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

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Effects of most to least prompting on teaching simple progression swimming skill for children with autism. İlker Yılmaz, **Ferman Konukman**, Binyamin Birkan, and Mehmet Yanardağ, The College at Brockport, State University of New York, Dept. of Physical Education and Sports, Brockport, NY 14420-2989.

Long-term outcomes of services for two persons with significant disabilities with differing educational experiences: A qualitative consideration of the impact of educational experiences. **Diane Lea Ryndak**, Terri Ward, Sandra Alper, Jennifer Wilson Montgomery, and Jill F. Storch, G315 Norman Hall, PO Box 117050, Gainesville, FL 32611-7050.

Evaluation of a personal digital assistand as a self-prompting device for increasing multi-step task completion by studens with moderate intellectual disabilities. **Linda Mechling**, David L. Gast, and Nicole H. Seid, University of North Carolina Wilmington, Department of Early Childhood and Special Education, 601 South College Road, Wilmington, NC 28403-5940.

Resilience in families with an autistic child. **Abraham P. Greef**, and Kerry-Jan van der Walt, Department of Psychology, University of Stellenbosch, Private Bag XI, Matieland, 7602 SOUTH AFRICA.

Social skills instruction carried out by teachers working at private special education institutions. **Ayten Uysal** and Yasemin Ergenekon, Anadolu University, Research Institute for the Handicapped, Eskisehir, 2647 TURKEY.

Description of communication breakdown repair strategies produced by nonverbal students with developmental disabilities. Baris Dincer and **Dilek Erbas**, Erciyes Universitesi, Ozel Egitim Bolumu, Kayseri, TURKEY.

Professionals' attitude on partnering with families of children and youth with disabilities. **Jamie Bezdek**, Jean Ann Summers, and Ann Turnbull, Haworth Hall, 1200 Sunnyside Avenue, Room 3136, The University of Kansas, Lawrence, KS 66045-7534.

Effects of the TOUCHMATH program compared to a number line strategy to teach addition facts to middle school students with moderate intellectual disabilities. Dale Fletcher, **Richard Boon**, and David F. Cihak, Department of Communication Sciences, & Special Education, 537 Aderhold Hall, College of Education, Athens, GA 30602.

Enabling a prelinguistic communicator with autism to use picture card as a strategy for repairing listener misunderstandings: A case study. **Yoshihisa Ohtake**, Michael Wehmeyer, Naomi Uchida, Akitaka Nakaya, and Masafumi Yanagihara, University of Okayama University, 3-1-1 Tushima-naka, Okayama-Shi, Okayama, 700-8530 JAPAN.

Training teachers to use an inquiry-based task analysis to teach science to students with moderate and severe disabilities. **Ginevra Courtade**, Diane M. Browder, Fred Spooner, and Warren DiBiase, 509 Wilson Ave, Morgantown, WV 26501.

Family perspectives on post-secondary education for students with intellectual disabilities. **Megan Griffin**, Elise D. McMillan, and Robert M. Hodapp, Vanderbilt University, 230 Appleton Place, Peabody Box 228, Nashville, TN 37203.

Deinstitutionalisation and adaptation of adults with intellectual disabilities: Results from Quebec. **Hubert Gascon** and Pierre Morin, Departement des Sciences del l'education, UQAR Campus de Levis, 1595, boulevard Alphonse-Desjardins, LEVIS (Quebec), G6V 0A6 CANADA.

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Promoting Active Engagement in the General Education Classroom and Access to the General Education Curriculum for Students with Cognitive Disabilities

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Abstract: This study examined the effects of the Self-Determined Learning Model of Instruction in promoting active engagement in the general education classroom and access to the general education curriculum for three junior high school students with significant cognitive disabilities. The goals included improving public speaking, asking more questions in class, and improving food preparation skills. The students were instructed to employ student-directed learning strategies to achieve their goals. Specifically, antecedent cue regulation (picture cues) and self-instruction strategies were used. Positive changes were reported for all students. Also, all of the students and two of their teachers expressed positive perceptions about the value of such instruction. The implications of these findings with regard to accessing the general curriculum are discussed.

The expectation for the education of students with significant cognitive disabilities, promulgated both by federal law and, increasingly, in best practices, is that such students will be educated with their non-disabled peers and that they will be involved with and show progress in the general education curriculum. These expectations do not mitigate the need for instruction to promote unique student learning needs that are not found in the general education curriculum, but do require that the educational programs of students with significant cognitive disabilities move beyond the status quo of simply functional skills instruction (Spooner & Browder, 2006).

Beyond just expectations, however, there is now an emerging evidence-base documenting that students with significant cognitive disabilities can gain access to the general education curriculum and documenting practices to promote such access. Spooner, Dymond, Smith, and Kennedy (2006) suggested that there are four general approaches that have been investigated as routes to promoting access to the general education curriculum for students with significant cognitive disabilities: peer supports, self-determination, universal design for learning, and teaching and assessing content standards. Each approach has evidence to support its legitimacy on this list. Carter and Kennedy (2006), for example, documented the evidence base for peer-mediated interventions to support more meaningful engagement of students with significant cognitive disabilities. Likewise, researchers have examined the links between aligning instruction for students with significant cognitive disabilities with state and district-level standards (Browder, Spooner, Wakeman, Trela, & Baker, 2006; Lee, Wehmeyer, Palmer, Soukup, & Little, 2008) and the potential for universal design for learning to impact student access, involvement, and progress (Wehmeyer, Smith, & Davies, 2005; Wehmeyer, Smith, Palmer, & Davies, 2004).

The study was supported in part by Department of Education Grant No. H324D990065 awarded to Drs. Wehmeyer and Agran, and does not necessarily reflect the opinions of the Office of Special Education Programs. Correspondence concerning this article should be addressed to Martin Agran, Department of Special Education, College of Education, Department 3374, 1000 E. University Avenue, University of Wyoming, Laramie, Wyoming, 82071. Email: magran@uwyo.edu

While we suspect that Spooner and colleagues did not intend that each of these approaches are orthogonal and non-overlapping, it is of value to examine each to determine their impact with regard to promoting student access, involvement, and, ultimately, progress. The fourth approach suggested by Spooner et al. (2006) was the role of promoting self-determination to promote access to the general education curriculum, and the present study focuses on this approach.

Wehmeyer, Field, Doren, Jones, and Mason (2004) suggested the instruction to promote self-determination can promote student access to and involvement in the general education curriculum in two ways. First, in virtually every set of State adopted standards there are student achievement standards in which students are expected to learn and apply effective problem-solving, decision-making, and goal-setting skills. By identifying where in the general education curriculum all students are expected to learn skills and knowledge related to the component elements of self-determined behavior, teachers could promote self-determination and promote access to and progress in the general education curriculum. In addition, teaching students with disabilities skills such as self-regulation, self-management, problem solving, goal setting and decision making provides students with valuable tools to enhance their academic performance. Kame'enui and Simmons (1999) identified one basic design principle of curriculum adaptation to be the use of "conspicuous strategies," noting: "To solve problems, students follow a set of steps or strategies. Many students develop their own strategies, but a considerable amount of time may be required for the student to identify the optimum strategy. For students with disabilities, such an approach is highly problematic because instructional time is a precious commodity and these learners may never figure out an efficient strategy. Learning is most efficient when a teacher can make it conspicuous or explicit" (p. 15). Students who learn effectively set learning goals and objectives to reach those goals and then use problem-solving and self-regulation skills to tackle the activities to achieve those goals, all components of instruction to promote self-determination.

