81\%$ of intervals; range, 0% to 32%).

Maintenance

The mothers’ percentage of correct implementation remained high across the three maintenance sessions. All mothers implemented all procedures during the three maintenance sessions.

All children’s level of problem behaviors during the maintenance phase reflected levels close to those observed during the intervention phase. Alp’s behaviors ($M = 5,5; range, 0\% to 9.5\%$) remained low and under 10% of intervals for all three maintenance sessions. Davut’s behaviors ($M = 19,5; range, 0\% to 24,3\%$) and Yakup’s behaviors remained lower.

Discussion

The results of the study indicate that consultation plus feedback is effective in teaching mothers of children with developmental disabilities to use consequence and antecedent procedures. Many of studies have shown the effectiveness of feedback increasing participants’ behaviors (Roscoe, Fisher, Glover, & Volkert, 2006; Scheeler & Lee, 2002, Codding et al., 2005). The findings from the present study are consistent with previous study demonstrating that feedback is an important component of the parent training sessions (Dunlap & Fox, 1999; Dunlap, et al., 2001; Fox, Vaughn, Dunlap, & Bucy, 1997; Lucyshyn et al., 2002, Vaugh et al., 1997; Symes, et al., 2006). Children problem behaviors are inversely related to their mothers’ implementation consequence and antecedent procedures. The results showed that when mothers implemented PBS procedures correctly, chil-
Figure 1. Mothers' percent of correct implementation of antecedent and consequence procedures.
Children's problem behaviors decreased and remained low throughout the study. Consultation plus feedback was more effective than consultation alone in teaching the
proper use of antecedent and consequence procedures. These findings support the results of previous studies that have been done with teachers, and student teachers (e.g., Coddington et al., 2005; Coulter & Grossen, 1997, O’Reilly et al., 1992; O’Reilly et al., 1994, Scheeler & Lee, 2002). Correct implementation of consequence and antecedent procedures did not improve rapidly during consultation alone condition (Condition 1). One explanation for why the parents did not demonstrate high level of correct performance during consultation alone condition might be because they were given information written and verbally about intervention procedures but not necessarily feedback on their performance. While parents were provided with verbal feedback and their errors were corrected by using video segments of their actual performance, they made resulted in an immediate improvement in performance during consultation plus feedback condition. In other words, they watched themselves perform target response on videotape and were given clear verbal description of what their errors were and how to correct them from researchers.

In general, mothers respond correctly in both conditions (consultation alone and consultation plus feedback). One explanation for this might be due to parents’ high motivation to obtain necessary information to help and cope with their child’s problem behavior.

Another interesting finding was that Alp’s mother showed more rapid acquisition than other parents during consultation plus feedback condition. This differential effect may have been due to Alp’s mother education level.

A limitation of the study was that mothers of children with disabilities were selected based on willingness to participate. Thus, participants may represent a highly motivated group that may not be representative of mothers of children with disabilities in general. Also, this study compared the effect of consultation alone and consultation plus feedback on the proper use of a few specific antecedent and consequence strategies (e.g., using cue card, giving a choice, differential reinforcement), but not necessarily on all of the component skills necessary to implement PBS strategies. For example, actual implementation of PBS (both antecedent and consequence procedures) requires additional skills such as the ability to develop intervention corresponding to function of problem behaviors and data analysis. Moreover, a component analysis was not done to assess which antecedent or consequence procedure is implemented more accurately. Future research is needed to address these concerns.

In summary, the present results contributed to the literature in two ways. First, when mothers of children with disabilities learned how to use antecedent and consequences procedures in an ongoing PBS with consultation plus feedback, their children’s problem behaviors were reduced to low level. Second, the study represents a replication of parent training in

<table>
<thead>
<tr>
<th>Participants</th>
<th>(# Sessions per condition)</th>
<th>% Intervals of Challenging Behaviors [Mean (Range)]</th>
<th>% of Correct Implementation of Procedures [Mean (Range)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yakup’s mother</td>
<td>Yakup Condition 1 28,18</td>
<td>5 (0–10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yakup Condition 2 23,20</td>
<td>67,50 (35–90)</td>
<td></td>
</tr>
<tr>
<td>Alp’s mother</td>
<td>Alp Condition 1 17,09</td>
<td>22,40 (15–30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alp Condition 2 15,81</td>
<td>77 (40–100)</td>
<td></td>
</tr>
<tr>
<td>Davut’s mother</td>
<td>Davut Condition 1 18,78</td>
<td>20,58 (12–20)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Davut Condition 2 17,10</td>
<td>73,33 (45–90)</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 7
Means and Ranges for Participants’ Behaviors
PBS, in that a new group of researchers applied the procedures in a new country. Replications across investigative teams and countries are needed to further advance and strengthen the use of PBS.

References


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Mercury and Autism: A Review

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Tennessee Technological University

Abstract: The prevalence of autism has increased approximately four times in children in nearly one decade (California Health and Human Services Agency, 2003). It has been reported that explanations such as immigration, shifts in the interpretation of diagnostic criteria, improved identification, or diagnostic accuracies cannot explain the observed increase (Geier & Geier, 2005). One potential cause that has alarmed many has been the presence of thimerosal, the mercury-based preservative found among immunizations. Although many refute this, concern has been leveled by many families and professionals concerning the potential impact of mercury poisoning as a causal factor. Researchers have proposed that autism may be in part caused by mercury, because there was cumulative mercury exposure through dental amalgam, fish consumption, environment pollution, and additionally, through increased thimerosal-containing vaccines for both mothers and newborns (Mutter, Naumann, Schneider, Walach, & Haley, 2005). The purpose of this study is to review the information from studies concerning the relationship between mercury exposure and autism.

It has been estimated that prevalence of autism has increased approximately four times in childhood autism in about one decade, from 1 in 1,333 children (7.5 per 10,000 children) among children born in the mid-1980s to 1 in 323 children (31.2 per 10,000 children) among children born in the late-1990s (California Health and Human Services Agency, 2003). In 2004, the Department of Health and Human Services and the American Academy of Pediatrics issued an Autism ALARM claiming that presently 1 in 166 children (60 per 10,000 children) has autism. In California, the autism rate increased by 634% between 1987 and 2002 (California Health and Human Services Agency). Once a rare disorder, autism has now been found to be more prevalent than childhood cancer, diabetes and Down Syndrome (California Health and Human Services Agency). It has been reported that explanations such as immigration, shifts in the interpretation of diagnostic criteria, improved identification, or diagnostic accuracies cannot explain the observed increase (Geier & Geier, 2005). Researchers have proposed that autism may be in part caused by mercury, because there was cumulative mercury exposure through fish and industrial sources, amalgam and additionally, through increased thimerosal-containing vaccines for both mothers and newborns (Mutter, Naumann, Schneider, et al., 2005).

Similarities Between Autism and Mercury Poisoning

The harmful effects of mercury include impaired motor planning, decreased facial recognition, blurred vision and constricted visual fields, insomnia, irritability, tantrums, excitability, social withdrawal, anxiety, difficulty verbalizing, altered taste, impaired short-term memory, slowed reaction time and difficulty with concentration (Jepson, 2004). Bernard, a parent of a child with autism, and several other investigators compared signs and symptoms of mercury poisoning with those of autism (Bernard, Enayati, et al., 2001). Distinct similarities were found between autism and mercury poisoning in their effects upon immune, sensory, neurological, motor, and behavioral dysfunctions, and these similarities extend to neuroanatomy, neurotransmitters, and biochemistry (Geier & Geier, 2005). Thus, Bernard, Enayati, et al. suggest that the

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regressive form of autism represents a form of mercury poisoning (Bernard, Enayati, et al.).

Historically, there were such illnesses caused by environmental exposure to mercury as Acrodynia or Pink’s disease and Minamata’s disease. Like autism, these diseases also presented with large range of variability and susceptibility among individuals in the population and were eradicated when the source of the exposure was eliminated (Jepson, 2004). In the early 20th century, Acrodynia (Pink’s Disease) affected up to 1 of 500 infants in some industrial countries. Acrodynia disappeared after a frequently used teething powder, which contained mercury as calomel (Hg₂Cl₂), was removed from the market. Calomel works by poisoning the nerves in the baby’s gums. When given orally, it is one of the less toxic forms of mercury and is about 100 times less toxic than ethyl mercury to neurones in vitro (Deth, 2004). From 1932 to 1968, 27 tons of organic mercury compounds were dumped into Minamata Bay, Japan by the Chisso Corporation (Stoller, 2006). Over 3,000 victims whose normal diet included fish from the bay unexpectedly developed symptoms of methyl mercury poisoning and have been recognized as having Minamata disease, a myriad of neurological and neurodevelopmental symptoms (Stoller et al.). In addition, closer observation indicates that the more severe the autism the higher the male to female ratio. For example, in very severe cases males may outnumber females by 15 to 1 or even more (Holmes, Blaxill, & Haley, 2003).

Boris, Goldblatt, Galanko, and James (2004) conducted genomic studies of children with autism in comparison to normal control populations to examine genes in pathways that are responsible for the synthesis of key biochemical molecules, which are functionally relevant in the excretion and/or oxidative stress protection of mercury from the body (Boris et al.). Results demonstrated that there was approximately a twice statistically significant increase in the homozygous methylenetetrahydrofolate reductase (MTHFR) 677TT gene among children with autism compared to controls. MTHFR 677TT is one of the key genes in the biochemical pathway responsible for the synthesis of glutathione, a key molecule in the body’s natural defenses against mercury, and those with the MTHFR 677TT gene have been found to have an enzyme with only 32% of the activity of normal (Chango, Boisson, & Barbe, 2000). James, Cutler, and Melnyk (2004) evaluated the methionine cycle and transsulfuration metabolites in children with autism in comparison to age- and sex-matched control children (James, 2004; James et al.). The process of cysteine and glutathione synthesis, both of which are crucial for natural mercury excretion, are reduced in children with autism with autistic spectrum disorders (Lutchmaya, Baron-Cohen, Raggatt, Knickmeyer, & Manning, 2004; Manning et al.). The authors demonstrated that the more severely autism the higher the levels of prenatal testosterone. Tordjman, Ferrari, Sulmont, Duyme, and Roubertoux (1997) measured plasma testosterone and adrenal androgen in nine drug-free prepubertal children (6–10 years old) with autism and 62 neurotypical control children of same age, sex, weight (within 2 kg), and stage of puberty. Results showed that three of the nine children with autism had an abnormally high plasma testosterone concentration (Tordjman et al.). These studies may explain that autism affects males four to five times as often as females (Bertrand, Mars, et al., 2001; Yeargin-Allsopp et al., 2003). In addition, closer observation indicates that the more severe the autism the higher the male to female ratio. For example, in very severe cases males may outnumber females by 15 to 1 or even more (Holmes, Blaxill, & Haley, 2003).

Biochemical and Genomic Basis

Studies point to the possibility that testosterone significantly enhances mercury toxicity, whereas estrogen decreases the toxic effects. Manning, Baron-Cohen, Wheelwright, and Sanders (2001) examined 72 children with autism, including 23 children with Asperger syndrome, 34 siblings, 88 fathers, 88 mothers, and sex and age-matched controls to investigate prenatal testosterone levels in children
Results showed that there were significant decreases in the plasma concentration of both cysteine (19% lower) and glutathione (46% lower) in children with autism (James; James et al.). The reduction of plasma level of cysteine and glutathione, among others, adversely affect the ability to detoxify and excrete metals like mercury (Deth; James et al.), which may lead to higher Hg concentrations in tissues like the nervous system and also lead to a longer half-life of mercury (Deth; Mutter, Naumann, Sadaghiani, Walach, & Drasch, 2005). The Environmental Working Group (EWG) investigated the relationship between mercury exposure, especially mercury exposure from thimerosal-containing childhood vaccines, and autistic disorders (Environmental Working Group, 2004). It is found that there is a severe metabolic imbalance in the ratio of active to inactive glutathione, the body’s most important tool for detoxifying and excreting metals, in children with autism. As a result, these children would be susceptible to the harmful effects of mercury and other toxic chemical exposures. The EWG drew the conclusion that by identifying a metabolic common to nearly all children with autism that would make these children poorly equipped to mount a defense against a number of neurotoxic compounds, including mercury (Environmental Working Group). These findings significantly strengthen the possibility that mercury could cause or contribute to autism and other neurodevelopmental disorders. These are some of the biochemical and genomic basis for the increased body-burden of mercury in children with autism.

Higher Body-Burdens of Mercury

Several clinical studies evaluated the body-burden of heavy metals present in children with autism in comparison to typically developing children (Geier & Geier, 2005b). Holmes et al. (2003) and Hu, Bernard, and Che (2003) found that despite significantly higher mercury levels exposure through maternal dental amalgam and thimerosal containing immunoglobulins during pregnancy (Holmes et al.; Hu et al.), mercury levels in the first babies’ haircut of 94 children with autism were about 8-fold lower than 49 control children. Interestingly, Grandjean, Weihe, White, and Debes (1998) found that infants who reached milestone criteria early had significantly higher mercury concentrations in the hair at 12 months of age (Grandjean et al.; Mutter, Naumann, Sadaghiani, Schneider, & Walach, 2004). It was also observed that the more severe the autism the lower mercury levels were present in the first baby haircut, which leads to the conclusion that the mercury levels in the first baby haircuts were inversely related to the severity of the autism (Geier & Geier). Further studies showed elevated levels of mercury, lead and uranium in haircuts from 40 older children with autism in comparison to 40 normal controls, while there was no difference for other toxic metals like aluminium, arsenic, cadmium or beryllium (Fido & Al-Saad, 2005). Bradstreet et al. evaluated the concentration of heavy metals in the urine among 221 vaccinated children with autistic spectrum disorders in comparison to a neurotypical control population (Bradstreet, Geier, & Kartzinel, 2003). Based on excretion following an identical three-day oral provocation with meso 2,3-dimercapto succinic acid (DMSA), there were approximately six times significantly greater urinary mercury concentrations among vaccinated children with autism matched to vaccinated neurotypical controls, whereas the two groups of children had similar urinary cadmium and lead concentrations. Following DMSA treatment, similar urinary mercury concentration levels were observed among matched vaccinated and unvaccinated neurotypical children. Results suggest that after exposure to mercury, children with autism are unable to properly eliminate mercury and thus have significantly higher body-burdens of mercury than neurotypical children (Bradstreet et al.).

Slikker from the FDA confirmed that thimerosal crosses the bloodbrain barrier and placental barriers, resulting in appreciable mercury content in tissues including the brain (Slikker, 2000). In addition, Sager reported the half-life of mercury in the brain of infant primates was approximately 28 days following administration of solutions containing vaccine comparable concentrations of thimerosal (Institute of Medicine, 2004).
Mercury Exposure during Pregnancy

Even before they are born, it is speculated that children with autism may have had a higher mercury exposure during pregnancy due to maternal dental amalgam, thimerosal-containing immunoglobulin shots, and fish consumption. Vahter et al. (2000) examined the different species of mercury in the blood of pregnant women. They found high correlations between inorganic mercury levels in blood and urine during early pregnancy, a significant correlation between cord and maternal blood, and decreased mercury levels during lactation, presumably due to excretion in milk (Vahter et al.).

Dental amalgam consists of about 50% of the most toxic nonradioactive element (Mutter, Naumann, Walach, & Daschner, 2005), and of other heavy metals as tin, copper, silver, zinc additionally. Amalgam fillings were first used in 1830 in the United States (Stoller, 2006). By 1840, organized dentistry denounced the use of amalgam as a poor filling material because of concerns about mercury poisoning, and the American Society of Dental Surgeons was formed and required members to sign a pledge promising not to use mercury fillings. In 1926, Dr. Alfred Stock, a chemist, noted that mercury amalgam fillings in the mouth were a source of mercury vapor (Stoller). Mercury vapor escapes during the preparation and placement of amalgam restorations. Some of the vapor may be inhaled (Davidson et al., 2004). Research indicates that mercury levels in human placentas correlate with the number of maternal amalgam fillings and a substantial amount of mercury from amalgam reaches the fetus (Stoiber et al. 2004; Their et al., 2003).