There are several studies that have documented the relationship between promoting self-determination and access to the general education for students with disabilities. Specifically, these studies have examined the application of an instructional model, the Self-Determined Learning Model of Instruction (SDLMI), described in more detail subsequently, to promote such access (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000).

Palmer, Wehmeyer, Gipson, and Agran (2004) used a modified interrupted time series with switching replication design to examine the attainment of goals linked to science, social studies, or language arts standards for 22 middle school students with intellectual disability. Students received support to implement the SDLMI to address a goal that was derived from the state standard in each respective content area that emphasized a self-determination focus. Repeated measures ANOVA for pre and post-intervention problem-solving criterion scores, problem solution scores, and study planning scores revealed significant group by measurement time differences, with students in the experimental group showing significant improvement in their knowledge and skills in all content areas. Students were able to achieve educationally-relevant goals (using the *Goal Attainment Scaling* metric) tied to district-level standards at expected or greater than expected levels, thus supporting the hypothesis that instruction in self-determination can serve as an 'entry point' to the general curriculum for students with disabilities.

Lee et al. (2008) used a pretest-posttest randomized trial control group design with 42 students with cognitive disabilities to evaluate the impact of the *SDLMI* on access and goal attainment. Students who were involved with the *SDLMI* were able to achieve at, in general, a higher than expected rate, self-set goals linked to the general education curriculum. Agran, Cavin, Wehmeyer, and Palmer (2006) examined the effects of the *SDLMI* on the academic skill performance of three junior high school students with moderate to severe intellectual disability using a single-subject design. The academic skills taught students were aligned to the district general education curriculum, and extended benchmarks were individually determined. The students were instructed to engage in a self-regulated

TABLE 1

Student Characteristics

Name	*Age*	*Gender*	*Grade*	*Disability*[a]	*Support Needs*[b]	*Participation in General Education*	*Challenging Behavior*
Alisha	15	Female	8th	Mental disability	Pervasive (Level 3)	Included in 4 out of 7 general education classes	Non-compliance
Emily	14	Female	8th	Mental disability	Limited (Level 2)	Included in 4 out of 7 general education classes	Easily distracted
Ben	15	Male	9th	Mental disability, behavioral disability	Limited-extensive (Level 3)	Included in 2 out of 7 general education classes	Inattentive, Oppositional, aggression toward peers

[a] Based on state guidelines of need for support. Standardized intelligence or performance test scores are used for supportive information but are not included in the IEPs.

[b] Based upon support hierarchy from *Mental retardation: Definition, classification, and systems of support*, by the American Association on Mental Retardation, 2002.

problem-solving strategy, as well as to use one or more additional student-directed learning strategies. Last, Agran, Wehmeyer, Palmer, and Calvin (2008) investigated the effects of the SDLMI on a variety of academic skills for three junior high students with extensive support needs included in a general education Health class. Five generic behaviors were identified: coming to class prepared (i.e., having notebook, writing instrument, and planner), begin journaling (i.e., writing a minimum of three words), take required materials out when requested (e.g., work sheets, instructional materials), begin assignment, and engage in in-group activities as assigned. Positive changes were reported for all students.

The purpose of this study was to extend the literature base pertaining to the role of promoting self-determination as a means to promote access to the general education curriculum. Specifically, this study examined the effects of the SDLMI in promoting active engagement in the general education classroom and access to the general education curriculum for three junior high school students with significant cognitive disabilities, focusing not on academic skill attainment in the general education classroom, but on the attainment of student behaviors that contribute to more positive achievement outcomes.

Method

Participants and Settings

Three Junior High students participated, two females and one male. All students were receiving special education services under the state category of cognitive disabilities, with secondary disabilities of seizure disorder, Down syndrome, and ADHD, respectively. Table 1 summarizes the students' backgrounds. The state in which the study was conducted determines eligibility for services in the area of cognitive disabilities based on level of support needed. Level 1 represents the least support and Level 3 the most. All three students were classified as Level 2 or 3. The students were in at least one general education class per day.

Two of the students, Alisha and Emily, were 8th Graders in a school district serving about 2,100 students. Ben was a 9th grader in a neighboring district serving about 4,500 students. All three students were educated in general education classrooms for at least a portion of their school day. Both Ben and Emily were included in Basic Family Consumer Science classes, while Alisha was in a half-semester Speech class. Ben and Alisha each had an aide who accompanied them to their classes. Emily participated in class without the support of an aide. The aides' respon-

TABLE 2

Standards and Benchmarks

Student	*Standard*	*Benchmark*	*Goals from Which Selected*	*Goal Chosen*	*Measurement of Goal*
Alisha	Understand the nature of scientific inquiry.	Design and conduct scientific investigation. (grades 6-8)	Practicing the scientific inquiry (including communication), understanding motion and simple machines, understanding the states of matter.	Increase formal and informal public speaking ability.	Correct performance of public speaking task sequence activities.
Emily	Understand the importance of positive self-concept.	Understand how communication techniques can improve relationships. (8^{th} grade)	Applying effective listening skills, communicate effectively, learn to become more assertive.	Increase the number questions asked (communicate effectively).	Correct performance of problem-solving steps for asking questions.
Ben	Understand essential nutrition concept and food preparation techniques.	Demonstrate basic food preparation skills by following recipes. (8^{th} grade)	Prepare various foods in class, learn the names and uses of kitchen utensils, learn the importance of accurate measurement.	Prepare various foods in class.	Correct performance of self-instruction strategy in following recipes.

sibilities were to support the students' learning needs as well as to assist other students in the class if necessary.

Alisha was in 8th grade Speech and experienced great difficulty in public speaking. She failed to make eye contact, fidgeted much with her hair, and spoke in a quiet mumbled voice. She wanted to increase her speaking ability in both formal and informal speaking. Although Emily was doing well in Family Consumer Sciences class, she would rarely ask any questions for clarification or additional information. Instead she would wait until a teacher noticed that she was not doing anything and then come over and ask if she needed help. Her goal was to increase the number of questions she asked during class that were specifically related to the assignment. Ben had little experience in cooking and difficulty following directions. His goal was to increase his cooking ability by following the directions in recipes.

Dependent Measures

The target behaviors were developed in regard to the school district's Standards and Benchmarks. The students developed their goals by using the SDLMI (see description of SDLMI in Experimental Design and Conditions). A standard developed by the district was chosen for each student based the results of Phase 1 of the model. Table 2 describes the Standards and goals. The primary dependent measure for the study was the percentage of occurrence of target behaviors performed by each student.

Data collection. One researcher, two paraprofessionals, and one general education teacher collected data throughout the base-

line, intervention, and maintenance conditions. The third author of this paper was the primary data collector, and the paraprofessionals and general educator collected data across approximately 20% of the sessions. The percentage of correct responses was recorded.

Observer training. Observer training consisted of three steps. First, the operational definitions of the target behaviors and the recording system were explained to the observer. Also, the instructional checklist used to monitor treatment fidelity was explained. Second, the observers observed the students in their general education classes and were provided practice in observing and recording the students' performance. Third, the primary and independent observers were provided opportunities to collect data concurrently. When the primary observer reached an 80% agreement across three consecutive sessions, formal data collection began.

Interobserver agreement. Interobserver agreement scores were obtained throughout all experimental conditions. An independent observer observed and recorded participants' performance of target behaviors approximately 25% of the sessions. A point-by-point agreement ratio was used to determine the agreement between the observers. Point-by-point agreement is established by dividing the number of agreements by the number of agreements added to the disagreements and multiplied by 100 (Kazdin, 1982). The range across all students was 94–100%, with a mean of 98% across all experimental conditions for all students. For Alisha, a mean of 99% was reported, with a range of 97–100%. For both Emily and Ben, a mean of 97% was reported with a range of 94–100%.

Experimental Design and Intervention

A multiple baseline design across students ((Tawney & Gast, 1984) was used to examine the effects of the intervention on student performance. The experimental design included three experimental conditions: baseline, intervention, and maintenance. A pre-baseline component was also conducted, but no data were collected.

The SDLMI served as the intervention for the investigation. The SDLMI is a model of teaching based upon the principles of self-determination and self-regulated learning (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000). Model implementation involves teaching students a self-regulated problem-solving process to allow them to set goals, plan courses of action to achieve these goals, self-evaluate their progress, and adjust or modify their goals or plans as needed. There are three phases in the model. Each phase of the model introduces a problem the student needs to address; specifically, What is my goal? What is my plan? What have I learned? Each phase includes a series of four *Student Questions* (see Table 3). By answering each question in Phases 1 and 2, the student informs him- or herself about his or her concern (or problem) and identifies a solution(s) to the problem. Following, the student implements a self-directed strategy to resolve the problem, and, last, evaluates the action taken.

Pre-baseline. Prior to baseline, the students were instructed to go through Phase 1 of the model. This phase consisted of several questions designed to help the students to develop an educational goal. The researchers supported teachers to enable the students to answer the questions in the first phase. Also, the cooperating teachers shared with the students the relevant standards and benchmarks of the school district so that the goals could be aligned with them. With this support, each student was able to set a goal for him- or herself.

Baseline. Baseline data were collected for all students. Baseline for Alisha and Emily took place in the general education classroom they were attending during the hour they participated. Baseline data for Ben were collected during 7th hour study hall on a one-on-one basis with the researcher. Each student was told he or she would be observed during his or her general education class, but was not told why. Continued probes of Emily and Ben took place immediately before they were moved from baseline to intervention. The students' performance related to their chosen target behaviors was recorded. The observations were conducted over the entire class period. No feedback or reinforcement was given during this condition. Movement into training was granted after a student's performance was stable for at least three consecutive data collection sessions.

TABLE 3

Student Responses to Questions

Phase 1

Alisha

- What do I want to learn?–How to speak to people better.
- What do I know about it now?—Nothing.
- What must change for me to learn what I don't know?–Keep my hands (down) and talk louder.
- What can I do to make this happen?–Work harder.

Emily

- What do I want to learn?–To get help in Ms. Jacobsen's (not her real name) class.
- What do I know about it now?—Nothing.
- What must change for me to learn what I don't know?–Ask for help.
- What can I do to make this happen?–Don't know.

Ben

- What do I want to learn?–Make snacks after school.
- What do I know about it now–Can make PBJ sandwiches.
- What must change for me to learn what I don't know?—Nothing.
- What can I do to make this happen?–Learn more stuff to make.

Phase 3

Alisha

- What actions have I taken?–To talk better in class.
- What barriers have been removed?–(No response).
- What has changed about what I don't know?–My eyes (are) up and (I) talk louder.
- Do I know what I want to know?—Yes.

Emily

- What actions have I taken?–Asked question in class.
- What barriers have been removed?—Nothing.
- What has changed about what I don't know?–I don't know.
- Do I know what I want to know?–Yes.

Ben

- What actions have I taken?–Made more foods.
- What barriers have been removed?–Tried stuff with Mike (trainer).
- What has changed about what I don't know?–Tried more stuff.
- Do I know what I want to know?—Yes.

Phase 2 of the SDLMI was completed by each student during baseline. This phase involved four questions to assist the students in developing plans to achieve their goals. Different types of self-directed learning strategies were explained (e.g., picture cues, self-instruction), and the students were asked to choose which one they would like to use. No instruction, reinforcement, or feedback was provided during baseline. Each participant moved into the intervention condition after at least three consecutive sessions of stable responding were observed.

Intervention. The intervention involved implementing the action plan each student had developed using Phase 2 of the SDLMI. Strategies were developed by the researchers to assist each student in achieving his or her goal, based on the learning strategy he or she preferred. Alisha and her associate were trained on how to use an antecedent cue regulation card (picture cues) with symbols of each specific skill performed as she spoke (e.g. eye contact, speaking loud and clear, keeping hands at her side.) Emily was trained to follow a six-step self-instruction problem-solving sequence. The sequence was developed to improve her conversational skills and to increase the frequency of asking question of peers and teachers. Ben was also instructed to use a self-instruction strategy that focused on following the directions to a recipe.

All instruction took place during an open study hall or break period. Approximately 15- to 20-min instructional periods were used. Each participant was instructed on how to use the antecedent cue regulation or self-instruction strategy. First, the strategy was demonstrated by the trainer who provided examples and non-examples of its execution. Following, the students demonstrated the learning strategy and were provided feedback on their performance. Multiple opportunities to perform the strategy with the researcher providing cues and directions as needed were provided. Finally, the student would perform the strategy without support. Mastery of target behavior for all students was set at 80%. Once the participant had reached the established criterion of at least 80% correct responding over three consecutive sessions, the participant moved on to the maintenance condition.

Alisha had a cue card that she took to her

Speech class. The cue card had four different pictures on it (i.e., two eyes, two hands, a face with a smile on it, a speaker with lines coming off it). She was trained what each symbol meant and what she was to do when she looked at the card. The picture of the *eyes* cued her to look at who she was talking to, the *hands* reminded her to keep her hands at her side or on the desk/podium (out of her face), the *face with the smile* prompted her to smile when she talked, and the *speaker* reminded her to speak loud and clearly so people could understand her. Training was done by an associate prior to class. Alisha was also asked after class how she felt she did in class talking with other people.

Emily and Ben had a series of self-instructions they used to guide them through their respective instructional activities. Emily's self-instructions were:

1) "I need to ask a question" to identify I need help;
2) "What do I ask?" to begin forming a question;
3) "Is the question about what we are doing in class?" to make sure the question is specific to what she needs help in;
4) "Who can I ask?" to identify who she needs to ask for help (e.g., teacher, associate, peer);
5) "Ask the question"; and, last,
6) "Did I ask a question about what we were doing in class?" to self-evaluate her performance after asking the question.

Emily was taught how to use the self-instruction prior to her Family Consumer Science class by the researcher who guided her on how to use the self instruction cues, as well as expand her ability to ask others in the class for help when appropriate,

Ben's self-instructions directed him how to follow a recipe. His instructions included:

1) Read Recipe out loud;
2) Ask an adult if I have questions;
3) Collect all ingredients;
4) Collect all utensils;
5) Read each step out loud and do what it says;
6) Put stuff away; and
7) Clean space.

Ben was trained during a free period (7th period) of his day by the researcher. He was taught to state the instructions out loud, and then perform the directed instruction. Practice trials were conducted without preparing any food, followed by the preparation of a snack. During the instruction, Ben was initially allowed to have a laminated card with each step printed on it, but this was faded after the first three intervention sessions.

Maintenance. After the intervention was faded, the observations continued for each participant during this condition to assess maintenance. During maintenance each participant completed Phase 3 to evaluate his or her progress in achieving the self-selected goal. No feedback or prompting was delivered. Data continued to be collected until classes were over for the semester. Alisha's speech class ended half way through the semester due to it being a 9-week course.