Rh-negative women were routinely given Rhogam injections several times during their pregnancies until recently. Those Rhogam injections contained significant amounts of thimerosal, which has been removed only recently (Geier & Geier, 2003). Additionally, there are other prescription drugs and over-the-counter medications that contain significant amounts of thimerosal (Geier & Geier).

As Davidson et al. (2004) pointed out, the principal source of organic mercury that humans are exposed to in the aquatic environment is atmospheric mercury deposited on the surfaces of bodies of water that is then biomethylated by microorganisms and subsequently biomagnifies as it ascends the food chain. Some older, larger carnivorous fish at the top of the food chain can contain more than 1 ppm. Infants and children may be exposed postnataally to mercury from breast milk if their mother consumes foods that contain high levels or if they consume fish or foodstuffs that contain fish products (Davidson et al.). The FDA currently recommends that pregnant women and those women who may become pregnant avoid species with the highest average amounts of methylmercury and that a balanced diet of seafood consumption should be followed to keep methylmercury levels low (Geier & Geier, 2003).

Mercury Exposure after Birth

The regressive form of autism is rising at a much higher rate than the form of autism evident from birth. The regressive form now is felt to make up close to 75% of the new cases (Jepson, 2004). Jepson uses the rise in environmental exposure to explain that more children nowadays have less severe deficits genetically.

Elemental mercury is the form of mercury represented in the hazardous air pollutant (HAP) database (Windham, Zhang, Gunier, Croen, & Grether, 2006). Every year, there are approximately 3,400 metric tons of elemental mercury released into the environment, 95% among which resides in terrestrial soils, 3% in ocean surface waters, and the remaining 2% in the atmosphere. Approximately 70% of the mercury in the environment comes from anthropogenic sources such as coal-fired electric power generation facilities and industrial waste. Natural sources, however, also deposits it in the environment from volcanos, mines, and the erosion of ores (Davidson et al., 2004).

Windham et al. (2006) linked the California autism surveillance system to estimated hazardous air pollutant (HAP) concentrations compiled by the U.S. Environmental Protection Agency (EPA) to explore possible associations between autism spectrum disorders (ASD) and environmental exposures. They included 284 children with ASD and 657 controls, born in 1994 in the San Francisco Bay
area. Results suggest a potential association between autism and estimated metal concentrations (Windham et al.). Palmer, Blanchard, Stein, Mandell, and Miller (2006) did an epidemiologic study, linking Toxic Release Inventory (TRI) data on mercury to special education data in Texas. The study reported a 61% increase in autism prevalence rates (or 17% adjusted) per 1,000 pounds of mercury released (Palmer et al.).

Thimerosal is an ethylmercury-containing compound (49.6% mercury by weight) (Geier & Geier, 2006). It is a preservative that is added to many vaccines at 0.005% to 0.01% level to prevent bacterial contamination and thus, prolonging shelf-life and facilitating multi-use vials. It has become a major source of mercury among children in the United States since within their first two years of life, who may have received a quantity of mercury that exceeded Federal Safety Guidelines (Ball, Ball, & Pratt, 2001; Redwood, Bernard, & Brown, 2001). Geier and Geier pointed out that the routine childhood immunization schedule used to include five doses of Thimerosal-containing Diphtheria-Tetanus-whole-cell-Pertussis (DTP) vaccine with the first dose being administered at two months of age. From the late 1980s through the 1990s, the Centers for Disease Control and Prevention (CDC) expanded the number of doses of Thimerosal-containing vaccines to be administered to US infants. Eventually, the immunization schedule came to be composed of three doses of Thimerosal-containing hepatitis B vaccine with the first dose administered as early as the day of birth, and four doses of Thimerosal-containing Haemophilus Influenzae type b (Hib) vaccine with the first dose administered at two months of age. From the late 1980s through the 1990s, the Centers for Disease Control and Prevention (CDC) expanded the number of doses of Thimerosal-containing vaccines to be administered to US infants. Eventually, the immunization schedule came to be composed of three doses of Thimerosal-containing hepatitis B vaccine with the first dose administered as early as the day of birth, and four doses of Thimerosal-containing Haemophilus Influenzae type b (Hib) vaccine with the first dose administered at two months of age. Additionally, the CDC also began recommended that three doses of Thimerosal-containing influenza vaccine be administered to certain infant population with the first dose administered by the sixth month of age (Geier & Geier).

As a result, if all thimerosal-containing vaccines were administered according to the immunization schedule recommended by the CDC, infants in the United States may have been exposed to 12.5 micrograms (µg) of ethylmercury at birth, 62.5 µg at two months, 50 µg at four months, 62.5 µg at six months, and 50 µg at 18 months, for a total of 237.5 µg of ethylmercury during the first 18 months of life (Ball et al., 2001; Redwood et al., 2001). In addition, if three thimerosal-containing influenza vaccines were administered during the first 18 months of life as they were suggested to certain infant population, the total mercury exposure could have been as high as 275 µg of mercury (Ball et al.; Redwood et al.).

Geier and Geier (2004) reviewed the 2003 US Physician’s Desk Reference (PDR) and found that some childhood vaccines still contain thimerosal. For example, DTaP manufactured by Aventis Pasteur contains 25 µg of mercury, b (Hib) vaccine manufactured by Wyeth contains 25 µg of mercury, and pediatric hepatitis B vaccine manufactured by Merck contains 12.5 µg of mercury. Additionally, influenza vaccine recommended for an increasing population also contains 25 µg of mercury. Therefore, possible total childhood mercury in the United States in 2003 is more than 300 µg, among which levels of mercury from thimerosal contained childhood vaccinations are higher than at any time in the past (Geier & Geier). Furthermore, injecting thimerosal into infants muscle also bypasses the GI tract, one of the body’s first-line defense mechanisms (Geier & Geier).

In 1982, an expert panel at the Food and Drug Administration (FDA) reviewed thimerosal, reported it as toxic, causing cell damage, ineffective in killing bacteria or halting their replication, not as safe or effective as generally recognized (Federal Register, 1982), and thus called for its removal in over-the-counter products (Stoller, 2006). In 1988, the FDA ruled that thimerosal should be removed from OTC products, but gave the industry another 16 years to phase out its presence. In 1999, the FDA announced that under the recommended childhood immunization schedule, infants might be exposed to cumulative doses of ethylmercury from vaccines that exceed federal safety guidelines established for the oral ingestion of methylmercury (Geier & Geier, 2006). In the same year of 1999, the Public Health Service (PHS) and the American Academy of Pediatrics (AAP) issued a joint statement calling for the removal of thimerosal from all childhood vaccines as soon as possible due to any potential risk (Stoller). In 2001, the FDA required that vaccine manufacturers remove thimerosal from their vaccines. In the same year of 2001,
the Institute of Medicine (IOM) stated that it was biologically plausible for mercury from thimerosal-containing childhood vaccines to cause childhood neurodevelopmental disorders (Geier & Geier, 2004). Interestingly, thimerosal was taken out of animal vaccines a decade ago because of the safety concern (Stoller).

The Environmental Protection Agency (EPA)’s safety guideline of vicinal thimerosal is 1 part-per-million (ppm) for one-year old. Redwood et al. (2001) utilized a one compartment pharmacokinetic model to estimate hair mercury concentrations expected to result from the recommended CDC childhood immunization schedule during the 1990s, and the results indicated that modeled hair mercury concentrations in infants exposed to vicinal thimerosal were in excess of the EPA’s safety guidelines for up to the first 365 days, with several peak concentrations within this period (Geier & Geier, 2005b; Redwood et al.). Nowadays in the United States, thimerosal has been removed from many vaccines administered to infants, but there is no recall of the existing thimerosal-containing product. Additionally, other thimerosal-containing vaccines are still being developed and marketed such as influenza, Tetanus-diphtheria, Rhogam, and monovalent tetanus. Thimerosal has also been present in other commercial products such as contact lens solution, which was removed in 1998, eardrops and various nasal preparations (Jepson, 2004).

Thimerosal has been recognized as a developmental toxin by the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. Maternal exposure during pregnancy can disrupt the development, cause birth defects, low birth weight, biological dysfunctions, or even the death of the fetus, and exposure to it can also cause psychological or behavior deficits that become evident as the child grows (Geier & Geier, 2005). In vitro, mercury and thimerosal in levels reached eight days after vaccination inhibit methionine synthetase (MS) by 50%. MS is crucial in biochemical steps for brain development, attention, and production of glutathione, an important antioxidative and detoxifying agent. Subsequently, children with autism have significantly decreased level of reduced glutathione (Geier & Geier). In addition, a study reported that thimerosal was a potent inhibitor of phagocytosis, which is the first step of the innate immune system (Rampersad et al., 2005). While the acquired immune system can be only built up by aging, it seems likely that injection of thimerosal would inhibit an infant’s immune system. Fagan, Pritchard, Clarkson, and Greenwood (1977) reported that 10 children out of 13 treated with a thimerosal containing topological “antiseptic” for umbilical cord infection died, even though this antiseptic was used world-wide on adolescents and adults and very little negative effects were reported. This strongly implied that infants were much more susceptible to thimerosal toxicity than others (Mutter, Naumann, Schneider, et al., 2005).

An ecological study evaluated birth cohorts from the mid-1980s through the late 1990s to investigate the relationship between the average mercury doses children received from thimerosal-containing vaccines in comparison to the prevalence of autism. Results showed that there was an increasing linear correlation between the amount of mercury children received from thimerosal-containing vaccines and the cohort prevalence of autism (Geier & Geier, 2004).

Epidemiological studies conducted in the United States using various databases, including the California Department of Developmental Services (CDDS), Vaccine Adverse Event Reporting System (VAERS), US Department of Education, and the Vaccine Safety Datalink (VSD) to examine the relationship between thimerosal-containing childhood vaccines and neurodevelopmental disorders (Geier & Geier, 2006). Results indicate significant links between exposure to Thimerosal-containing vaccines and neurodevelopmental disorders, showing that in comparison to children receiving thimerosal-free childhood vaccines, children receiving thimerosal-containing childhood vaccines were two- to six-fold statistically significantly increased risks to develop neurodevelopmental disorders, depending upon the specific conditions or symptoms examined (Geier & Geier, 2005b).

Geier and Geier (2003) evaluated doses of mercury from thimerosal-containing childhood immunizations in comparison to U.S. Federal Safety Guidelines. Results showed that children received mercury from thimerosal-
containing vaccines, as part of the routine US childhood immunization schedule, in excess of the Federal Safety Guidelines for the oral ingestion of methylmercury. Secondly, based upon the Vaccine Adverse Events Reporting System (VAERS) database, Geier and Geier investigated the effects of increasing doses of mercury on the incidence rates of neurodevelopment disorders reported following thimerosal-containing vaccines in comparison to thimerosal-free vaccines. Outcomes showed increasing relative risk of neurodevelopment disorders with increasing doses of mercury. Finally, the authors used data from the US Department of Education to analyze the prevalence of school children at various ages with various types of disabilities in comparison to the mercury dose that children received from thimerosal in their childhood vaccines. The analyses showed autism and speech disorders were correlated with increasing mercury from childhood vaccines (Geier & Geier).

Geier and Geier (2004) used the Biological Surveillance Summaries of the Centers for Disease Control and Prevention (CDC), the U.S. Department of Education datasets, and the CDC’s yearly live birth estimates to evaluate the effects of mercury from thimerosal-containing childhood vaccines on the prevalence of autism. Results indicated that there was a close correlation between mercury doses from thimerosal-containing childhood vaccines and the prevalence of autism from the mid-to-late 1980s through the mid-1990s. Additionally, it was found that there were statistically significant odds ratios for the prevalence of autism following increasing doses of mercury from thimerosal-containing vaccines with birth cohorts of 1985 and from 1990 to 1995 in comparison to a baseline measurement with birth cohort of 1984 (Geier & Geier).

Geier and Geier (2005) did a two-phased population-based epidemiological study. Phase one examined reported neurodevelopmental disorders (NDs) to the Vaccine Adverse Event Reporting System (VAERS) following Diphtheria-Tetanus-whole-cell-Pertussis (DTP) vaccines in comparison to Diphtheria-Tetanus-whole-cell-Pertussis-Haemophilus Influenzae Type b (DTPH) vaccines administered from 1994 to 1997 and following Thimerosal-containing Diphtheria-Tetanus-acellular-Pertussis (DTaP) vaccines in comparison to Thimerosal-free DTaP vaccines administered from 1997 to 2000. Results demonstrated that a significant risk factor for the development of neurodevelopmental disorders was the amount of mercury children received from Thimerosal-containing childhood immunizations, thus there is a significant relationship between the Thimerosal-containing childhood vaccines evaluated and childhood neurodevelopmental disorders (Geier & Geier).

Conclusion

To sum up, there has been a great deal of information from different studies that seems to indicate that repetitive mercury exposure during pregnancy, through thimerosal, dental amalgam, and fish consumption, and after birth, through thimerosal-containing vaccinations and pollution, in genetically susceptible individuals is one potential factor in autism. Certainly this question continues to stir debate among professionals across the medical and behavioral sciences. It serves as a grey area for many families as they seek to quell their anxiety invoked by this debate by discovering the facts. The purpose of this article was to synthesize the findings relative to this question to hopefully serve as a resource to educa-
tors as we seek to become more well-informed on this timely issue. As the prevalence rate for autism in children continues to rise, more research is needed to better understand causal factors. It is also crucial that quality reviews be conducted to synthesize a body of knowledge pertaining to these questions if the puzzle is to be solved pertaining to the link between mercury exposure and autism.

References


Jepson, B. (2004). *Understanding autism: The physio-


Instructional strategies that enable students to engage in a high rate of active participation offer several educational and behavioral benefits to a variety of learners. Active participation has been described as “the planned and cognizant component of the instructor’s lesson, which enables students to participate overtly in the lesson” (Pratton & Hales, 1986, p. 211). Active participation involves students performing a specific behavior, such as calculating mathematical equations or imitating a desired skill. Although active participation allows students the opportunity to practice the skill during the acquisition and fluency phases of learning, it also allows teachers the opportunity to monitor student progress and provide feedback while educational concepts are being acquired.

The traditional form of active participation involves students raising their hands and verbally stating the answer; however, this method has numerous drawbacks. First, active participation through the use of hand raising only actively engages one student while the remainder of the class is passively engaged in the task. Second, the enactment of No Child Left Behind and the “highly qualified” teacher requirement has led to a dramatic increase in co-teaching which has inundated general educators with students with a variety of disabilities in their classrooms. In addition, the No Child Left Behind act requires that students with disabilities receive access to core content which has led to an increase of inclusion practices for students who have more significant disabilities. Therefore, the general education teacher must be providing students with a variety of disabilities the opportunity to actively participate in their natural environments. Although hand raising may be an acceptable technique to passively engage students without disabilities, it may not be a suitable technique for students who have physical disabilities or who are nonverbal. Furthermore, Heward’s (1994) review of active student response strategies revealed that instructional strategies that engage students in high rates of active participation promote the acquisition of skill development (Fischer & Berliner, 1985; Greenwood, Dequadri, & Hall, 1984) and increase students’ rates of on-task behavior (Miller, Hall, & Heward, 1995; Sainato, Strain, & Lyon, 1987), as well provide instructors with immediate feedback on student performance (Narayan, Heward, Gardner, Courson, & Omness, 1990). Simply put, the more opportunities that students have to actively engage in learning, the more time they spend learning instead of engaging in off-task behaviors.