Social Validation

The SDLMI allowed participants to socially validate the intervention in several ways. First, Phase I included several questions that assisted the student in developing meaningful instructional goals for themselves (see description of Phase I in *Experimental Design and Conditions*). Additionally, the students were asked to provide input on a self-directed learning strategy that they might want to use to promote their learning. For Alisha and Emily, their general and special education teachers supported them as they addressed each of the questions. For Ben, his associate assumed this responsibility. Also, the SDLMI allowed the student to evaluate his or her progress in achieving their self-selected goals in Phase III of the model (see description in *Experimental Design and Conditions*).

Results

Baseline

Figure 1 displays the performance data of each participant. Alisha had range of 20% to 33% with and average of 24% for her public speaking skills. Because of a stable pattern, she was moved into the intervention after 3 days of baseline. Emily had a range of 0% to

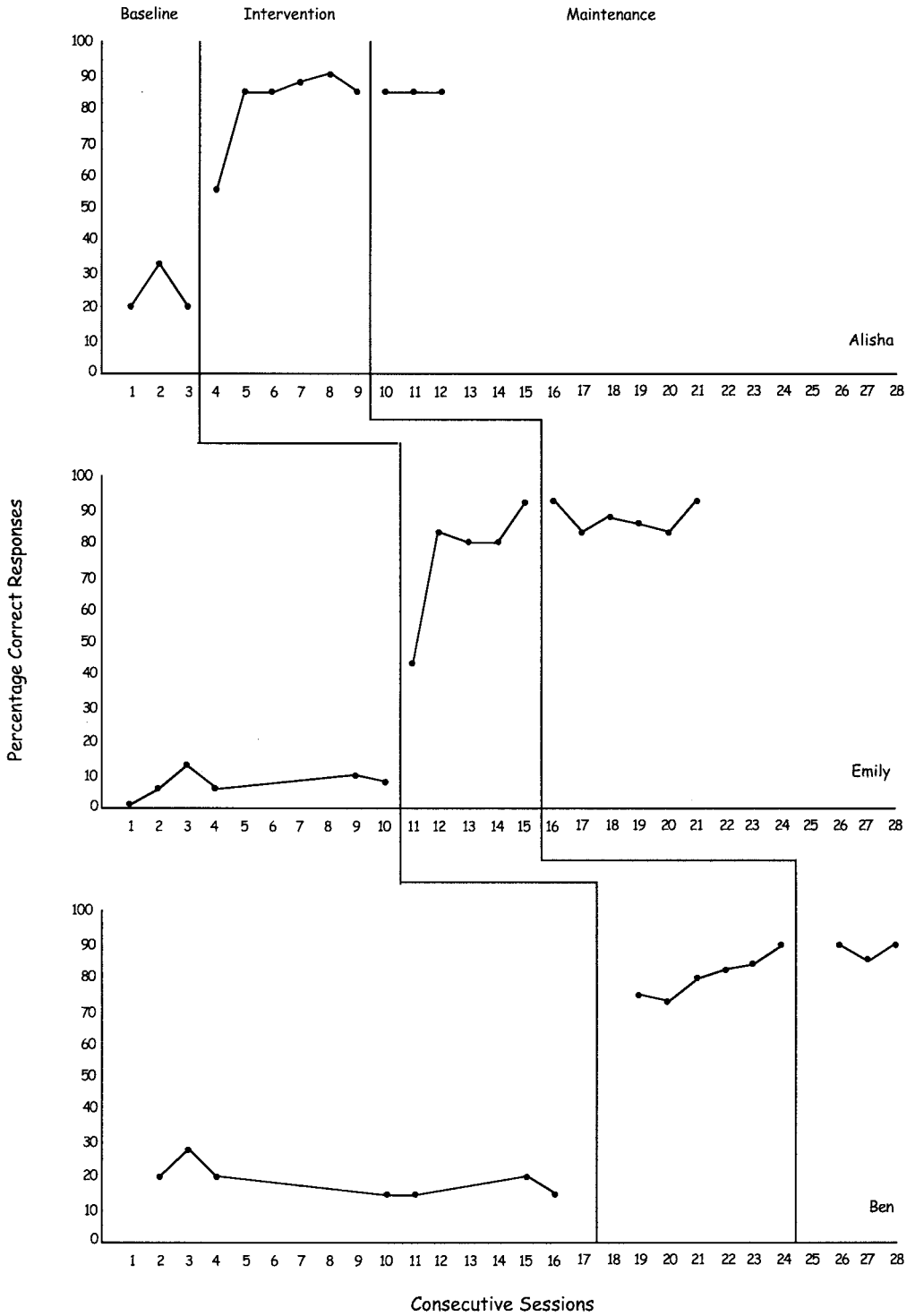

Figure 1. Percentage of correct responses of students across baseline, training, and maintenance conditions.

12% with an average of 6 % for question asking. Ben had a range of 15% to 28% with an average of 20% for following a recipe.

Intervention

There was a marked increase in performance of the target behaviors for all three participants. Alisha had a range of 56% to 90% with an average of 80% in demonstrating her public speaking skills. Emily had a range from 43% to 92% with an average of 76% in demonstrating her ability to ask relevant questions. Ben had a range from 73% to 90% with an average of 81% in demonstrating his ability to follow the directions in a recipe.

Maintenance

All three students maintained their performance at a level of at least 80% for the duration of the study. Maintenance for Alisha lasted for only one week after intervention because her speech course was only one-half of the spring semester. She maintained at 84%. Maintenance for Emily lasted for 5 weeks. She had a range from 83% to 93% with an average of 87% in asking relevant questions. For Ben maintenance lasted for 2 weeks after the intervention had ended. His performance ranged from 85% to 92% with an average of 89% in following directions in a recipe.

Social Validation

Social validation data were obtained from both the participants and their teachers. Table 3 reports the participants' responses to the problem-solving questions in Phases I and III. Alisha and Ben were able to set goals for themselves and determine what they needed to do to achieve these goals. Emily knew what she needed to do (ask for help), but didn't know what to do to change her behavior. In Phase III, the students reported what they did to achieve their goals, and Alisha and Ben indicated what had changed about their situation.

Two of their participants' teachers reported positive changes. Alisha's speech pathologist indicated that Alisha has improved her expressive language in terms of answering questions, sharing, and making requests for basic needs. Emily's Family Consumer Science Teacher remarked that Emily has been better about asking for help, rather than sitting and waiting for someone to come up and see if she is alright.

Discussion

The purpose of the present investigation was to examine the effects of the SDLMI in promoting access to the general education curriculum of three junior high school students with varying support (limited to pervasive) and learning needs; specifically, public speaking, asking questions, and preparing food. All of the students achieved the mastery level and maintained their performance for the duration of the maintenance condition, which differed across students based on logistical (e.g., semester end) and temporal (e.g., end of school year) factors. Further, the social validation data obtained from the participants and two participating teachers were generally positive. The study adds to the growing research literature that suggests self-determination or student-directed learning strategies and the SDLMI, specifically, can promote access to the general curriculum for students with significant support needs.