Randolph (2007) contended that the underlying premise of active participation is based on the principle asserting that the learning trial is a fundamental component of instruction. The learning trial, which is found...
in both the acquisition and implementation stages of learning, is derived from three essential elements. The first element is formulated by the teacher posing a question to the entire class or a specific student. The second element consists of a response to the teacher directed question. The final element is the delivery of teacher feedback. The time elapsed between the three trial elements and the time elapsed between each trial presentation correlates to the number of opportunities for students to actively participate in a teaching sequence. Researchers also have stated that the pace and frequency of learning trials contributes to the acquisition of student learning (Heward, 1994). Instructional strategies that promote active student responding, such as response cards, guided notes, and choral responding, assist in capitalizing on the number of complete learning trials that can be delivered during whole group instruction (Randolph), while maximizing the number of opportunities that students have to actively respond to the stimuli presented.

One active responding method that repeatedly has been found to be an effective and efficient means to actively engage students in instructional practices is response cards. Response cards, which offer educators a low cost, low tech tool to increase active student responding during instructional sessions, have been described as “cards, signs, or other conveyances simultaneously held up by all students in the class to display their responses to a teacher presented question or problem – to be an effective way of increasing student participation” (Cavanaugh, Heward, & Donelson, 1996, p. 403). Berrong, Schuster, Collins, and Morse (2007) concluded that all learners, especially those with disabilities, can benefit from the systematic implementation of active student responding techniques (2007). Therefore, the purpose of this paper is to review and synthesize the published, empirical literature that has focused on using response cards as a means of active responding for students who have an identified physical or cognitive disability without regard to the severity of the condition. In addition, it is believed that substantial evidence exists to establish response cards as an evidenced-based practice for students who have been identified as having a disability.

Method

The author completed an ERIC search and reviewed the Psychological Abstracts that were identified. Furthermore, she conducted a hand search of approximately 20 educational and psychological, peer-reviewed journals and reviewed the reference lists located in cited manuscripts. The procedures described yielded a total of six relevant studies. The six studies all used response cards as a means of engaging students in active responding, and most discussed the impact that the use of response cards had on student participation, on-task behavior, and the acquisition of the desired skill. Based on the criteria outlined in Horner, Carr, Ahlle, McGee, Odom, and Wolley (2005), response cards should be considered an evidenced-based practice because the following guidelines have been met: (a) a minimum of five studies have adequately documented the use of experimental control in peer-reviewed journals, (b) the investigations were conducted by a variety of researchers in a variety of settings, and (c) the investigations were conducted with a minimum of 20 total participants.

Results

Table 1 provides information pertaining to the studies reviewed. Studies illustrating the effectiveness of response cards have been conducted with students in preschool through the ninth grade, in both inclusive and self-contained environments. Participants involved in the investigational studies have had varying degrees of disabilities, with participants having no identifiable disabilities to students with severe cognitive disabilities. An ABAB design was used to exhibit experimental control in five of the studies reviewed. Overall in each of the six studies, students exhibited an increased rate of accurate responses, while half of the studies reported an increase in on-task behavior and a decrease in the occurrence of inappropriate behavior.

Although the literature has been expanded in recent years pertaining to students with disabilities and the use of response cards, past research has been conducted in general education classrooms with students with and without disabilities. In one such study, Narayan,
Heward, Gardner, Courson, & Omness (1990) used response cards in a fourth grade social studies classroom. The researchers collected data on four dependent variables, including the rate at which the teacher presented instruction, the number of student responses, the accuracy of the student responses, and the students’ daily quiz scores. They divided each class period into three segments. The first segment consisted of the instructor delivering instruction with the use of an overhead projector and verbally questioning the learners after each concept had been presented. During the second segment, the instructor reviewed material presented during either the response card or hand raising condition. The remainder of the class was spent taking a quiz. In the hand raising condition, the instructor verbally stated a question; if the students wished to respond, they raised their hands. In the response card condition the instructor first presented a question to the whole class. The instructor then asked students to “write” their answer on their response cards. Last, the instructor requested that the students hold up their response cards. The instructor then swiftly scanned the students’ responses and provided feedback. If every student in the class responded accurately to the teacher-posed question, the instructor provided descriptive verbal praise in a statement similar to “Great job, the capital of Kentucky is Frankfort.” However, if incorrect responses were indicated, the teacher provided whole class corrective feedback, such as “I see many of you indicated Frankfort is the capital of Kentucky; that is correct.” If no student in the class responded correctly, the teacher said, “I see no one responded correctly, the capital of Kentucky is Frankfort.” The use of descriptive feedback allowed the students to hear the correct information on multiple occasions.

Through the use of an ABAB design, the researchers found that (a) a greater number of students offered responses during the response card condition, (b) correct responses occurred at a higher rate during the response card conditions, and (c) daily quiz scores were

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narayan et al. (1990)</td>
<td>4th grade social studies students with and without disabilities</td>
<td>ABAB design</td>
<td>Response cards resulted in increased response rate, correct responses, and daily quiz scores</td>
</tr>
<tr>
<td>Cavanaugh et al. (1996)</td>
<td>9th grade science students with and without disabilities</td>
<td>ABAB design</td>
<td>Response cards yielded higher rates of accuracy on next day and weekly quiz scores</td>
</tr>
<tr>
<td>Godfrey et al. (2003)</td>
<td>Preschool students with attending difficulties</td>
<td>ATD design</td>
<td>Response cards resulted in increased on-task behavior and greater rates of responding, as well as diminished occurrences of inappropriate behavior</td>
</tr>
<tr>
<td>Davis et al. (2004)</td>
<td>4th grade English students identified with learning and behavior disorders</td>
<td>ABAB design</td>
<td>Response cards resulted in higher rates of active responding and correct responses</td>
</tr>
<tr>
<td>Horn et al. (2006)</td>
<td>Middle school students identified with moderate to severe disabilities</td>
<td>ABAB design</td>
<td>Response cards resulted in greater occurrence of active responding, on-task behavior and acquisition of the targeted skill occurred at an increased rate</td>
</tr>
<tr>
<td>Berrong et al. (2007)</td>
<td>Elementary students identified with moderate to severe disabilities</td>
<td>ABAB design</td>
<td>Response cards resulted in higher rates of active responding, on-task behavior and lower occurrence of inappropriate behavior</td>
</tr>
</tbody>
</table>
higher during the response card condition as opposed to the hand raising condition. Furthermore, the results indicated that, during a 20-min instructional session, students responded fewer than two times during the hand raising condition. During the response card conditions, students responded an estimated 30 times per 20-min instructional session. Cumulatively, response cards could offer students an additional 5,000 opportunities to actively participate during an entire academic year.

The effectiveness of response cards also has been investigated by Cavanaugh et al. (1996) through the use of review sessions conducted at the conclusion of a ninth grade general education science class. The researchers collected data from 23 ninth grade students with and without disabilities during next-day and weekly science tests. The next-day science tests included 12 fill-in-the-blank questions, and the weekly tests involved 42 fill-in-the-blank questions. Instructional sessions consisted of a 30-min science lesson that was divided into three parts. The first part involved the teacher lecturing on science material. The second segment involved an experiment or demonstration in which the class was actively participating. The final segment entailed the teacher reviewing the content of the lesson. During the passive review condition of the experiment, the teacher read each key point of her science lesson while disclosing it to her students on an overhead projector. After providing students with the key term definition expressed in a complete sentence, the instructor provided an example or additional explanations as necessary before proceeding to the next point. During the response card review condition, the teacher continued to disclose key points on the overhead projector while simultaneously reading the information aloud. However, during the response card review, each key point contained a blank in place of the key term or concept. The instructor prompted students to write the word in order to complete the point. Once the teacher’s verbal cue had been given, students were required to hold their response card above their head. The instructor immediately surveyed the results and then provided the class with the correct response before proceeding to the next question.

The results obtained through an ABAB design indicate that students performed with a higher degree of accuracy on next day and weekly fill-in-the-blank quizzes when response card conditions were in effect. Although the data indicate that response cards were effective in teaching science material to students with and without disabilities, the research indicates that the response card condition was also effective in providing the instructor with immediate feedback on the effectiveness of the lesson taught. On numerous occasions during the response card condition, the instructor was able to identify that teaching was ineffective when no students were able to provide an accurate response to material previously taught. Although end of the unit tests may provide instructors with information pertaining to the effectiveness of their teaching strategy, the use of response cards provides immediate feedback that can assist instructors in planning subsequent lessons with a higher rate of efficiency.

In a more recent study, Godfrey, Grisham-Brown, and Schuster (2003) used an alternating treatments design to assess the effectiveness of active student responding techniques with five preschool students who previously had been identified as having attending difficulties during large group instruction. The researchers compared the effectiveness of a traditional hand raising technique to choral responding and response cards. They collected data to determine which technique was most efficient in (a) increasing on-task behavior, (b) increasing student participation, and (c) decreasing the occurrence of inappropriate behavior during a morning calendar group activity. Each calendar session consisted of eight teacher-directed questions pertaining to the daily calendar or current weather conditions. Students were required to raise their hands, respond in unison, or use their response cards to answer the teacher-directed question, depending on the condition being implemented in the study. The response card condition involved students attaching their response to a laminated response card. Each participant was encouraged to make an independent selection from four predetermined choices given to each student following each teacher-posed question. The data indicated that, when response card conditions were in
effect, students responded to a greater number of teacher-directed questions. The use of response cards also was more effective in promoting on-task behavior for all students than choral responding or hand raising conditions. Additionally, when response card conditions were in effect, students participated in fewer occurrences of inappropriate behavior as compared to the choral responding or hand raising techniques.

Furthermore, the researchers noted that the use of response cards allowed the students to participate in kinesthetic, auditory, and visual modes of learning that can be beneficial when dealing with more active learners. Allowing students to manipulate items during instruction may have contributed to the increase in on-task behavior for the students participating in the study as well as the decrease in inappropriate behavior, considering students' attention remained focused the materials involved with their response cards.

In the next study, Davis and O’Neill (2004) compared response cards to hand raising during a writing skills class with four middle school students who were identified as having learning disabilities and who were receiving English as a Second Language (ESL) instruction. The researchers collected data within an ABAB reversal design during an English class in which instruction focused on the acquisition of writing skills. The researchers collected data on the rate of student academic responses, percentage of correct responses, percentage of trials in which student’s responses occurred after raising their hands, and the occurrence of off task behavior. In additional, the researchers collected data on fill in the blank quizzes pertaining to material that had been taught during instructional sessions that had occurred the preceding week. The researchers also obtained social validity information pertaining to which response technique was more effective in increasing student participation and learning. The results of the study indicated that students had higher rates of academic responses, as well as higher rates of correct academic responses, during response card conditions. Substantially higher quiz scores also were evidenced during the response card phases of the study. However, response card usage had limited effects on the occurrence of inappropriate behavior for students participating in this study.

In addition, the social validity data indicated that students did not prefer to use response cards as a learning tool. However, when students were asked to elaborate on their preference for the hand raising condition, all comments provided had a negative connotation. Students indicated that, when the hand raising condition was in effect, the classroom was too noisy, students’ performance was lower, and only one student was able to respond to the instructor’s question. Students indicated they did not like having to provide a written response during the response card condition. The social validity data provided by this study is in direct contradiction to the literature reviewed. It should be noted that students participating in this study were receiving instruction on writing skills, which may have contributed to their negative reactions regarding response card usage that required writing.

In yet another study, Horn, Schuster, and Collins (2006) used an ABAB design to determine the effectiveness of response cards in a middle school special education classroom to teach three students with moderate to severe disabilities how to tell time. The researchers collected data on four dependent variables that included the rate of active responding, on-task behavior, occurrence of inappropriate behavior, and the accuracy of student responses. During each training session, the instructor asked students 10 telling time questions. During the hand raising condition, students were required to raise their hand and wait to be called upon. During the response card condition, each student had a response card that could be manipulated to provide an answer that would resemble the face of a digital clock. Results indicated that students’ active responding rates were consistently higher when response card conditions were in effect. Students had higher percentages of on task behavior during response card conditions with lower occurrences of inappropriate behavior. Data collected also indicated that students acquired the telling time skill with substantially higher rates during all response card conditions as compared to the implementation of the hand raising conditions.

Social validity data indicated that all stu-
dents preferred the response card condition when compared to the hand raising condition. Additionally, when response card conditions were in effect, students provided each other with immediate feedback on their performances. Students provided feedback on their counterpart’s time to respond, encouraged them to “focus” after an incorrect response, and provided one another with “high fives” when correct responses were recorded for the group.

Berrong et al. (2007) also used response cards with eight elementary students who were identified as having a low incidence disability. One individual participating in this study did not have the ability to raise his hand and was allowed to tap on the table as a means of responding. Additionally, a second student had a hearing impairment and did not verbally communicate. Instruction occurred in a self-contained classroom during calendar group. During the hand raising condition, students were required to raise their hands or independently tap on the table in order to respond. The response card condition required students to grasp their response cards in their hands and place them in the appropriate position on their response boards within 10 s of the instructor’s question. The instructor collected data on the percentage of active responding, the percentage of on-task behavior, and the occurrence of inappropriate behavior. During response card conditions, students had higher rates of active responding as well as higher rates of on-task behavior. The occurrence of inappropriate behavior was lower during response card conditions for the majority of the students participating in this study.

Although Berrong’s research failed to look at the acquisition of an academic task, it provided clear evidence that response cards can be used successfully to increase on-task behavior, decrease inappropriate behavior, and elevate the number of active responses expressed by students during group instructional activities. Furthermore, Berrong’s study illustrates that response cards can be used effectively with students who are physically impaired, as well as students who have limited verbal communication. Response cards provide access to the curriculum, which may have been previously unobtainable in the general education classroom. Additionally, response cards provide a low cost, low-tech solution when compared to the majority of augmentative communication devices.

Discussion

Although the published research on the effectiveness of response cards is limited, the research available clearly illustrates that response cards can be a beneficial tool in the educational process of students with and without disabilities. The research available provides clear evidence that response cards can be a low cost, high power instructional tool. In general, response cards have been shown to increase student rates of active responding, decrease inappropriate behavior, promote skill acquisition and enhance the occurrence of on task behavior exhibited by students.

The recent enactment of No Child Left Behind has inundated general education teachers with students with an array of disabilities. Response cards may be the instructional tool necessary to promote increased rates of academic responding among the diverse populations inhabiting our classrooms. The research provides substantial evidence that response cards are an effective instructional tool that does not require additional planning time or reduce the monetary resources that are currently in short supply. Response cards not only enhance on-task behavior and skill acquisition, but they also provide educators with immediate feedback on their instructional practices, which can be used to guide subsequent lesson formation.

One of the most important features of response cards is the opportunity they provide to students. Response cards allow students to actively engage in the acquisition, fluency, maintenance, and generalization phases of learning. Although the acquisition of the skill may be the most beneficial feature to learners, incorporating response cards into the fluency, maintenance, and generalization phases of learning are also extremely beneficial because they afford students the opportunity to respond while allowing educators to continually assess student learning.

The benefits that the use of response cards provides to educators also are immense. First, incorporating response cards into a whole
group instructional sequence has been proven to reduce the occurrence of inappropriate behavior exhibited by students with and without disabilities. Although the research does not indicate a specific reason for this reduction, a variety of ideas can be hypothesized. One hypothesis for the reduction in inappropriate behavior may be attributed to the notion that, when response card conditions are in effect, students have items to manipulate. The kinesthetics involved in the most minute of movements required by response cards may assist students in remaining focused on the appropriate task.