Spooner et al. (2006) suggested that a potentially effective way to promote access to the general education curriculum is by promoting students' self-determination, and indicated that the SDLMI represents an instructional model that has been empirically validated. The present investigation provides a further demonstration that the model can be effective in teaching students with disabilities skills that are aligned with district standards and are naturally performed in general education settings. Following the phases of the model, each student took an active role in setting goals for him or herself, developing an action plan to achieve those goals, utilizing a self-selected self-determination strategy to progress meeting the goal, and, last, evaluating how well he or she has done to meet the goal. Even though the student directly employed only one student-directed learning strategy—picture cues for Alisha, self-instruction for Emily and Ben—the SDLMI functions as a self-regulated problem-solving process that involves the use of several self-directed learning strategies—

specifically, goal setting, decision making, self-scheduling, and self-evaluation; and, in doing so, provides an opportunity for the student to have an active role in various aspects of the learning experience. As Wehmeyer (2006) noted, self-determination serves both as an entry point to the general education curriculum as well as to provide the means to teach the skills to engage in the curriculum, and the SDLMI serves both of these functions.

As Agran et al. (2008) indicated, the model's efficacy is not limited to a particular type or class of educational goals. As indicated previously, the model has been shown to produce positive behavior changes across diverse curricular domains, including: academics, transition, social, communication, and functional skill development (see Agran, Blanchard, & Wehmeyer, 2000; Agran et al., 2006; Wehmeyer et al., 2000). In the present study, the effects of the model on two types of communication skills and a functional skill were investigated. Although these skills are not core academic skills, they are skills that allow students to have positive experiences as they participate in the general education curriculum (Ryndak & Billingsley, 2004), and for the two communication skills, have utility in other general education classes. In this respect the study contributes to the literature by extending the research to include two additional skills areas. That said, the primary contribution of the study was that it provided an experimentally-sound demonstration that students with extensive support notes can learn to regulate and evaluate their learning in a general education classroom. Downing (2006) indicated that educators are often in a bind because, although we are asked to recommend evidence-based procedures to promote student access to the general curriculum, there is insufficient research to determine what these procedures are. The SDLMI suggests such an evidence-based procedure in providing through several replications a functional relationship between self-determination and achieving progress in the general curriculum (Wehmeyer, 2006).

Powers (2006) suggested that a major barrier to enhancing the self-determination of people with severe disabilities is the belief among many professionals that promoting their self-determination is not possible or important. As Powers noted, despite strong advocacy to promote self-determination by researchers, self-advocates, and other members of the professional community, many school systems continue to deny students the opportunities and supports that will allow them to regulate their behavior and manage their learning. It is hoped that studies involving applications of the SDLMI and the varied student-directed learning strategies in promoting access to the general curriculum may have greater power in persuading schools and teachers to advance self-determination than previous efforts have had. Most self-determination applications have involved behavior changes that have been meaningful at the individual and experimental levels and, as such, are highly valued. However, self-determination applications relating to access have an added benefit by suggesting that the general curriculum is accessible and relevant for students with severe disabilities when they are provided instruction in using effective learning tools to access it. Students with severe disabilities are expected to receive the supports, instruction, and opportunities they need to meaningfully access the general curriculum (Carter & Kennedy, 2006). We suggest that models like the SDLMI will help meet this challenge by providing students with a capacity-building process to promote their motivation and engagement in the general curriculum.

Despite the reported changes, a number of limitations warrant attention. First, given the small number of participants, the findings are specific to those students and target behaviors. Needless to say, additional research is needed to investigate the effects of the model on other target behaviors and students with varying learning and support needs. In particular, applications with students with more severe disabilities and greater communication challenges are warranted. All of the students in the present studies verbally communicated their identified goals, intended actions, and evaluative feedback. For students with a more limited communicative capacity, additional modifications to the model would have been needed, and researchers are encouraged to investigate this issue. Second, generalization data were not collected. Such data provide a valid measure of the impact of learning, and

the generalized effects of the SDLMI and other self-determination approaches warrant further study. Third, as indicated by the authors of the present study in previous research (see Agran et al., 2006), the students' progress in meeting specific goals does not provide a measure of their overall progress in the general education curriculum and should not be interpreted as such. There is no question that progress in acquiring the target behaviors assisted the students in meeting the task requirements in the target settings, but we cannot assume that they represent a measure of overall impact. Fourth, no procedural fidelity data were collected. Also, although Phases I and III of the model allow students to provide meaningful input about the effects of the model, limited social validation data in all were obtained. Efforts should be made to obtain data from all relevant stakeholders (e.g., peers, general and special educators, paraprofessionals). Last, although the reported data suggest that the SDLMI was effective in supporting the students' in their efforts to acquire the target skills, it remains uncertain if the model was effective in enhancing the students' overall self-determination. As indicated previously, the model involves the students' execution of several strategies (e.g., goal setting, decision making), so it would appear that such a relationship would be evident. However, without a discrete pre- and post-assessment (such as Martin & Marshall's *ChoiceMaker Self-Determination Transition Assessment* {1996} or Wehmeyer & Lawrence's *Whose Future is it Anyway? A Student-Directed Transition Planning Program* {1995}), such effects remain speculative.

In our efforts to ensure that students with severe disabilities participate in and access the general curriculum, we must acknowledge that traditional procedures involving decisions by others (e.g., teachers, administrators) on what they think is best for the student to learn and how he or she acquires that skill will not suffice. Instead, we need to endeavor to actively involve the student in decision making and have him or her assume ownership for their own learning. The SDLMI serves as a potential useful way to achieve this outcome, and, as a consequence, enhance learning and, hopefully, self-determination.

References

Agran, M., Blanchard, C., & Wehmeyer, M. (2000). Promoting transition goals and self-directed learning model of instruction. *Education and Training in Mental Retardation and Developmental Disabilities, 35,* 351–364.

Agran, M., Cavin, M., Wehmeyer, M., & Palmer, S. (2006). Participation of students with moderate to severe disabilities in the general curriculum: The effects of the Self-Determined Learning Model of Instruction. *Research and Practice for Persons with Severe Disabilities, 31,* 230–241.

Agran, M., Wehmeyer, M., Palmer, S., & Cavin, M. (2008). Promoting student active classroom participation skills through instruction to promote self-regulated learning and self-determination. *Career Development for Exceptional Individuals, 31,* 106–114.

Browder, D. M., Spooner, F., Wakeman, S. Y., Trela, K., & Baker (2006). Aligning instruction with academic content standards: Finding the link. . *Research and Practice for Persons with Severe Disabilities, 31,* 309–321.

Carter, E. W., & Kennedy, C. H. (2006). Promoting access to the general curriculum using peer support strategies. *Research and Practice for Persons with Severe Disabilities, 31,* 284–292.

Downing, J. (2006). On peer support, universal design, and access to core general curriculum for students with severe disabilities: A personnel preparation perspective. *Research and Practice for Persons with Severe Disabilities, 31,* 327–330.

Kame'enui, E. J., & Simmons, D. C. (1999). *Toward successful inclusion of students with disabilities: The architecture of instruction.* Arlington, VA: Council for Exceptional Children.

Kazdin, A. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Lee, S. H., Wehmeyer, M. L., Palmer, S. B., Soukup, J. H., & Little, T. D. (2008). Self-determination and access to the general education curriculum. *The Journal of Special Education, 42,* 91–107.

Martin, J. E., & Marshall, L. H. (1996). *ChoiceMaker Self-Determination Transition Assessment.* Longmont, CO: Sopris West

Palmer, S. B., Wehmeyer, M. L., Gipson, K., & Agran, M. (2004). Promoting access to the general curriculum by teaching self-determination skills. *Exceptional Children, 70,* 427–439.

Powers, L. (2006). Self-determination by individuals with severe disabilities: Limitations or excuses? *Research and Practice for Persons with Severe Disabilities, 30,* 163–167.

Spooner, F., & Browder, D. M. (2006). Why teach the general curriculum? In D. M. Browder & F. Spooner (Eds.), *Teaching language arts, math, and*

science to students with significant cognitive disabilities (pp. 1–13). Baltimore: Paul H. Brookes.

Spooner, F., Dymond, S. K., Smith, A., & Kennedy, C. (2006). What we know and need to know about access the general curriculum for students with significant cognitive disabilities. *Research and Practice for Persons with Severe Disabilities, 31*, 277–283.

Tawney, J. W., & Gast, D. (1984). *Single subject research in special education*. New York: Merrill.

Wehmeyer, M. L. (2006). Beyond access: Ensuring progress in the general education curriculum for students with severe disabilities. *Research and Practice for Persons with Severe Disabilities, 31*, 322–326.

Wehmeyer, M. L., Field, S., Doren, B., Jones, B., & Mason, C. (2004). Self-determination and student involvement in standards-based reform. *Exceptional Children, 70*, 413–425.

Wehmeyer, M. L., & Lawrence, M. (1995). Whose future is it anyway? Promoting student involvement in transition planning. *Career Development for Exceptional Individuals, 18*, 69–83.

Wehmeyer, M. L., Palmer, S. B., Agran, M., Mithaug, D. E., & Martin, J. (2000). Teaching students to become causal agents in their lives: The self-determined learning model of instruction. *Exceptional Children, 66*, 439–453.

Wehmeyer, M. L., Smith, S., & Davies, D. (2005). Technology use and students with intellectual disability: Universal design for all students. In D. Edyburn, K. Higgins, & R. Boone (Eds.), *Handbook of special education technology research and practice* (pp. 309–323). Whitefish Bay, WI: Knowledge by Design.

Wehmeyer, M. L., Smith, S., Palmer, S., & Davies, D. (2004). Technology use by students with intellectual disabilities: An overview. *Journal of Special Education Technology, 19*(4), 7–22.

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Culturally Diverse Parents' Perspectives on Self-Determination

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Abstract: Current research examining self-determination in cultural contexts has yielded mixed findings. This qualitative interview study collected rich information from parents of four major cultures about their understanding of self-determination and their daily engagement in self-determination related activities with their children with disabilities. Various culturally-related patterns were found indicating differences between parents of mainstream culture and other cultures. Differences existed in the following areas: understanding the concept of self-determination; talking to the child about strengths and weaknesses; promoting self-efficacy; and teaching independent living, goal setting, problem solving, and decision making skills. Implications and recommendations for future research are provided.

Since early 1990s, the concept of *self-determination* and its related practices have been widely studied and, as a result, many research and practice materials have been published on this topic. For example, a quick search of the Educational Resources Information Center's (2007) online resources identified 316 journal articles, 40 conference proceedings and 69 books. The concept of self-determination and its related values and practices have been widely accepted by the disability community as essential for quality assurance in education, services and independent living (Algozzine, Browder, Karvonen, Test, & Wood, 2001; Schloss, Alper, & Jayne, 1993; Zhang, Wehmeyer, & Chen, 2005).

When applied to education, self-determination revolves around fostering an interest in students to learn, value education and have confidence in their strengths (Zhang & Benz, 2006). Based on a review of research on the benefits of self-determination, Zhang and Benz found that student self-determination helps with staying in and completing school and enhances student post-school outcomes. Self-determination skills have been used to increase student involvement in educational decision making such as participating in the individualized education program (IEP) process (Test & Neale, 2004), leading the IEP meeting (Martin, Marshall, Maxson, & Jerman, 1996; Warger & Burnette, 2000) and planning for transition to adulthood (Wehmeyer, Garner, Yeager, & Lawrence, 2006). These skills also have been applied to enhance positive classroom behaviors, academic performances, school completion and transition results (Bremer, Kachgal, & Schoeller, 2003).

Given that parenting styles impact children's acquisition and development of self-determination skills (Zhang, Katsiyannis, & Zhang, 2002; Zhang, et al., 2005), researchers believe that parents of students with disabilities play a critical role in promoting self-determination skills in home settings (Sands & Doll, 1996; Wehman, 1998). Therefore it is recommended that parents foster self-determination skills on a daily basis by offering opportunities for their children to set simple goals, solve simple problems, make choices and decisions and evaluate the outcomes of their decisions (Field, Martin, Miller, Ward, & Wehmeyer, 1998; Sands & Doll, 1996; Zhang, 2006). However, because the concept of self-determination has its roots in the normalization movement that originated in Europe, the values inherent in most efforts to promote self-determination are values associated with Anglo-European cultures and societies

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(Frankland, Turnbull, Wehmeyer, & Blackmountain, 2004). In recognition of this European origination and the fact that the U.S. society has become increasingly multiethnic and multilingual, researchers have begun to examine self-determination and its related practices within cultural contexts, especially non-Western and collective cultures (Landmark, Zhang, & Montoya, 2007; Leake & Boone, 2007; Trainor, 2005; Zhang, 2006).

In a panel presentation on human rights and cultural diversity, Zhang (2007) suggested four approaches to examine cultural differences regarding parental involvement in fostering their children's self-determination skills: 1) compare international cultures that are believed to be different (e.g., collective versus individualistic), focusing on students with disabilities; 2) compare immigrants and non-immigrants in the U.S.; 3) compare subcultural groups (e.g., African American, Asian, Hispanic, and Caucasian cultures) within the U.S.; and 4) compare international cultures that are believed to be different, focusing on students without disabilities. These approaches will facilitate the understanding of parent self-determination practices within the context of their original culture and adjustments to the new culture.

Research has already been conducted using some of these approaches. In terms of comparing international cultures and focusing on students with disabilities, Lee and Wehmeyer (2004) investigated the application of the self-determination concept in Korean schools; while Ohtake and Wehmeyer (2004) compared Japanese exemplary special education practices and values associated with self-determination and the application of the concept into the Japanese culture. Both studies found that self-determination related practices and values were shared by schools and teachers of these two Eastern cultures. Similarly, Zhang, et al. (2005) found that U.S. teachers had similar levels of engagement in fostering self-determination as teachers in Taiwan. However, with regard to parents, Zhang et al. found that U.S. parents reported higher levels of engagement in self-determination fostering behaviors than parents in Taiwan.

Zhang (2006) compared immigrant and non-immigrant parents regarding their self-determination practices and found that children from Caucasian non-immigrant families were more involved in doing household chores and interacting with salespeople in their daily lives and that Asian immigrant parents did not emphasize parental authority as hypothesized, but valued family priorities over individual goals as much as Caucasian and non-immigrant parents. These findings seem to support the assumption that Anglo-cultures encourage independence, and children from these cultures are provided with more opportunities from their parents to practice these skills. The findings also suggest that self-determination related parenting practices can be accepted and valued by non-Western cultures and may be related to education and exposure to Western culture.

Several researchers investigated the concept and practices of self-determination within one or more sub-cultures in the U.S. and found that self-determination is common among these sub-cultures. Kuperminc, Blatt, Shahar, Henrich, and Leadbeater (2004) conducted a survey with 448 African American, Caucasian and Hispanic students aged 11 to 14 and found that students from these different ethnic groups possessed similar self-awareness and beliefs. Frankland et al. (2004) examined family structures and social factors in the Dine (Navajo) culture and compared them with the essential characteristics of self-determination. They found that self-determination characteristics were highly relevant in Dine culture and self-determination had considerable utility and heuristic value in the culture. Goff, Martin, and Thomas (2007) conducted a phenomenological qualitative study to investigate the impact that survival conflicts might have on the academic orientation of today's African American students and how these conflicts perpetuate their disproportional representation in special education. Their findings suggest that self-determination can empower African American students to address and end their disproportional representation in special education. Trainor (2005) conducted a qualitative study with 15 adolescents with learning disabilities from three cultural groups: African American, European American and Hispanic American. Findings indicated only subtle differences among diverse participants, all cultural groups exhibited component skills of self-determination and

most participants perceived their home environments to be facilitative of self-determination.