Second, the use of response cards can provide students with additional opportunities to practice the knowledge being taught. Response cards allow students to respond to questions throughout the instructional lesson while instructive feedback affords students with an additional opportunity to acquire the knowledge being taught. Furthermore, the research also indicates that teacher-posed questions occur at a substantially increased rate over more traditional responding techniques. Additionally, contrary to the traditional hand raising technique, response cards enable the whole class to answer the teacher-directed questions instead of a select few who volunteer to respond.

Third, response cards provide educators with immediate feedback on the effectiveness of the instruction being delivered to their students. Most educators do not systematically evaluate their performance on a daily basis. The use of response cards enables instructors to present material, pose a question, and immediately evaluate if students successfully acquired the necessary information. Although, seatwork and homework activities allow educators to evaluate student performance, they do not provide a clear link to the instructional practices being administered in the classroom. However, if an instructor is introducing a new topic, providing definitions and simultaneously delivering questions to the class as a whole, judgments can be made about the effectiveness of the lesson and adjustments can be implemented immediately.

Last, response cards can be a low cost, low-tech tool to accommodate students with a variety of disabilities. Response cards can assist students who have limited verbal skills in the communication process as well as assist students who have limited fine motor abilities by constructing their response cards with high frequency selections that relate to the topic being discussed.

Conclusion

In conclusion, the available research on the use of response cards with children with disabilities was summarized. The research provides clear evidence to support the use of response cards with students who have a variety of disabilities. Although the author’s search of relevant material only produced six studies, the results are clear. Response card usage can positively affect the number of opportunities students have to actively respond, as well as increase the students’ performance on assessment material. Furthermore, response cards can be effective in increasing on-task behavior as well as diminishing the occurrence of inappropriate behavior. Additional research is warranted to determine if response cards can be effectively implemented into various collaborative settings involving additional content with the continued success of previous studies.

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Response Cards / 123
Effects of Constant Time Delay Procedure on the Halliwick’s Method of Swimming Rotation Skills for Children with Autism

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Abstract: Effects of a constant time delay procedure on the Halliwick’s method of swimming rotation skills (i.e., vertical and lateral rotation) for children with autism were investigated. A single subject multiple baseline model across behaviors with probe conditions was used. Participants were three boys, 8–9 years old. Data were collected over a 10-week period using the single opportunity method as an intervention. Results revealed that all subjects increased their correct rotation skills significantly during intervention. In addition, subjects maintained their successful skills during first, second and fourth week of generalization phases. Results showed that constant time delay was an effective way of increasing and maintaining Halliwick’s method of swimming rotation skills of children with autism.

The therapeutic use of water activities or swimming can facilitate language, self concept and improve adaptive behaviors for children with disabilities. In addition, these activities provide an appropriate educational setting for many early interventions (Killian, Joyce-Petrovic, Menna, & Arena, 1984; Yılmaz, Birkan, Konukman, & Erkan, 2005a). For example, Best and Jones (1974) used swimming as a main component of their movement therapy on three children with autism. Subjects participated in an individualized 15-week swimming program which utilized manipulation, imitation, command and self motivation as a progress. Researchers reported that the subjects improved their confidence and body awareness as well as skills of front, back float, and kicking.

Autism is a lifelong developmental disability that causes delays in verbal and nonverbal communication and social interaction as well as exhibition of ritualistic and compulsive behaviors (Loovis & Ersing, 1979). Children with autism have severe communication, language, and social interaction problems compared to their nondisabled peers. Therefore, teaching games and physical activity is an important need to improve vital social skills of children with autism (Leaf & McEaching, 1999; Maurice, Green, & Fox, 2001).

Autistic children have several stereotypical motor behaviors (e.g. swinging their bodies backward and forward, playing with their fingers, moving their head in a circular motion and jumping). These behaviors cause communication and learning problems for children with autism. However, it is possible to reduce these behaviors via teaching physical activity and games (Leaf & McEaching, 1999; Smith, 2001). Sherrill (1986) stated that some of these stereotypical behaviors can be used to

This study was presented as a poster session at the Annual Convention for American Alliance of Health Physical Education Recreation and Dance in Philadelphia, US in April 2003. Correspondence concerning this article should be addressed to İlker Yılmaz, Anadolu University, School of Physical Education & Sports, Eskisehir, 26470, TURKEY. E-mail: ilkery@anadolu.edu.tr
teach skills similar in behavior such as swimming (e.g., swinging their bodies backward and forward, moving arms up and down).

Research indicated that children with autism have an interest in aquatic activities and these activities reported as enjoyable and helpful to improve motor skills. Moreover, these studies reviewed aquatic and swimming activities as popular activities among the children with autism (Campion, 1985; Dewey, 1973; Killian et al., 1984; Mosher, 1975; Oppenheim, 1977; Wing, 1976; Yılmaz, Birkan, Yanardağ, & Konukman, 2005b)

Although past research showed that children with autism have normal motor development patterns, a recent study found that autistic children have very low performance in motor skills. Therefore, it is recommended that autistic children be encouraged to participate in games and other physical activities for motor skill development (Smith, 2001). There are several studies that showed the possibility of teaching individuals with autism or moderate to severe intellectual disabilities play skills such as playing darts (Schleien, Kiernan, & Wehman, 1981), pinball (Hill, Wehman, & Horst, 1993), frisbee (Horst, Wehman, Hill, & Bailey, 1981), Also, Cameron and Capello (1983) taught specific sport skills to individuals with autism or severe intellectual disabilities. Moreover, a recent study revealed that most to least prompting was an effective method in teaching leisure skills to an adult with autism (Vuran, 2008).

Constant time delay is an effective method in teaching children with severe mental disabilities (Bozkurt & Gürsel, 2005; Schuster, Gast, Wolery, & Guildinan, 1988; Stevens & Schuster, 1987; Tekin & Kircaali-Iftar, 2001; Wolery, Ault, & Doyle, 1992). In several studies, constant time delay was utilized to teach play skills such as playing darts, pool, pin knocking, hotshot basketball, golf, and frisbee to children with autism or intellectual disabilities (Tekin et al., 2001). Constant time delay was also used to teach lifetime sport skills to adolescents with severe to profound intellectual disabilities (Zhang, Gast, Horvat, & Datillo, 1995), playing UNO, croquet, horse shoe to adolescents or young adult with moderate to severe intellectual disabilities (Wall & Gast, 1997), and teaching bowling skill to an adult with mental retardation (Jiabei, Bridget, Shihui, & John, 2004).

Parallel to these findings in the literature, research has shown that constant time delay is an effective instructional procedure in teaching students with autism (Alig-Cybirowsky & Schuster, 1990; Ault, Wolery, Gast, Doyle, & Elizenstat, 1988; Browder, Morris, & Snell, 1981; Kleinert & Gast, 1982; McIlvane, withstandley, & Stoddard, 1984; Schoen & Sivil 1989; Schuster et al., 1988; Stevens & Schuster, 1987; Tekin et al., 2001; Yılmaz et al., 2005b).

Although there have been studies about effects of constant time delay procedures on different disabilities in the literature, there was no research on the effects of constant time delay procedures on the Halliwick’s method of swimming rotation skills (i.e., vertical and lateral rotation) for children with autism. Therefore, the purpose of the current investigation was to examine the effectiveness of constant time delay procedures on the Halliwick’s swimming rotation skills of children with autism who acquired mental adjustment to the water. Also, maintenance and generalization effects of the procedure were assessed.

The Halliwick’s method of teaching swimming skills was designed by James McMillan who taught at Halliwick School for Girls in Southgate, London. This teaching method based on scientific principles of hydrodynamics and body mechanics. It has been found very safe for people of all ages, and individual with disabilities as well as for the able bodied (Martin, 1981). Swimmers trained on a one-to-one ratio of instructor until complete independence achieved. The swimmer-instructor pair becomes a unit within a group activity so that the swimmer gains the advantages of social interaction with his peers while at the same time enjoying the unobtrusive but constant attention of an individual instructor. Groups became aware of properties and behavior of water and how to control their own specific balance problems. Swimmers disengaged from instructor when they learned initial mental adjustment to the water and balance control principles learned. In this method, games and activities were performed in a vertical position before the swimmer is subjected to the massive effect of buoyancy and willing to be in activities with horizontal
position where the instructor’s hands used to facilitate balance. Lateral rotation is a movement of the body around the spine and the swimmers are encouraged to move an arm or leg or both across the body. Thus, the body tips over and the swimmer faces down in the water. Finally, the 360 degree roll has to be practiced until it can be performed easily. The Halliwick’s method has ten stages and divided into four phases. Table 1 shows phases of the Halliwick’s method of teaching swimming rotation skills.

**Table 1**

<table>
<thead>
<tr>
<th>Stages of The Halliwick’s Swimming Method</th>
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<tr>
<td><strong>Phases</strong></td>
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<tr>
<td>Phase 1</td>
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<td>Phase 2</td>
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<td>Phase 4</td>
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**Method**

**Participants**

Three boys with autism, ages 8-9 years, participated. Six prerequisite conditions were established for participants before the study; 1) Ability to response to visual and audio stimuli for at least 7–10 minutes, 2) Ability to imitate gross muscle skills, 3) Have regular restroom habits, 4) Have no open wound on the body, 5) Ability to keep swimming suit and cap on the body and, 6) Ability to have mental adaptation to the water such as jumping, waiting, sitting, kicking, and splashing in the water. All participants met these criteria.

Osman was an 8 year old boy with autism. He participated in an early special education program when he was 3-5 years old. In addition, he had an individual special education service twice a week when he was 6 years old. At the time of the study, he was a mainstream student at a public school for two years. Osman had reading, writing, and simple mathematical skills. However, he had difficulty in social interaction, communication and language skills. Osman did not have any experience or systematic intervention in constant time delay procedure.

Cemil was an 8 years old boy with autism. He also participated in an early special education program when he was 4–5 years old. He also is mainstream student at a public school for a year, and he had reading, writing, and simple mathematical skills. However, he had problems in communication and language skills. Moreover, he did not get any prior systematic intervention in constant time delay procedure.

Uzan was a 9 year old boy with autism and he is the twin brother of Cemil. He participated in an early special education program when he was 4-5 years old. In addition, he had an individual special education service four times a week when he was 6 year old. At the time of the study, he had been a mainstream student at a public school for a year. Uzan had reading, writing, and all simple mathematical skills. However, similar to other participants he had problems in social interaction, communication, and language skills. Uzan did not have any systematic intervention in constant time delay procedure prior to study.

**Trainers**

The intervention phase was applied by four researchers. All researchers had degrees in
education and prior research experience in special education.

Settings
All instructional, probe, maintenance and generalization sessions occurred at the Anadolu University indoor swimming pool. The swimming pool was divided into two parts with a rope. At the beginning, all students participated in fun water activities (e.g. jumping, splashing water, and walking hand by hand) with instructors on the right side of the pool. Each student then was transferred individually to the left side of the pool for instruction and intervention. In addition, all sessions occurred in a one-to-one format for 10 weeks, three times a week, between 7:30 am and 8:30 am. There was also a writing board at the swimming pool.

Materials
There was no special equipment used during the study. However, a video recorder, video tapes, data collection forms, a writing board and pencil were used to collect data. Social reinforcements were used for motivational purposes (e.g., free time game activities, jumping in the water upward).

Screening Procedure for Target Behaviors
The main purpose of this study was to teach Halliwick’s method of swimming rotation skills for children with autism (Martin, 1981). Therefore, these skills were selected from this method. Each child trained on water adjustment skills before the implication of study.

Tasks
The task analyses were developed by all authors by performing the skills. Later, three of the authors got together and reviewed the task analyses by performing these skills again. Some modifications and revisions were done. These task analyses are presented in Table 2.

Experimental Design
Constant time delay is an errorless teaching procedure in which the stimulus control is transferred from a given stimulus condition (e.g. teacher) to other stimulus conditions (e.g. target stimulus). This is a promising al-

<table>
<thead>
<tr>
<th>Skills</th>
<th>Steps in the task analyses</th>
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<tbody>
<tr>
<td>Vertical Rotation</td>
<td>1. Participant turns his back to the trainer</td>
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<tr>
<td></td>
<td>2. Participant slightly bends his head to the trainer</td>
</tr>
<tr>
<td></td>
<td>3. Participant lays back (Trainer supports him behind the shoulders)</td>
</tr>
<tr>
<td></td>
<td>4. Participant bends his head and tucks his legs to the chest</td>
</tr>
<tr>
<td></td>
<td>5. Participant stands still</td>
</tr>
<tr>
<td>Lateral Rotation</td>
<td>1. Participant lays back (Trainer stands behind him)</td>
</tr>
<tr>
<td></td>
<td>2. Participant places both hands to his abs</td>
</tr>
<tr>
<td></td>
<td>3. Participant holds from trainer’s hand with his other hand</td>
</tr>
<tr>
<td></td>
<td>4. Participant takes a deep breath and close his mouth</td>
</tr>
<tr>
<td></td>
<td>5. Participant rotates once with commend of trainer and lays back</td>
</tr>
</tbody>
</table>

TABLE 2
Task Analyses for Making Vertical and Lateral Rotation Skills
ternative for instructing individuals with developmental disabilities because the instructor presents a target stimulus, waits the specific fixed amount of delay interval, and finally presents the controlling prompt. This prompt is then faded by systematically inserting a fixed amount of time between presenting the target stimulus and providing a controlling prompt that will ensure the student does the task correctly (Tekin et al., 2001; Wolery et al., 1992).

Constant time delay is an effective instructional procedure because it reduces the probability of the learner making mistakes. Especially, 0-s constant time delay is a good way of eliminating the number of mistakes made by learner. This procedure also provides reinforcement to the learner, and it could be a more fun and positive experience for both the learner and teacher (Tekin et al., 2001).

**Experimental Procedures**

A 1 to 1 instructional format was used during all experimental sessions. There were probe, probe, maintenance, and generalization sessions in the study. Teacher and participants were face to face in all sessions, and all participants were ready in the pool before the start of the study.

**Baseline (A) Conditions**

A probe condition was implemented before the training of each target behavior, and after the criterion was reached in training of that target behavior for a minimum of three probe sessions. Probe sessions occurred prior to training each target behavior and after the criterion was met in that target behavior. Each probe condition had a minimum of three consistent probe sessions. A single opportunity procedure was used during probe sessions. The teacher presented the task direction and recorded the subject’s response to steps of the task analysis. When the subject initiated an incorrect response, performed an incorrect response or no response, he was interrupted by the teacher and the subject’s response was recorded as a minus (−) and the rest of the steps in the task analysis were recorded as incorrect. When a subject performed a correct step he got a plus (+) (Brown & Snell, 2000).

For example, the trainer took his/her place in the pool and said, “Cemil, are you ready to perform lateral rotation movement in the water?” to get attention of subject. Once an affirmative verbal or physical response was received, the trainer delivered the task direction, “Do the lateral rotation movement in the water.” Then the trainer waited 4-s for the subject to initiate a response. Subject was reinforced with a descriptive verbal phrase when he initiated the correct steps in 4-s and kept it 15-s. Incorrect responses were defined as not initiating a step in 4 s, initiating but not completing in 15-s, and initiating an incorrect step of the task analysis is not considered. In addition, if the first response was incorrect then the rest of steps in the task analysis were recorded as incorrect (Wolery et al., 1992).

**Constant Time Delay Instructional (B) Conditions**

The Halliwick’s method of swimming rotation skills were taught by using a 4-s constant time delay procedure. Two types of delay intervals were used: 0-s and 4-s delay intervals. During 0-s trials the trainer secured subject’s attention and said, “Osman are you ready to perform the lateral rotation motion in the water?” Then the trainer said, “Osman do lateral rotation motion”, then presented the controlling prompt immediately and said, “Osman lay back.” The controlling prompt was determined according to the performance and characteristics of each subject and target behavior individually. The 4-s delay, trials were implemented in the same way as 0-s delay except the trainer waited 4-s before providing the subjects a controlling prompt.