By contrast, findings from other studies suggest differences between the mainstream culture and diverse cultures. Bui and Turnbull (2003) synthesized literature on person centered planning and found that Asian American families who have children with disabilities had some values of person centered planning that were not explicitly consistent with Asian American cultural values. A focus group study conducted by Leake and Boone (2007) suggested differential practices between cultures. These researchers conducted focus group interviews with 122 youth with emotional and/or behavioral disorders, parents and teachers from Hawaii and Washington, DC. The participants represented seven cultural groups. Their findings indicated that parents from certain non-mainstream cultures, for example the Samoan culture, tended to limit their children's opportunities to voice their opinions and make choices, although these are common childrearing practices of the mainstream culture.

Given the contradictive findings of research in this area, more research is needed to further investigate whether and what self-determination practices are utilized by parents of children with disabilities. Because many of the previous studies did not directly interview parents, there is a lack of in-depth information from the parents themselves about their beliefs and daily practices related to self-determination. The purpose of this study was to gather rich qualitative information from parents about their perspectives and practices regarding self-determination as conceptualized by Wehmeyer (1997). Because most of the past research targeted limited disability and cultural groups, this study was designed to be more inclusive of disability groups and cultures.

Method

Participants

This study was an extension of another study by Landmark, et al. (2007). Thus, nineteen of the 20 participants in this study also participated in the previous study. The participants were 20 parents of 20 high school students with disabilities in a South Central state. Nineteen of the students were selected by utilizing a two-step sampling procedure. First, students with disabilities 14 years of age and over in one local high school were sorted into four racial/ethnic groups (i.e., African American, Asian American, European American, and Hispanic American). Next, eight students from each of the groups, excluding the Asian American group, were randomly selected for inclusion in the sample. The Asian American group at this school consisted of only one student, so that student was selected. Another Asian American student from a similar school district was recruited to be a part of the sample, making the total sample 26 students. Due to incorrect contact information or disconnected telephone lines, six students had to be dropped from the sample. Thus, the final sample consisted of 20 students. Student demographic information was obtained from school district records (refer to Table 1 for an overview). Thirteen of the students were considered economically disadvantaged as indicated by their participation in the free (n = 11, 55%) or reduced (n = 2, 10%) school lunch program.

Parents of these students became the participants of this study. The participants included 1 (5%) foster parent, 2 (10%) stepparents, and 17 (85%) natural parents, of which 2 were non-custodial parents. Three (15%) of the participants were more comfortable speaking a language other than English (1 Chinese, 2 Spanish). Thirteen (65%) of the parents were females and 7 (35%) were males.

Instrument

The instrument consisted of semi-structured, open-ended questions that were developed based on Wehmeyer's (1997) conceptualization of self-determination and on a review of the research literature related to self-determination practices of culturally diverse parents who have children with disabilities (Zhang, 2006; Zhang, et al., 2005). The interview questions covered all component elements in the Wehmeyer model and were classified into the following two areas: 1) What understanding do parents have of self-determination?, and 2) What practices do parents engage in to pro-

TABLE 1

Demographic Information of Participants' Children with Disabilities

Group Membership	*Age*	*Grade Completed*	*Disability*		
			Primary	*Secondary*	*Tertiary*
African American					
Female	18	11	MR		
Female	17	11	MR		
Female	16	9	ED	LD	
Female	17	10	LD		
Male	16	10	MR		
Male	15	9	MR		
Asian American					
Male	19	12	AU		
Male	17	12	AU		
European American					
Female	16	9	MR		
Female	17	10	LD		
Female	17	11	AU		
Female	17	10	MR	SI	OHI
Male	18	11	ED	SI	
Male	17	11	LD		
Male	16	10	LD		
Hispanic American					
Female	17	9	MR	SI	
Female	15	9	ED		
Male	16	10	MR	SI	
Male	15	10	LD		
Male	15	9	ED	SI	

Note. The abbreviations for the disabilities are AU, autism; ED, emotional disturbance; LD, specific learning disability; MR, mental retardation; OHI, other health impairment; and SI, speech/language impairment.

mote the self-determination of their children? The use of a semi-structured interview protocol allowed the interviewers to clarify or expand the questions in order to obtain the most complete information from each participant (Riessman, 1993).

Data Collection

Data collection occurred via telephone calls to the parents over a period of four months. Three callers conducted the telephone interviews after being trained in the protocol. Multiple phone calls at various times of the day were needed in order to contact the parents. A scripted information sheet about the study was read to the parents so that they could make an informed decision regarding participation in the study. After verbal consent, the interview was conducted and audio-taped. Transcription of the tapes occurred following the interviews.

Data Analysis

The data were analyzed systematically via content analysis (Erlandson, Harris, Skipper, & Allen, 1993, Lincoln & Guba, 1985). First, the telephone transcripts were unitized into units of data that were then printed on index cards. A unit of data is the smallest piece of information that can be interpreted independently (Lincoln & Guba, 1985). One of the research team members conducted a primary sort of the units in order to obtain the emergent categories. In this manner, the categories "emerge" when the team member looks individually at each of the units and groups units

appearing to be similar in idea or tacit feeling together into the categories and sub-categories (Erlandson, et al., 1993). After this primary sort, the unit index cards were removed, shuffled and re-sorted using the emergent categories from the primary sort. This was done to ensure that the categorical content was true to the categorical names. A tertiary shuffling and re-sorting of the units into the categories was conducted by a different team member in order to further enhance the trustworthiness of the analysis. Discrepancies between the team members' sorts were remedied by having the team members discuss their rationales for the classification decisions and then come to a consensus regarding the most appropriate categorization. Finally, the two team members checked each category to ensure that the units contained in each category was representative of the category classification.

Results

The unitization of the data yielded almost 600 units, which were then classified into seven broad, emergent categories. The emergent categories included understanding of self-determination, strengths and weaknesses, independent living skills, self-efficacy, goals, decision making, and problem-solving. Each of the broad, emergent categories was further sorted into more specific sub-categories and by cultural group.

Understanding of Self-Determination

Thirty percent ($n = 6$) of the parents did not know what the term *self-determination* meant. These parents were all culturally diverse parents: three Hispanic American parents, two African American parents and one Asian American parent. The responses from the parents who did provide an answer to this question were classified into sub-categories that included self-knowledge, self-reliance, the determination to succeed and the individual as the causal agent. The parents who felt that self-determination was an individual's ability to know and understand oneself were all European American ($n = 3$). Similarly, the ability to rely on oneself as the definition of self-determination was provided by one of the European American parents. The parents who felt that self-determination was a determination to succeed in life included African American ($n = 3$), European American ($n = 1$), and Hispanic American ($n = 1$) parents. These parents felt that self-determination was a driving force in a person's life that helps one to achieve one's goals. Most of the parents (35%, $n = 7$; 3 European American, 2 African American, 1 Asian American, 1 Hispanic American) believed that self-determination referred to an individual being the primary decision maker in their own lives, in other words, being the causal agent in one's life. For example, one of the European American parents stated that self-determination means that "THEY make the decisions about their own lives. They're the primary decision-maker of their own lives."