There were six types of subject responses during instructional sessions: correct response; anticipations, errors, nonwait, wait, and no response. Correct waits were defined as completing a step of the task analysis correctly within 15-s after the prompt. Anticipations were defined as initiating a step of the task analysis before the prompt and completing the response correctly within 15-s. There were three types of nonwait errors: initiating a step of the task analysis before the prompt but performing it correctly as a topographical error, initiating a step of the task analysis before the prompt but not completing it within 15-s duration as a duration error, performing a different step of task analysis as a sequence
error. Wait errors were completing the response incorrectly or completing the response within 15-s of the prompting. No response was not initiating a response within 4-s of the prompt. All types of correct responses, correct anticipations, and correct waits resulted in descriptive verbal praise. Finally, all incorrect responses were ignored and the task direction for the next step was provided (Tekin & Kircaali-İftar, 2001).

Maintenance and Generalization Sessions

Maintenance data were collected one, two, and four weeks after the instruction had stopped. Maintenance data showed that the subjects maintained the rotation skills taught to them at criterion level one, two, and four weeks after the instruction. Generalization across persons was examined by a pre-post test design. These sessions occurred before training and at the end of teaching for each targeted leisure skill. Generalization sessions were conducted exactly the same but with another trainer. Generalization data showed that all subjects generalized the rotation skills taught to them across people to a certain extent 100%.

Reliability

Reliability data were collected during at least 35% of all experimental sessions. Interobserver reliability was calculated by using point by point method with a formula of the number of agreements divided by the number of agreements plus disagreements multiplied by 100 (Tawney & Gast, 1984).

The mean percent of the inter-observer agreement for the vertical rotation skill during baseline was 98% (90% to 100%); during instruction was 92% (80% to 100%); during maintenance was 100% and during generalization was 97% (90% to 100%). The mean percent of the inter-observer agreement for the lateral rotation skill baseline during was 100%; during instruction was 96% (80% to 100%); during maintenance was 100%; and during generalization was 100%.

Independent variable reliability (procedural reliability) was calculated by dividing the number of teacher behaviors observed by the number of teacher behaviors planned and multiplied by 100 (Billingsley, White, & Munson, 1980). The following teacher behaviors were observed for procedural reliability during training session: (a) having the materials ready, (b) securing the subject’s attention, (c) delivering the task direction, (d) delivering the controlling prompt in time (if appropriate), (e) waiting for the response interval, (f) delivering the correct behavioral consequences, (g) waiting for the inter-trial interval. The same steps were observed during probe, maintenance, and generalization sessions except delivering the controlling prompts in time.

Procedural reliability measures resulted in an overall percentage of 100% during baseline for the vertical rotation skill. Procedural reliability measures resulted in an overall percentage of 92% (85% to 100%) during instruction for the vertical rotation skill. This teacher implemented maintenance and generalization sessions with 100% accuracy for the vertical rotation skill. Procedural reliability measures resulted in an overall percentage of 100% during baseline for the lateral rotation skill. Procedural reliability measures resulted in an overall percentage of 96% (80% to 100%) during instruction for the lateral rotation skill. This teacher implemented maintenance and generalization sessions with 100% accuracy for the lateral rotation skill.

Results

Constant Time Delay Instructional Data

Probe and training data for Osman, Cemil, and Uzan are shown in Figure 1 through 2 respectively. The open circles represent the percentage of correct responding during full probe and instructional sessions, maintenance and generalization session. As seen in Figures 1 through 2, all subjects met the criteria after the introduction of 4-s constant time delay. These data revealed that constant time delay was effective on teaching rotation skills of Halliwick method to the children with autism.

The instructional data each subject, the number of training sessions, the number and percentage of training errors, amount of training time are in Table 3. A total of 32
training sessions and approximately 3 hours and 16 minutes training time were required for all students to reach criterion on two rotation skills. Table 3 shows instructional data for each student through the criterion.

Osman needed 9 training sessions to reach criterion on rotation skills. A total of 45 minutes training time was required to reach criterion on rotation skills. Cemil needed 14 training sessions to reach criterion on rotation skills. A total of one hour and 42 minutes training time was required to reach criterion.

Figure 1. Percentage of correct responses after the prompt for vertical rotation skill during full probe, instructional, maintenance, and generalization probe sessions. Closed circles represent correct responses during full probe, instructional, and maintenance sessions. Open circles represent correct responses during generalization sessions.
Uzan needed 8 training sessions to reach criterion on rotation skills. A total of 51 minutes training time was required to reach criterion on rotation skills. Percentage of training errors which occurred during training sessions was between 0% and 6%.

Figure 2. Percentage of correct responses after the prompt for lateral rotation skill during full probe, instructional, maintenance, and generalization probe sessions. Closed circles represent correct responses during full probe, instructional, and maintenance sessions. Open circles represent correct responses during generalization sessions.
The main aim of this study was to determine the effects of a constant time delay procedure on the Halliwick’s method of swimming rotation skills for children with autism. In addition, generalization and follow up data was collected. Results of the study were analyzed using graphic illustrations. Results showed that all subjects increased their correct target skills in lateral and vertical rotation with a significant amount during the intervention phase. Moreover, subjects maintained their successful rotation skills during the first, second, and fourth weeks of generalization phases.

Literature review shows that constant time delay is an effective method to teach chained tasks to individuals with disabilities in using copy and soda machines (Chandler, Schuster, & Stevens, 1993); using napkins, spoon, and cup (Collins, Gast, Wolery, Holcombe, & Leatherby, 1991); reacting positively to newly introduced people (Collins, Schuster, & Nelson, 1992); applying first aid skills for small wounds, burns and bites (Gast, Winterling, Wolery, & Farmer, 1992) learning kitchen skills (Griffen, Wolery, & Schuster, 1992; Hall, Schuster, Wolery, Gast, & Doyle, 1992); life time sport skills (Zhang, Gast, Horvat, & Datillo, 1995); and teaching drink and snack preparation (Bozkurt & Gürsel, 2005). Parallel to the these findings, this study demonstrated that constant time delay was an effective method to teach and maintain Halliwick’s lateral and vertical swimming rotation skills to children with autism.

According to the graphic illustration of data, it can be concluded that all participants received the same amount of sessions and first and third subject did not have any error in their performance. Only second subject performed with minimal percentage error. Considering the difficulties subjects have with attention and communication skills, this study revealed that constant time delay was an effective method to teach the Halliwick’s swimming rotation skills. In addition, procedural reliability measures showed that all teachers applied constant time delay procedure consistently between 92%-100%. In the literature it is recommended that procedural reliability which is minimally 80% and above 90% is high regarded (Wolery, Bailey, & Sugai, 1988). This study showed that procedural reliability was highly for teachers during the sessions. It can be concluded that all teachers efficiently applied the procedures of constant time delay to teach The Halliwick’s swimming rotation skills for children with autism. Also all participants performed rotation skills very well in early sessions with this intervention in a limited time. Therefore, this procedure is highly recommended for further studies.

The study has two important contributions to literature: 1) support of the literature that constant time delay was an effective method to teach chain and maintained tasks to individuals with disabilities; 2) first research attempt to

<table>
<thead>
<tr>
<th>Students</th>
<th>Behaviors</th>
<th>of sessions thru criterion</th>
<th>Errors thru criterion</th>
<th>Training time thru criterion</th>
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</thead>
<tbody>
<tr>
<td>Osman</td>
<td>Vertical Rotation</td>
<td>4</td>
<td>0%</td>
<td>00:20:35</td>
</tr>
<tr>
<td></td>
<td>Lateral Rotation</td>
<td>5</td>
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TABLE 3
Instructional Data for Each Student Through Criterion
determine the effects of constant time delay procedure on the Halliwick's swimming rotation skills for children with autism. Results of this study provide several recommendations for future research. First, 1 to 1 teaching arrangement and single opportunity method to teach swimming rotation skills was used. The results of this study can be replicated using instructional group arrangements and other instructional methods such as direct instruction, peer tutoring. Second, lateral and horizontal swimming rotation skills were selected from the Halliwick’s swimming education program (Martin, 1981). Thus, all children became ready to participate and learn actual swimming skill patterns. Therefore, it is recommended to teach different swimming skills to children with autism for future experimental research. Third, trainers reported that all children enjoyed these aquatic drills during sessions, and children improved their social and communication skills with peers compared to their out of pool behaviors. Fourth, most important, trainers observed autistic children had less stereotypical motor behaviors (e.g., swinging their bodies backward and forward, playing fingers, moving head in a circular motion and, jumping) in the water during training sessions.

Consequently, findings of this study indicated that constant time delay is an effective method of increasing and maintaining the Halliwick’s swimming rotation skills for children with autism. Also, it can be concluded that teachers can teach many different activities via these swimming rotation skills. However, this study has several limitations, such as the characteristics of participants, tests, and the measurements that were applied. Therefore, further studies should address effects of constant time delay procedure on different sport skills, disabilities, gender, and ages of children with autism.

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Use of Self-Modeling Static-Picture Prompts via a Handheld Computer to Facilitate Self-Monitoring in the General Education Classroom

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Abstract: This study was designed to evaluate the effects of a combined self-monitoring and static self-model prompts procedure on the academic engagement of three students with autism served in general education classrooms. The percentage of intervals engaged academically and the number of teacher prompts was analyzed in the context of a multiple probe across settings design with an embedded A-B-A-B. Results indicated that students all benefitted from use of the handheld computer depicting self-model static-picture prompts. Students also were able to successfully self-monitor and regulate their behavior in multiple settings. Results are discussed relative to the use of self-model prompts, handheld computer, and independence provided by self-monitoring.

If students with disabilities are to access the benefits available in general education settings, appropriate supports that maximize participation in general education classes must be provided (Hunt & Goetz, 1997). Task engagement was identified as an essential ingredient in programs for students with autism (National Research Council, 2001). One of the salient features often displayed by students with autism spectrum disorders is an absence of, or a poorly developed set of self-management skills, such as difficulty directing, controlling, inhibiting, or maintaining and generalizing behaviors required for adjustment both in and outside of the classroom without external support and structure from others (Adreon & Stella, 2001; Myles & Simpson, 2002; Ozonoff, Dawson, & McPartland, 2002; Tantam, 2003). Despite these difficulties, students with autism display significant strengths that when identified appropriately and reliably can lead to enhanced lifestyle outcomes. These strengths include rote memory, concrete thinking, and the ability to efficiently process visuospatial information (Quill, 1995). One method that has been demonstrated to be highly effective in teaching students with autism is the use of visual cues as a primary form of instruction (Mesibov & Shea, 1996). Visual cues can be represented in the form of individualized activity schedules comprised of photographs, pictures, and/or symbols.

Researchers have indicated increased academic and task engagement with the use of photographic activity schedules (Carson, Gast, & Ayres, 2008; Hall, McClannahan, & Krantz, 1995; Krantz, MacDuff, & McClannahan, 1993; MacDuff, Krantz, & McClannahan, 1993; Massey & Wheeler, 2000; Spriggs, Gast, & Ayres, 2007), cooperative group learning (Dugan, Kamps, Leonard, & Watkins, 1995; Kamps, Leonard, Potucek, & Garrison-Harrell, 1995), choral responding (Kamps, Dugan, Leonard, & Daoust, 1994), and self-monitoring (Shearer, 1996). In particular, self-management strategies have gained popularity as an alternative to teacher-managed contingency procedures for students with disabilities (Cole & Bambara, 2000; McDougall, 1998; Rock, 2005; Shapiro & Cole, 1994). Self-management strategies were implemented successfully for students with autism spectrum disorders (e.g., Callahan & Rademacher, 1999; Koegel, Koegel, & Carter, 1999; Koegel, Koegel, Hurley, & Frea, 1992; Odom et al., 2003; Wilkinson, 2005). In most studies, self-management programs typically
involved two or more instructional components containing (a) self-monitoring including self-assessment and self-recording, (b) self-evaluation including decision-making and goal setting, and (c) self-reinforcement for goal attainment.

An important benefit of self-management is the focus on skill building to teach students to be more independent, self-reliant, and responsible for their own classroom behavior. By learning self-management techniques, students can become more self-directed and less dependent on external control and continuous supervision. Further, by teaching students to engage in a positive behavior in place of an undesirable behavior, students can have concurrent benefits of improving academic performance. Self-management also provided students with an opportunity to participate in the development and implementation of their behavior management programs, an important consideration for high-functioning students with autism spectrum disorders (Myles & Simpson, 2003). Shifting the responsibility for managing behavior from teachers and other external sources is well suited for students with autism who value locus of control and structure (Klin & Volkmar, 2000). Self-management has been considered a pivotal skill that can help generalize adaptive behavior, promote autonomy, and produce broad behavioral improvements across various contexts for many children with autism spectrum disorders (Myles & Simpson, 2003). However, in spite of its potential usefulness and current trends in ensuring that students with disabilities have increased access to the general curriculum, there is a lack of research on the effects of self-management in students with autism who are being educated in general education classrooms (McDouggall, 1998). Lee et al.’s (2007) meta-analysis regarding the effects of self-management for students with autism, more than half of the studies reviewed were conducted in school settings and none of the studies occurred in a general education classroom. Moreover, no studies used self-management methods to increase academic performance in general education classrooms. Accordingly, there is an obvious need for further research in these areas.

Lee et al. (2007) also noted that self-management intervention materials had included tangible, visual, token systems, and paper recording materials to successfully teach students with autism self-management skills. However, only four studies from 1992 through 2001 incorporated the use of tangibles or visual materials. Picture prompts have been used extensively for students with moderate and severe intellectual disabilities for task acquisition (e.g., Robinson-Wilson, 1977), generalization (e.g., Wacker, Berg, Berrie, & Swatta, 1985) and maintenance (e.g., Cuvo, Jacobi, & Sipko, 1981). Picture prompts also were used to teach students functional (e.g., Thinesen & Bryan, 1981), vocational (e.g., Sowers, Verdi, Bourbeau, & Sheehan, 1985; Wacker, & Berg, 1983), community (e.g., Cihak, Alberto, Taber-Doughty, & Gama, 2006) and domestic skills (e.g., Bates, Cuvo, Miner, & Korbeck, 2001; Sanders & Parr, 1989). However, much of the literature on picture prompts for students with autism have focused on schedules, transitioning, and helping students learn to transition independently between tasks (e.g. Bryan & Gast, 2000; MacDuff et al., 1993; Spriggs et al., 2007). Few studies have examined the use of picture prompts or visual materials to improve behavioral regulation in more academic environments for students with autism.

Adapting some of the successful features of picture activity schedules and self-management techniques to improve student independence and work completion, the current investigation focused on academic engagement in a general education setting. In general education settings there are several key behaviors to which students need to attend in order to be successful. Because of the complexity of multiple concurrent behavioral requirements in an academic setting (e.g., sitting quietly, reading, writing, following instructions), the current investigation incorporated the use of self-modeled picture-prompts, similar to those proposed by MacDuff et al. (1993).

The contemporary self-modeling literature has primarily focused on video self-modeling. Video self-modeling is a specific application of video modeling that allows the student to ob-
serve him or herself performing a behavior successfully (Dowrick, 1999). Some researchers have suggested the utility of a variation of video modeling called video prompting which involves the individual watching a video demonstration of a model performing specific steps of a skill or behavior (Cihak et al., 2006). Unlike video modeling, video prompting involves the student observing only separate steps of a task or behavior rather than watching the demonstration of the entire task. In addition, video prompting incorporates both continuous demonstrations of a behavioral sequence and static-pictures (individual frames of the video) which show close-up images (Alberto, Cihak, & Gama, 2005). Alberto et al. noted that static-pictures allow for a stationary focus of relevant features and the absence of attention diverting motions, which may benefit students who have difficulty maintaining task engagement.

While video self-modeling has proven effective in a variety of contexts, only two studies have specifically evaluated video modeling to improve task engagement (Coyle & Cole, 2004; Hagiwara & Myles, 1999). Coyle and Cole examined the effects of a video self-modeling and self-monitoring intervention program on the off-task classroom behavior of three students with autism. Students watched a video of themselves “working very well” while the teacher paired a picture communication card depicting “working” on a classroom task (p. 8). Hagiwara and Myles also used video modeling to target on-task behavior for one student with autism. The intervention incorporated video self-modeling with an interactive computer-based social story. The student read and listened to the social story and then watched a brief video of them performing on-task behaviors prior to entering the lunchroom and special education classroom. The results indicated the intervention had minimal impact on the student’s on-task performance. It may be possible that the student did not acquire adequately the information from the model through watching and attending to the model. While these previous results are mixed, they suggest a possible way for incorporating self-modeling into behavioral regulation interventions in the form of static picture prompts.

Cihak, Kessler, and Alberto (2007, 2008) pioneered the use of a handheld computer (e.g., personal digital assistant) to display self-modeled static-pictures to prompt students with severe disabilities to complete complex tasks and to transition independently from task-to-task and place-to-place. Because handheld computers have the capacity to display sequences of images, they provide a unique, unobtrusive means for displaying picture prompts to students. Further, since they are about the size of a large cell phone, students can take the handheld computer with them anywhere, which permits a student to view their models as often as needed to facilitate learning.

The purpose of this study was to examine the use of a handheld computer to deliver self-model static-picture prompts to facilitate the acquisition of self-monitoring for students with high-functioning autism in a general education classroom. Specifically, what were the effects self-modeling static-picture prompts via a handheld computer to increase task engagement and reduce teacher prompts for students with high-functioning autism in the general education classroom? In addition, what was the social validity of using a handheld computer to facilitate self-monitoring in the general education classroom?

Method

Participants and Setting

Three middle-school students diagnosed with high-functioning autism participated in this study. Students were diagnosed by their physician. All students demonstrated (a) difficulties initiating and attending to task, (b) participated in all general education classes, (c) no hearing or vision impairments that impeded instruction, (d) agreeing participate in the study, and (e) parental permission.

Adam was an 11-year-old student in the sixth grade. The administration of the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1988) placed Adam within the high-functioning autistic range. The Wechsler Intelligence Scale for Children (WISC-III; Wechsler, 1991) indicated a full-scale IQ equivalence score of 108. Jordan also was a 11-years-old in the sixth grade. The Gilliam Autism Rating Scale (GARS; Gilliam,
1995) placed Jordan within the high-functioning autistic range and the WISC-III (Wechsler) indicated a full-scale IQ equivalence score of 72. Richard was 13-years-old in the seventh grade. The administration of the GARS (Gilliam) placed Richard within the high-functioning autistic range and the WISC-III (Wechsler) indicated a full-scale IQ equivalence score of 105.

In addition, nine general education and two special education teachers participated. Although all students were in the same school system, Adam and Richard both attend the same middle school, whereas Jordan attended a different middle school. All students were fully included and participated in general education classes throughout the entire school day. The average class size was 27 students. All phases of this study occurred in the general education classroom. For each student three courses targeted. Adam’s classes included language arts, reading and math. For Jordan, his three classes were social studies, language arts and math, and Richard’s classes were language arts, science and math.

Materials

Three colored-photos were taken of each student using a Canon PowerShot A580® digital camera. Pictures showed the student self-modeling task engagement. Photos included the student writing, reading, and watching and listening to their teacher. Photos then were downloaded and inserted into a PowerPoint® presentation. Only one photo was used per slide. A different photo showing the student modeling task engagement was displayed every 30 s. Lastly, the presentation was downloaded into the HP iPAQ Mobile Media Companion® handheld computer. A plastic business card holder was used to hold the handheld device upright on the student’s desk to be viewed easily. In addition, a self-recording 3 × 5 in. index card was provided, which included 10 numbered “yes” or “no” responses for students to circle if they were demonstrating task engagement.

Response Measurement and Data Collection

The target behavior for all students was task engagement. Task engagement was defined as (a) being in one’s seat, (b) looking at the materials or teacher as requested, (c) writing numbers or words related to the assigned task, and (d) complying with instructions with 4 s. Task engagement data were collected during the first 15 min of class time. For all sessions, the teacher recorded the occurrences of the student’s task engagement via paper and pencil using a continuous 15 s partial-interval recording technique. The number of task engagement occurrence intervals was then divided by the total number of intervals possible (i.e., 60 intervals) and then multiplied by 100 to calculate a percentage of task engagement occurrence intervals. In addition, event recording was used to record the number of times the teacher either verbally redirected the student on-task or restated an instructional directive throughout the entire class period (50 min).

Experimental Design

A multiple probe across settings with an embedded A-B-A-B (Barlow & Hersen, 1984) design was used to examine the efficacy of the handheld device on a student’s task engagement behavior and the number of teacher directed prompts. This design allowed sequential application, comparison effectiveness, and an opportunity to replicate the effects of the handheld self-modeling picture prompts within students. In the student’s first classroom setting, the study included four phases: baseline, handheld self-modeling picture prompts intervention, no handheld intervention, and a reimplementation of the handheld intervention. In subsequent classroom settings, the two phases were baseline and the implementation of the handheld self-modeling picture prompts intervention. Prior to baseline, a pretraining period occurred during which the students were taught to operate the handheld computer, to press the hardware button, and to view the pictorial PowerPoint® presentation.

Experimental Procedures

Pretraining. Prior to baseline, students participated in a pretraining phase. Students were instructed on how to operate the handheld computer. They were instructed to phys-
ically turn on the device and to select the hardware button to start the pictorial PowerPoint® presentation. A Model-Lead-Test procedure (Adams & Engelmann, 1996) was used to instruct the students on the use of the handheld computer. The teacher modeled the necessary steps for accessing the presentation, led the students as they accessed and viewed the pictorial presentation, and tested the student’s performance on using the handheld computer and accessing the picture presentation independently. Students were considered trained if they could independently access the pictorial presentation for three consecutive trials.

**Baseline.** During baseline, students were presented with the typical class milieu. The number of task engagement occurrences during the first 15 min of class and the number of teacher prompts throughout the entire class were recorded. During the first 15 min of class, students were expected to complete two tasks: writing lesson information (e.g., lesson objective, homework assignments) in their agenda and complete a warm-up activity. Data were collected until a stable baseline was achieved for a minimum of five sessions. No additional feedback, prompting, or cueing occurred during the first 15 min of class time.

**Handheld self-modeling picture prompts.** At the beginning of each class period, students were provided with the handheld computer including the self-modeling static-picture prompt presentation. The device was placed in a plastic business card holder in the corner of the student’s desk. Students were prompted to activate the device. After the students activated the handheld computer, the pictorial presentation showed photos of the student self-modeling task engagement behavior. Photos depicted a different self-modeling static-picture every 30 s and the presentation repeated automatically throughout the entire class period. When the self-model picture was displayed, the student self-recorded by circling either “yes” or “no” on a 3 × 5 in. index card if they were demonstrating task engagement. This process continued until the student reached a criterion of 90% occurrence intervals of task engagement for three consecutive sessions.

**No handheld pictorial prompting.** Similar to the baseline phase, the number of task engagement occurrences and the number of teacher prompts were recorded for each student. Data were collected for a minimum of three sessions. Moreover, no additional feedback, prompting, or cueing occurred during the first 15 min of class time.

**Handheld self-modeling picture prompts reinstated.** The criterion to reinstate the intervention phase occurred when the mean of the intervention withdrawal phase returned to within close proximity of the mean of the baseline phase and trended in a contra-therapeutic direction. Similar to the previous handheld self-modeling picture prompts phase, students were provided with the handheld computer, instructed to turn on the device at the beginning of class and self-record. Student then pressed the button to play and watch the pictorial PowerPoint presentation of themselves modeling task engagement behaviors, as well as, self-recording every 30 s.

**Generalization procedures.** The criteria to generalize the intervention across settings occurred when the student reached of 90% occurrence intervals of task engagement for three consecutive sessions in the first classroom during the reinstatement of the handheld self-modeling picture prompts (B2). Similar to handheld self-modeling picture prompts phase, the student was provided the handheld computer and prompted to activate the device and to watch the pictorial PowerPoint presentation of themselves self-modeling task engagement in the second classroom. After the student reach criterion, the handheld self-modeling picture prompts intervention was then introduced in the third classroom.

**Social Validity**

Following the conclusion of the study, all participating teachers completed the Intervention Rating Profile (IRP)-15 (Martens, Witt, Elliot, & Darveaux, 1985) to assess the social validity and acceptability of the use of handheld self-modeling picture prompts to increase task engagement and reduce teacher directed prompts for students. The IRP-15 is a 15-item Likert-type scale that assesses general acceptability of interventions. The Likert scale ranges from one-strongly disagrees to six-strongly agrees. Scores generated by the IRP-15 range from 15 to 90. Higher scores
indicate better acceptance of interventions and ratings above 52.5 were considered to reflect acceptability by the rater (Brock & Elliott, 1987). In addition, the participating students’ social acceptability was assessed using the Student Post-Intervention Acceptability and Importance of Effects Survey for grades four through six (Lane & Beebe-Frankenberger, 2004). The students’ survey consisted of a 14-item Likert-type scale that assesses general acceptability of interventions. The Likert scale ranges from one-strongly disagrees to seven-strongly agrees. Following the 14-items, an open-ended question asked students, “What else do you think?” The Likert scale ranges from one-strongly disagrees to seven-strongly agrees. Scores generated by the student survey range from 7 to 98. Higher scores indicate better acceptance of interventions and ratings above 70 were considered to reflect acceptability by the rater.

**Reliability**

Interobserver reliability data and procedural reliability data were collected simultaneously by the primary investigator and the classroom teacher. Interobserver and procedural reliability data were collected during 33% of baseline and each concurrent phase. Observers independently and simultaneously recorded task engagement. Interobserver agreement was calculated by dividing the number of intervals of agreements by the number of intervals of agreements plus disagreements and multiplying by 100. Interobserver reliability ranged from 95 to 100%, with a mean of 97% agreement. The mean interobserver reliability agreement for each student across conditions was Adam, 100%; Jordan, 97%; and Richard, 95%.

Procedural reliability measures verified the teachers’ performance of providing the handheld self-modeled picture prompting device to the student and prompting the student to activate the device. The procedural agreement level was calculated by dividing the number of observed teacher behaviors by the number of planned teacher behaviors and multiplying by 100 (Billingsley, White, & Munson, 1980). Procedural reliability was 100%.

**Results**

Figures 1, 2, and 3 display the students’ percentage of task engagement and number of teacher-directed verbal prompts with and without the handheld computer and across classroom settings. Overall, the students’ mean percentage of task engagement during baseline was 29% and increased to a mean of 94% intervals of task engagement during the handheld picture prompting phase. The mean number of teacher-directed verbal prompts during baseline was 26.7 and decreased to a mean of 3.3 during the handheld picture prompting phase.

Figure 1 shows Adam’s percentage of task engagement and number of teacher-directed verbal prompts with and without the handheld self-modeled picture prompt and across classroom settings. During baseline, Adam demonstrated a mean of 39% occurrence intervals of task engagement and his teacher verbally prompted him a mean of 33 times in the language arts classroom. During the handheld picture prompting phase, Adam increased task engagement to a mean of 91% (range = 77–100%) and the number of teacher prompts decreased to a mean of 5 occurrences (range = 1–15). When the handheld intervention was withdrawn, Adam’s task engagement decreased to a mean of 29% (range = 23–40%) and teacher prompts increased to a mean of 26 (range = 22–34). However, when the handheld picture prompting intervention was reintroduced, Adam’s task engagement increased to a mean of 97% (range = 95–98%) and the mean number of teacher prompts decreased to 3 (range = 1–4). During reading, Adam’s task engagement was a mean of 35% occurrence intervals and the mean number of teacher prompts was 23 during baseline. When the handheld picture prompt was implemented, Adam’s task engagement increased to a mean of 95% (range = 90–100%) occurrence intervals and the number of teacher prompts decreased to a mean of 2.6 (range = 1–4) occurrences. During math, Adam’s task engagement was a mean of 27% occurrence intervals and the mean number of teacher prompts was 29 during baseline. When the handheld picture prompt was implemented, Adam’s task engagement increased to a mean of 94%
(range = 87–100%) occurrence intervals and the number of teacher prompts decreased to a mean of 3.6 (range = 1–7) occurrences.

Figure 2 shows Jordan’s percentage of task engagement and the number of teacher-directed verbal prompts with and without the handheld self-modeled picture prompt and across classroom settings. During baseline, Jordan demonstrated a mean of 38% occurrence intervals of task engagement and his
teacher verbally prompted him a mean of 26 times in the social studies classroom. During the handheld picture prompting phase, Jordan increased task engagement to a mean of 95% (range = 88–98%) and the number of teacher prompts decreased to a mean of three occurrences (range = 1–12). When the handheld intervention was withdrawn, Jordan’s task engagement decreased to a mean of 26% (range = 20–33%) and teacher prompts increased to a mean of 18 (range = 17–19). However, when the handheld picture prompt-
ing intervention was reimplemented, Jordan’s task engagement increased to a mean of 98% (range = 95–100%) and the mean number of teacher prompts decreased to two (range = 1–3). During language arts, Jordan’s task engagement was a mean of 36% occurrence intervals and the mean number of teacher prompts was 25 during baseline. When the handheld picture prompt was implemented, Jordan’s task engagement increased to a mean of 94% (range = 83–100%) occurrence intervals and the number of teacher prompts decreased to a mean of 3.6 (range = 1–9) occurrences. During math, Jordan’s task engagement was a mean of 94% (range = 97–100%) occurrence intervals and the number of teacher prompts decreased to two (range = 1–3). During science, Jordan’s task engagement was a mean of 36% occurrence intervals and the mean number of teacher prompts decreased to a mean of 3.6 (range = 1–9) occurrences. During math, Richard’s task engagement was a mean of 16% occurrence intervals and the mean number of teacher prompts was 25 during baseline. When the handheld picture prompt was implemented, Richard’s task engagement increased to a mean of 94% (range = 83–98%) occurrence intervals and the number of teacher prompts decreased to a mean of three (range = 1–8) occurrences.

Social Validity

Based on the IRP-15 (Martens et al., 1985), the nine general education and two special education teachers indicated that the use of the handheld self-modeling picture prompts to increase task engagement and reduce teacher directed prompts in the general education classroom was socially acceptably. The teachers’ mean IRP-15 score was 80 (range = 75–90). All teachers indicated that agreed or strongly agreed across all items, specifically the intervention was (a) an acceptable intervention for the student’s problem behavior, (b) most teachers would find the intervention appropriate, (c) I would suggest this intervention to other teachers; (d) this intervention would be appropriate for a variety of students; and (e) this intervention was beneficial to the student. There was no difference in rating scores between special and general education teachers; both found the intervention socially valid.

In addition, the participating students’ also indicated that the use of the handheld self-modeling picture prompts was socially acceptably based on the Student Post-Intervention Acceptability and Importance of Effects Survey for grades four through six (Lane & Beebe-Frankenberger, 2004). The students’ mean score was 83 (range = 79–91); Jamie’s survey score was 91, Jordan’s was 80, and Richard’s was 79. All students rated all items similarly, agreeing to strongly agreeing that the intervention was (a) easy for me to stick with, (b) helped me change in important ways; (c) quickly improved my skills; (d) made a difference in my grades, and (e) is one I would tell other kids about. However, all students disagreed or strongly disagreed that the intervention “helped me make more friend.”
Discussion

The purpose of this study was to examine the use of self-modeling static-picture prompts via a handheld computer and self-modeling to increase task engagement and reduce teacher prompts for students with high-function autism in the general education classroom. Prior to this study all students performed high levels of off-task behaviors and required high levels of teacher prompts to initiate and maintain task engagement. When the intervention was
implemented, all students demonstrated an increase in task engagement and decrease in teacher directed prompts. Moreover, all students generalized the use of the self-monitoring and prompting strategy across other general education classrooms. A functional relation was established since experimental control occurred by demonstration of a co-variation between change in behavior patterns and introduction of the intervention within, at least, three different series at three different points in time (Horner et al., 2005).

This study supports previous self-monitoring studies, which demonstrated improved task engagement (Callahan & Rademacher, 1999; Koegel, Koegel et al., 1999; Koegel et al., 1992; Lee et al., 2007; Odom et al., 2003; Wilkinson, 2005). This study also supports previous studies that have used self-modeling to increase task engagement (Coyle & Cole, 2004; Hagiwara & Myles, 1999). Additionally, this study supports the use of handheld computers to enhance student independent functioning (Cihak et al., 2007, 2008).

This study extends the literature in several ways. First, this study was conducted in general education classrooms. In spite of self-management effectiveness and usefulness, previous self-management studies in school settings have not demonstrated its application in the general education classrooms. With current trends of educating students with disabilities in the general classrooms, this study expands the versatility of self-management techniques for inclusive settings. By learning self-management techniques, students were more self-directed and less dependent on teacher supports and supervision. Moreover, learning to self-manage their task engagement, the students generalize adaptive behavior skill, autonomy, and demonstrated behavioral improvements across various classroom environments.

Secondly, this study expanded the use of video prompting procedures by incorporating the use of self-modeling static-picture prompts. One of the advantages of using static-picture prompts is a stationary display of relevant features and a lack of attention diverting motions, which may occur with video modeling. Since all the students in this study had difficulty initiating and maintaining attention, the students benefited from a prompt that provided extended time for students to focus and obtain the essential information of the pictorial prompt. Moreover, the static-picture only showed relevant stimulus information, so the potential for students to overlook relevant or attend to irrelevant features of a prompt were minimized.

Thirdly, the use of handheld computers was applied in the general education classroom to facilitate positive behavior change. When modeling is used for priming a behavior change (Coyle & Cole, 2004; Hagiwara & Myles, 1999) or watching the model in-vivo, the observer may have only one or limited opportunities to acquire the behavior through observation learning. Since the static pictures were presented on a handheld computer, it increased the opportunities for the learner to retrieve information anytime to guide behavior. With increased opportunities for an observer to watch a model, the opportunity for observational learning is enhanced.

Fourth, this study expanded the social validity of using self-modeling static-picture prompts and a handheld computer as a positive behavioral support in the general education classroom. Both students and teachers reported social acceptability for the intervention use. Moreover, both special and general education teacher suggested that they would recommend its use to other teachers and use self-modeling static-picture prompts and a handheld computer again for students who experience similar behavioral challenges. Although the students noted that the intervention did not help make more friends, they did report that it was easy to use, it helped them quickly and made a difference in their grades, which are critical components in the educational programming for students with autism (National Research Council, 2001).

However, several limitations may have affected the overall interpretations of this study and future research is needed. First, photos of the students reading, writing, or watching and listening to their teachers did not always correspond to the task at hand. That is, a photo of the student writing may have appeared when actually they were expected to be reading. Although the students were instructed to self-record “yes” if they were engaged in the task at hand, future studies are required to examine the displaying of specified picture-
prompts with specified behaviors. Second, as with other single-subject designs a small sample size was examined. In this study, only three students participated. With this mind, conclusions must be interpreted within the context of this study. Future research is needed to verify these results and its external validity across larger samples. Third, a functional assessment or analysis was not conducted prior to intervention implementation, so the student’s function of behavior was not determined. Fourth, the experimental design does not allow evaluation of separate effects resulting from self-management or self-prompting alone. Future investigations could employ multielement or multiple treatment designs in an attempt to distill how each of these components contributes to behavioral change. Moreover, future self-management studies are needed to examine the impact of this intervention on specific functions of behavior (e.g., escape, attention, sensory, multiple functions). Thirdly, all students’ were highly motivated and enjoyed using the handheld computer device, which may have produced intervention novelty effects. Evaluations over longer periods of time are required. Nevertheless, all students acquired the skills necessary to transition independently to different environments, and teachers reported favorable opinions concerning video modeling procedure and outcomes to improve behavioral functioning.

References


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Practices in Early Intervention for Children with Autism: A Comparison with the National Research Council Recommended Practices

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Abstract: The National Research Council (2001) report was reviewed to identify and document recommended practices for programs serving young children with autism spectrum disorder. Twenty seven surveys inquiring about program practices were sent to educational service districts, school districts, and neurodevelopmental centers in Oregon and Washington that had a program specifically designed to serve young children with autism spectrum disorder. Survey results indicated that the practices currently utilized within autism early intervention programs are in many ways inconsistent with the recommended practices identified in the literature. Implications and future research needs are discussed.

Currently, an estimated 1 in 150 (66.7 in 10,000) children have an autism spectrum disorder (ASD; Center for Disease Control [CDC], 2007). These prevalence estimates are of particular concern because they have increased dramatically from the early 1990s, when the estimated rate was 4 to 8 in 10,000 (Rogers, 1999). In addition to the rise in prevalence, children with ASD are now being identified at an earlier age. Recent research has indicated that ASD can be reliably diagnosed in children by the age of 2 years (Cox, et al., 1999; Osterling & Dawson, 1994; Stone, et al., 1999). More recently, researchers suggest that ASD might be diagnosed as early as 15 to 18 months (Hurth, Shaw, Izeman, Whaley, & Rogers, 1999), and possibly even by 8 to 12 months (Mars, Mauk, & Dowrick, 1998; Osterling & Dawson).

The recent changes in prevalence rates and diagnostic capabilities combined with the regulations of the Individuals with Disabilities Education Improvement Act (IDEIA; US Department of Education, 2006), the federal law that provides special education services to children with disabilities, has led to a significant rise in publicly funded early intervention programs serving infants, toddlers, and preschoolers identified with ASD (Heflin & Simpson, 1998; Hurth et al., 1999). Though the proliferation of intervention programs is promising, the accelerated rate at which these programs have come into existence has increased possibility that some may not adhere to best practices (Handleman & Harris, 2001). Thus, the potential of such programs to improve the outcomes of children with ASD may be compromised. The present study was designed to address the following research question: How do current practices utilized by publicly funded early intervention programs compare to recommended practices?

Historically it has been difficult to analyze areas of agreement regarding best practices among existing intervention programs because few, if any, studies compare different programs of equal intensity (National Research Council, 2001). The challenge of evaluating existing programs was further compounded because little standardization of program evidentiary bases (e.g., randomization and matching procedures) existed. Similarly, information regarding sample size, ethnicity, family characteristics, reporting measures, and characteristics of students involved in each program has often been lacking or insufficient.
Additionally, long-term follow-up and cost-benefit analysis information has rarely been offered (Dawson & Osterling, 1997; Lovaas, 1987). In part to address the relative lack of consensus regarding best practices in autism intervention, the National Research Council (NRC) was commissioned by the U.S. Department of Education’s Office of Special Education Programs to review the autism early intervention-related literature. The NRC (2001) was composed of a group of national autism experts who considered the following comprehensive programs in their review: Children’s Unit; Denver Model; Developmental Intervention Model; Douglass Developmental Center; Individualized Support Program; Learning Experiences, an Alternative Program for Preschoolers and Their Parents Preschool; Pivotal Response Model; Treatment and Education of Autistic and Communication-Handicapped Children; Young Autism Project; and Walden Early Childhood Programs. Taken together these represent a sample of nationally recognized, well-established, data-based programs serving children with ASD.

Following their review of existing programs the NRC (2001) developed and disseminated recommendations in the following areas: diagnosis; assessment and prevalence; role of families; goals for educational services; characteristics of effective interventions; public policies; personnel preparations; and needed research. Most relevant to the current study are the recommendations pertaining to goals for educational services and characteristics of effective interventions.

The recommendation related to educational services made by the NRC (2001) specified the need for a specialized curriculum. Specifically, the report indicated eight skill areas that should be carefully targeted within curriculum and programming. They are social skills; expressive, receptive and nonverbal communication; functional symbolic communication; attending to the environment and responding to appropriate motivational systems; fine and gross motor skills; cognitive skills (including symbolic play, basic concepts, academic skills); replacement of problem behaviors with appropriate behaviors; and skills needed to function in a general education classroom.

Beyond educational service recommendations, the NRC (2001) released additional guidelines regarding characteristics of effective early intervention programs. They are summarized as follows. First, intervention should begin as soon as a child is suspected of having ASD. This implies that intervention begins before, or while waiting for, a formal diagnosis to be made, assuming there is reason to suspect that the child will later qualify for services. Next, interventions should be individualized to the student’s and family’s strengths and areas of need. Regarding intensity of services, the NRC suggested that programs serving young children with ASD should provide a minimum of 25 hr of intervention per week, 12 months per year. Further, student-to-staff ratios should be as low as possible, allowing each child to receive individualized therapy and instruction.

Other recommended program characteristics included systematic, planned teaching and monitoring and quantifying child progress on an ongoing basis. The NRC (2001) indicated that this data should be used to assess Individual Education Program (IEP) or Individual Family Service Plan (IFSP) goals and objectives as well as to determine the effectiveness of the program for each child and to decide if program alterations are necessary. Further, inclusion with typically developing peers was recommended, with the stipulation that it leads to educational goals consistent with the educational recommendations previously stated.

Although the NRC (2001) recommendations have the potential to improve the early educational services that are available for children with ASD, this likely will not be the case if existing intervention programs are not consistent with the recommended practices and characteristics. Thus, it is necessary to examine the extent to which current ASD early intervention programs are consistent with the NRC recommendations. This is particularly important to do for publicly funded programs which provide services to the majority of children with developmental disabilities (Bride & Schwartz, 2003) without regard to their family income or resources.
Method

Participants

Participants were directors of ASD early intervention programs in the states of Oregon and Washington. Early intervention services were defined as those serving children birth to 5 years of age. Furthermore, the programs were only selected if they were specifically designed to serve young children with ASD (i.e., not developmental preschools). Finally, programs were limited to publicly funded classrooms providing services in affiliation with a school district, educational service district (ESD), or neurodevelopmental facility. In other words, private programs were not included in this study.

Once these parameters were determined, the offices of the superintendent of public instruction of each state were contacted to obtain information regarding ASD programs. Upon initial contact it was discovered that such information is not available directly from either state superintendent’s office. The difficulty encountered while attempting to generate a list of program contacts is necessary to note for two reasons. First, it illustrates the current disconnect among programs in both states and the state education agencies. This demonstrates one of the obstacles facing organizations and parents wishing to locate effective programs or obtain information about programs generally. Second, the lack of a central database of programs potentially limits the scope of this study. While exhaustive efforts were made to send a survey to every program in both states, it is quite possible that some were overlooked.

After contacting both state superintendents’ offices, the following strategies were employed to gain information about district and ESD affiliated ASD programs. First, the director for the Autism Outreach Project in Washington State was contacted, as were individual ESD directors and early childhood program directors in both states. From these communications, a list of possible programs was generated. Surveys were sent to all programs on the list, which included all Oregon early intervention/early childhood special education (EI/ECSE) areas and all Washington ESDs with possible programs. Finally, individual programs were added to the list and sent surveys based on personal communication with program directors as well as with other autism professionals in both states. It should be noted that in some cases surveys were sent to jurisdictions that were not on the generated list just in case a program might exist. As a result, the overall return rate may underestimate the actual return rate.

Neurodevelopmental providers were also included in the scope of this project. As with the educational programs, information regarding neurodevelopmental programs providing autism specific services was difficult to obtain. Therefore, each neurodevelopmental center in Oregon and Washington was initially emailed, then called. Surveys were then sent to programs that affirmatively responded to having an ASD early intervention program.

Procedure

Once the list of potential participants was established, a cover letter and survey were sent to a total of 26 programs. The survey was addressed to the director of each program based on the assumption that as the person in charge of administering the day-to-day workings of the program the directors would be most likely to be able to accurately respond to the survey questions. A second mailing was made two months following the initial mailing. In total, 17 out of 26 surveys were returned, indicating a 65.4% response rate. Of the 17 returned, ESDs and school districts represented 66%, and neurodevelopmental centers represented 34%.

Measure

The items for the 25-question survey were generated from a content analysis of several published studies that reviewed components of existing effective ASD programs (Dawson & Osterling, 1997; Hurth et al., 1999; Iovannone, Dunlap, Huber, & Kincaid, 2003; NRC, 2001; Powers, 1992). A bank of questions was generated, and from this bank 25 closed questions were selected to create the survey. This type of questioning method was selected because it is relatively easy to complete, thus increasing the chance of return (Fowler, 2002) and so the data could be analyzed using percentages.
(Alreck & Settle, 2004). Many of the questions also included an “other” option, allowing participants to provide an answer different than the options provided. Of these 25 questions, some were selected because they made inquiries regarding practices recommended by the NRC. Others were selected to gain additional information regarding various program characteristics (e.g., logistical information, staffing, teaching methods, etc.).

The survey was field-tested with the following professionals: The director, medical director, and educational director of a local neurodevelopmental facility, the director of an autism program in the state of California, a professor with specialization in the field of autism, and a professor with expertise in the area of survey research. As a result of the field-testing process numerous changes were made to the survey before the final version was sent out.

It should be noted that the original purpose of the survey was twofold. The first aim was to compare actual practices used by programs with the NRC (2001) recommendations. The other was to obtain information not included in the literature that was to be used to help guide the development of a new autism early intervention program. This paper will focus only on the results of the survey questions pertaining to the comparison between the NRC recommended practices and actual practices.

Data Analysis

For each survey question the percentage of respondents selecting each option was calculated. Because there were 17 respondents, each response represented 5.88% of the sample. However, for clarity and ease of presentation this percentage was rounded up to 6%. Participants had the option to mark more than one response for each question; therefore it is possible for the total percentage of responses for each question to add up to more than 100%.

Results

Earliest Start to Intervention

Regarding wait time, a high number of program directors reported students typically experience no wait to begin attending the program (72%). Only one director indicated the program waiting list was no more than 1 month (6%). Several directors specified a wait time of no more than 6 months (24%), and one indicated 1 year or more (6%). A few directors added that wait time varied by the service requested (18%). These responses indicate that students typically experience limited wait time when admitted to most ASD programs.

Intensity

Days per week. The question regarding number of days per week proved somewhat difficult to answer for many directors, as 48% indicated that the number of days per week depends on the student. A lower percentage indicated student attendance at 5 days per week (24%), followed by 4 days per week (18%), then 3 days per week (12%), with 2 days or less per week cited only by one director (6%).

Hours per week. Regarding the number of hours per week most students receive, responses reflect the wide range of hour options currently being provided for students with ASD. The highest percentage of responding program directors indicated students receive 7 to 9 hr per week (36%), followed by 4 to 6 hr per week (24%). Programs providing 3 hr or less (12%), 10–13 hr (12%), 14–16 hr (12%), 17–19 hr (12%) and 23–26 hr (12%) were all equal in number. Finally, one director marked the “other” option (6%) but did not specify hours.

Student-to-staff ratio. Directors also had difficulty providing information regarding student-to-staff ratio, with many marking more than one answer. A high percentage gave the student-to-staff ratio of 1:1–3 (90%). Next, directors indicated a ratio of 1:3–6 students (42%), while a smaller number said the ratio was 1:6–9 students (24%). No directors reported a ratio at or higher than 1 staff member to every 10 or more students.

Access to Typically Developing Peers

A large majority of directors indicated that students with ASD have access to typically developing peers while attending the program.

Practices in Early Intervention / 153
Of the program directors providing inclusion opportunities, most indicated that students with ASD have access to typical peers 50% or less of the time. In reviewing the additional written comments made by directors, it also was made clear that within programs some students may have access to these peers, while others do not.

**General Intervention Approaches**

Directors were provided with five recognized intervention approaches within the field of ASD research noted by the NRC (2001). These approaches were applied behavior analysis (ABA), neobehavioral (Lifeskills and Education for Students with Autism and other Pervasive Behavioral Challenges [LEAP]), Treatment and Education of Autistic and Related Communication-Handicapped Children (TEACCH), interactive approaches (Floor-time), and developmental theory (Denver Model). As expected, the directors surveyed employ an array of different teaching approaches. The most common approach indicated was applied behavior analysis (54%). A few directors also indicated approaches not listed as responses (12%), but did not specify the respective approaches. Many directors checked more than one approach, writing that their program is completely integrated. More than half of the programs reported utilizing a blended approach (54%). Directors selecting the blended approach were asked to provide the percentage of time each approach is used. Table 1 outlines the teaching approaches and percentages provided by these program directors.

**Curriculum and Instruction**

Directors were to indicate the specific instructional methods and curriculums utilized in their programs. They were given a choice of one-on-one instruction, group instruction, discrete trial teaching (DTT), incidental teaching, peer mediated/naturalistic, Strategies Based on Autism Research (STAR), structured teaching, pivotal response training (PRT), functional routines, Playschool curriculum, positive behavior support, and Floortime. Most program directors reported employing several different methods. All of the directors surveyed checked one-on-one instruction as a method used within their program (100%). Other instructional methods and curricula used by a high percentage of programs included functional routines (84%), group instruction (78%), incidental teaching (78%), and structured teaching (78%). Other methods reported were discrete trial teaching (66%), positive behavior support (66%), Developmental, Individual Differences, Relationship-Based Approach/Floortime (54%), peer mediated/naturalistic methods (48%), and pivotal response training (48%). Finally, the Strategies Based on Autism Research Program (42%), Playschool curriculum (24%), and other methods (12%) were all noted as in-

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**TABLE 1**

Summary of Director Responses Regarding Teaching Approaches Followed Most Closely (N = 9)

<table>
<thead>
<tr>
<th>Approaches and percentages</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely integrated so cannot provide percentage</td>
<td>2</td>
</tr>
<tr>
<td>Percentage depends on the child</td>
<td>2</td>
</tr>
<tr>
<td>Interactive 66, ABA 36</td>
<td>1</td>
</tr>
<tr>
<td>Interactive 50, TEACCH 25, ABA 15, Developmental 10</td>
<td>1</td>
</tr>
<tr>
<td>Interactive 75, TEACCH 15, ABA 10</td>
<td>1</td>
</tr>
<tr>
<td>Interactive 25, ABA 25, TEACCH 25, PECS 25</td>
<td>1</td>
</tr>
<tr>
<td>Interactive and ABA, percentage depends on the child</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. ABA = Applied Behavior Analysis; TEACCH = Treatment and Education of Autistic and Communication-Handicapped Children; PECS = Picture Exchange Communication System.
strucational and curricular methods employed by programs.

**Problem Behavior Prevention**

Most directors surveyed reported a variety of strategies to prevent problem behaviors. All of the programs use predictability and routine (100%). Most reported using direct instruction in basic behavioral skills (90%), a functional approach to problem behaviors (84%), and positive behavior intervention (84%). A slightly smaller percentage utilized a highly structured environment (78%), functional behavior assessment (78%), and principles of applied behavior analysis (72%). A lower number of directors reported using a consequence-based approach (30%), and only one reported using physically intrusive or aversive methods (6%).

**Monitoring Student Progress and Success**

To measure student progress and success, a high percentage of programs reported evaluating whether IEP or IFSP goals and objectives have been met (88%). Others reported using structured assessments (71%), parent and teacher ratings (65%), and long-term outcome studies (24%). Thirty-five percent of directors reported considering students and staff having fun as a measure of student and program success.

**Individualization for Families**

In terms of family individualization, all directors indicated that parents receive specific training regarding strategies to teach and support their children as a part of their program (100%). Many also noted that support for families (60%) and intervention services for children (54%) are provided in the home. In addition, a number of programs use parents as volunteers (42%). A number of directors marked the “other” option for this question (30%) and explained that their program provides parent organizations and education programs (30%).

**Discussion**

Because it is clear that an early start to intervention is highly correlated with positive outcomes for children with ASD (Rogers, 1996), the NRC (2001) has recommended an early start to intervention. Most directors surveyed allow children to enter their programs immediately upon referral, though 24% of directors indicated a wait time of approximately 6 months and 6% a wait time of over a year. It appears that most of the programs surveyed are able to provide services to children with minimal wait time, however, it is concerning that there are many programs that are not able to provide services as soon as a referral is made. It will be important for existing and new intervention programs to take the necessary steps to reduce wait-time for services as much as possible.

In addition to the need for an early start to intervention, the NRC (2001) stressed the importance of intensity of engagement, measured in days per week, hours per week, and student-to-staff ratio. Regarding days per week, the NRC recommended that children receive intervention 5 days per week. Comparing this recommendation to the number of hours per week indicated by the directors surveyed we found significant variability. For example, only 24% indicated student attendance of 5 days per week. It should be noted that many directors indicated that student attendance decisions are made on an individual basis and, therefore, did not provide exact numbers. These numbers are still concerning as the majority of children served by the programs surveyed appear to be receiving services less than 5 days per week.

Similarly concerning was the number of reported hours per week in which services were provided. Particularly troubling was the wide variation in the number of hours across programs. Only 12% of programs reported providing 23-26 hours per week, numbers within the range recommended by the NRC (2001), whereas 72% of programs provide less than 9 hours per week. The effectiveness of providing a high number of intervention hours is well documented in the research literature (McEachin, Smith, & Lovaas, 1993; NRC), yet our results indicate that most of the programs surveyed are not providing anywhere near the
number of recommended hours. Taken together, our results regarding the number of days and hours per week provided suggest that the outcomes of children with ASD enrolled in many public early intervention programs likely will be less than optimal in both the short- and long-term.

The third factor related to intensity of engagement is student-to-staff ratio, with the NRC (2001) recommending a low classroom ratio. Survey results related to this issue showed that most programs provide 1 staff member to every 1–3 students. These results are encouraging, however, many directors also reported a ratio of 1:3–6 students. Because directors were allowed to check more than one survey response it appears that ratios may vary within programs depending on the needs of each student. It is important to note that the staff ratios reported include certified teachers and paraprofessionals, as well as specialists (e.g., speech and language pathologists). This is significant because many early intervention professionals do not receive adequate formal training in assessment and instructional methods that they can use in the classroom to facilitate the development of young children with ASD and related developmental disabilities (Bricker, 1995; Schepis, Reid, Ownby, & Parsons, 2001). This may be especially true for the increasing number of paraeducators working in early intervention settings (Giangreco & Doyle, 2002; Giangreco, Edelman, Broer, & Doyle, 2001) who have lower levels of education and training than do certified teachers (Riggs & Mueller, 2001). As ASD programs continue to expand it will be important to ensure that all staff in such settings are adequately trained and capable of positively contributing to the development of the children in their care.

The NRC (2001) also recommended that programs provide access to typically developing peers, though it did not specify the amount of time within each day that should be spent in contact with such peers. The majority of programs surveyed provide access to peers, though the amount of time varies greatly among programs, with most directors indicating that students with ASD have access to typical peers 50% or less of their total time in program. It may be helpful for future recommendations to include specific information regarding the amount of time students should have access to typical peers.

The NRC (2001) did not endorse one type of teaching approach over another. Perhaps not surprisingly, our survey results indicated that programs are utilizing a wide variety of teaching approaches. Over 50% of the directors reported using applied behavior analysis, and over 50% also reported using a blended approach. Whereas the effectiveness of applied behavior analytic approaches have been documented in the research literature (Lovaas, 1987; McEachin et al., 1993), the research is still inconclusive regarding the effectiveness of using a blended approach. With the current use of blended methods there appears to be a risk of drift from the types of systematic, planned instruction that have been found to be so effective with young children who have ASD. Future research should focus on the effectiveness of blended approaches, as well as the ability of programs to provide systematic, planned instruction through the use of a blended approach.

Providing a specialized curriculum clearly targeting deficit skill areas is a clear recommendation made by the NRC (2001). Our results suggest that most programs are using a specialized curriculum. As with types of teaching approaches, it appears that programs are utilizing a wide variety of curriculums and often blending many different curriculums. Future research is warranted to examine the effectiveness of blending multiple curriculums and strategies. Further, research should search for the factors involved in selecting the different types of curriculums and strategies within each program. For example, are strategies selected based on the preferences of program personnel or in response to the effectiveness of the strategies when used with the particular child? In addition, it will be important to examine the extent to which the curriculums and strategies employed address the developmental skill areas outlined in the NRC recommendations.

A related issue is how programs measure student progress and success. The NRC (2001) stressed the importance of monitoring and quantifying child progress on an ongoing basis. Consistent with the NRC recommendations the large majority of program directors reported assessing child progress toward IEP/
IFSP goals. Most directors also reported using a multi-method, multi-informant assessment approach including structured assessments, as well as parent and teacher ratings. Thus, it appears that most of the programs surveyed are monitoring child progress as recommended by the NRC. What is less clear is whether the programs are using such data to make alterations to each child’s program as necessary. As noted by Downs and Strand (2006) this is a critical issue that is often neglected and which needs to be effectively addressed by all early intervention programs.

Employing strategies to prevent problem behaviors is another practice recommended by the NRC (2001). All directors surveyed reported the use of such strategies. The majority reported predictability and routine, direct instruction in basic behavioral skills, a functional approach to problem behaviors, and positive behavioral intervention as the primary strategies utilized. This is a recommendation that most of the programs surveyed appear to be following.

Similarly, little debate exists in the research literature regarding the importance of family involvement and individualization in an ASD program, as noted by the NRC (2001). This consensus is echoed in the survey results, as all programs provide specific training to enable parents to teach and support their child. This is the recommendation that the highest percentage of respondents reported following, though the way in which families are included varies from program to program. It is important to note that the conclusions that can be drawn from this study are limited somewhat by the methodology employed. Specifically, this study, as is the case with all survey research, relied on self-report rather than actual observation of programs. Thus, it is not possible to be certain that the practices reported by program directors are actually in place. In fact, because self-report biases typically serve to cast respondents in a positive light it is possible that the programs surveyed may be providing services that are even less consistent with the NRC recommendations than those reported. A related issue is the importance of assessing whether specific teaching approaches are being implemented with appropriate fidelity. Future studies should seek to compare self-reports with observational data to provide a potentially more accurate assessment of program components and fidelity.

This study also was limited somewhat by the possibility of sampling bias. There is no central registry of ASD programs serving young children in Oregon and Washington. Therefore, obtaining name and contact information proved to be a daunting task and may have limited the number of ASD programs included in the survey process, as at least a few potentially eligible programs may not have received a survey. This study was also limited by surveying only two states. Further, though the response rate was quite high (65.4%), it is possible that responders and non-responders may have differed in some way. However, it is important to note that surveys were sent to some jurisdictions where there was not confirmation that an ASD program even existed. As a result, it is quite likely that the actual rate of return was higher than indicated. In addition, the response rate among programs in rural areas (i.e., those with a population under 50,000) was 57% and the response rate among programs in urban and suburban areas was 68%, suggesting a fairly good geographic distribution in the final sample. Still, the potential sampling biases noted underscore the need to examine this issue on a national level.

Despite the limitations noted, this study provides some useful information regarding the practices and characteristics of early intervention programs for young children with ASD.

As the number of children diagnosed with ASD continues to rise, it is likely that the number of publicly funded program designed to meet the needs of these children and their families will also continue to rise. As this occurs it will be important for programs to carefully consider the recommendations put forth by the NRC (2001) regarding best practices for providing services for these young citizens. Although they should be interpreted cautiously, the results of the present study suggest that many programs may not currently meet many of these recommendations. Further, it is clear that the strategies utilized from program to program likely vary widely, and it is unclear how each program is making individual programming determinations. As programs continue to proliferate to meet the needs of the
increasing number of children identified with ASD, it will be necessary to monitor the consistency with which such programs are aligned with the best practices and recommendations outlined in the literature. Future research should also focus on how to best support programs in following the recommendations more closely, so that children with ASD may receive the most effective intervention possible.

References


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**Look! I'm in College! DVD**

*Look, I’m in College!* is a half-hour documentary that follows four students through an extraordinary time in their lives. Terence, Benny, Rayquan, and Donald are New York City public school students from high-need communities. They all have autism and intellectual disabilities, and they are the charter class in a college-based inclusion program. Through collaborative efforts of the New York City District 75 and Pace University, these four young men from challenging socio-economic backgrounds met with success as they participated in a college community among their age-appropriate peers.

By the Division on Autism and Developmental Disabilities (DADD). 2008. 31 minutes.

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Position Announcement

Publications Chair

The Division on Autism and Developmental Disabilities
The Council for Exceptional Children

The Division on Autism and Developmental Disabilities (DADD) of the Council for Exceptional Children (CEC) is seeking a professional to serve on the Division’s Board of Directors as Publications Chair. This position is appointed by the board for a three year term, with a maximum of three terms.

The Publications Chair oversees and coordinates all publications efforts of the DADD. These include the following:

- The Division’s flagship journal *Education and Training in Autism and Developmental Disabilities*.
- The Division’s bonus journal for members *Focus on Autism and Other Developmental Disabilities*.
- The Division’s *Prism* series of practitioner-oriented monographs. (This series is presently up to *Prism 6*.)
- The Division’s other book publications, including:
  - *Social Skills in School and Community* 2nd ed.
  - *Research-Based Practices in Developmental Disabilities* 2nd ed.
  - The DADD ETDD monograph series:
    - *Social and Communication Skills in Developmental Disabilities*.
    - *Assessment and Instruction in Developmental Disabilities*.
    - *Inclusion and Employment in Developmental Disabilities*.
  - *James Castle: His Life and Art*.
- The Division’s video publications, including:
  - *James Castle: Dream House*.
  - *Look: I’m In College!*
  - *Taylor Crowe: Growing Up With Autism*

The ideal candidate for the position of DADD Publications Chair would have the following background and experiences:

- A history of membership in CEC and DADD.
- A history of experience in serving individuals with autism and developmental disabilities.
- Successful background and history of scholarly professional productivity, including journals and books.
- Financial judgment and professional background in working with publishers and publication sales outlets.
- Editorial skills.
- Knowledge and skills in electronic publishing.

The position of DADD Publications Chair is not a compensated one. However, the individual does receive full reimbursement for travel to and registration at the annual CEC Conference, along with Board allocated travel reimbursement for the mid-year meetings of the DADD Board of Directors (including registration for the DADD biennial conference, when this conference coincides with the mid-year meeting of the Division’s Board of Directors).

Interested individuals should submit a letter of interest along with supporting evidence of desired background and skills electronically to Dr. Teresa Taber Doughty, Purdue University, tabert@purdue.edu