Strengths and Weaknesses

Parents were asked if they spoke to their children about their children's strengths and weaknesses. Twenty percent ($n = 4$; 2 African American, 2 Hispanic American) of the parents reported that they did not talk about strengths and weaknesses with their child, and there was not any evidence elsewhere during the interviews to indicate that they did discuss strengths and weaknesses. One of the Hispanic American parents reported that he had very limited time due to working so many hours; thus, he did not have time for this type of conversation with his child.

Regarding the parents who did discuss their children's strengths and weaknesses, when asked how frequently they discussed this topic with their child the responses ranged from "as needed" to "daily." Some of the strengths as reported by the parents included having a good personality, being a hard worker, being a high achiever, being artistic and having good math and science skills. Some of the children's weaknesses, as listed by the parents, included being naïve, being aggressive, having poor social skills and having difficulty learning. A summary of the reported strengths and weaknesses of the children by their parents and by cultural group is found in Table 2.

Independent Living Skills

Although the parents expressed a desire that their children be independent adults one day,

TABLE 2

Children's Strengths and Weaknesses as Reported by Parents

Group Membership	*Strengths*	*Weaknesses*
African American	Cooking skills	Academic skills
	Musical ability	Chores
	Personality	Hyper-activity
	Self-starter	
Asian American	Academic skills	Language skills
		Social skills
European American	Artistic	Chores
	Attention span	Naivety
	Determined	Negative attitude
	High Achiever	Repetitive
	Personality	Slow learner
	Work ethic	Uncooperative
		Will not take risks
Hispanic American	Artistic	
	Electronics ability	
	Everything	

the European American parents seemed to be more proactive than the other parents when it came to preparing their children for independence. For instance, one of the European American parents had placed his daughter on the waiting list for subsidized housing, and another European American parent frequently discussed group home living arrangements with her daughter. However, all of the parents (n = 20) allowed their children to learn and practice independent living skills including completing household chores, engaging in recreational activities (e.g., going to the movie theater), working, making appointments, budgeting, driving, paying bills, making purchases and ordering meals at restaurants. The skill categories most frequently practiced included completing household chores (100%, n = 20), making purchases (40%, n = 8; 4 European American, 3 African American, 1 Hispanic American) and ordering meals at restaurants (30%, n = 6; 4 European American, 1 African American, 1 Hispanic American).

Self-Efficacy

Most of the parents (90%, n = 18) believed that their children possessed self-efficacy. The parents who did not believe that their children had self-efficacy were the two Asian American parents. One of the Asian American fathers said that his son "often worries . . . that he won't be successful. . . He said, 'What happens if I cannot find a job—if I cannot find a girlfriend?'" The other Asian American parent did not believe that his son could experience self-efficacy because of the severity of his disability.

Fifty-five percent (n = 11; 5 European American, 4 African American, 2 Hispanic American) of the parents said that they taught their children self-efficacy by using praise and encouragement. For instance, one of the African American parents shared how she tried to promote self-efficacy in her daughter by telling her, "You can do that, you can do that," repeatedly. Twenty-five percent (n = 5; 2 Hispanic American, 1 African American, 1 Asian American, 1 European American) of the parents stated that they did not teach self-efficacy to their children, including the European American parent who felt that the construct of self-efficacy could not be taught.

Goals

Some of the parents (20%; 2 Hispanic American, 1 Asian American, 1 African American) reported that they did not talk to their chil-

dren at all about having and setting goals. One of the Asian American parents said that he did not talk to his son about goals because of his son's limited communication abilities. When parents did speak to their children about goals, the types of goals related to many different aspects of the children's lives. For example, some of the short term goals related to homework completion, behavior and recreational activities such as vacations or going to the movies. The long term goals primarily related to postsecondary issues such as education/training, employment, and independent living.

In fact, the majority of the parents (65%; 6 European American, 4 African American, 2 Hispanic American, 1 Asian American) who did discuss goals with their children specifically addressed postsecondary goals. For example, one of the Asian American parents spoke about the postsecondary educational goals of his son. He said that his son will soon enroll in courses at a community college. Employment goals were discussed by African American (n = 3) and Hispanic American (n =1) parents. Indeed, when Hispanic American parents spoke to their children about postsecondary goals, they primarily stressed finishing school and having a good career so that their children could have a better life. Independent living goals were most frequently mentioned by the European American parents.

One European American parent said that she and her daughter have been discussing postsecondary goals and plans for the last three years; nevertheless, the parent did not believe that her daughter fully understood these conversations. Other parents (15%; 2 European American, 1 African American) noted that discussions regarding postsecondary goals occurred regularly in their households. However, some of the parents (35%; 3 African American, 3 Hispanic American, 1 Asian American) did not discuss postsecondary goals because they felt that it was inappropriate due to their child's ability to understand long term goals or due to their cultural beliefs: "We are Hispanic and I don't think he has to leave the house when he turns 18. He is going to stay at home with his family."

Decision Making

How and whether parents teach their children to make decisions was also probed. African American parents taught decision making by talking with the child, utilizing teachable moments when someone made a poor decision, having family meetings, modeling the decision making process and specifically asking for the input of the child when making a decision. The Asian American parents taught decision making by applying consequences and modeling decision making. Modeling and discussing the consequences were the strategies used by the European American and Hispanic American parents. Some of the parents expressed concerns about the delicate balance between allowing their children to make decisions and guiding their children in making those decisions. One of the Asian American parents summarized this dilemma when he said, "They are not equal members of the family. The parents also cannot dictate their activities, either." Additionally, a few of the parents felt that as children grew and matured, more decisions could gradually be made by the children. One European American parent said, "Well, I believe up to a certain age the parent has the absolute authority. At about 12 they are old enough to make some of their own decisions." An African American parent concurred when she stated, "I think that there is a certain age when they should follow the directives of the parents, and after they get . . . 15 or 16, they start making some choices." Parents also considered whom the decisions would most impact when deciding the level of participation that the children had in making the decisions.

Decisions that impact the family. When asked specifically about the role of the child in making decisions that impact the family, three parents (15%; 2 African American, 1 Hispanic American) stated that their children were not considered equal decision makers. Conversely, five parents (25%; 2 European American, 2 Hispanic American, 1 Asian American) stated that their children were considered equally when making decisions that affect the entire family. Most of the parents (n = 12, 60%; 5 European American, 4 African American, 2 Hispanic American, 1 Asian American) felt that children's opinions should be consid-

ered when making family decisions, but that the parents should make the final decision. However, it should be noted that some of the parents made all of the family decisions because they felt that their children were not cognitively capable to participate.

Decisions that impact the child. Parents were more likely to allow their children to make decisions that directly impacted the children. For example, African American parents allowed their children to make decisions about recreational activities, clothing, high school coursework and friends. Asian American parents allowed their children to make decisions regarding recreational activities and personal care product choices (e.g., hair products). The Asian American parents did not forbid their children to make decisions about friends; however, the children did not make those types of decisions because of their poor social skills. Both of the Asian American children had an autism spectrum disorder. European American parents let their children make choices about purchases (e.g., bedroom furniture, groceries, clothing) and friends, although one of the parents said that his daughter did not have any friends due to the severity of her intellectual disability. Hispanic American parents allowed their children to make decisions regarding recreational activities, how to care for siblings, family purchases and friends. Similar to the European American parent, one of the Hispanic American parents noted that his son did not have any friends because of the severity of his disability.

Problem-Solving

Problem-solving, another facet of self-determination, was a category that emerged from the interviews. The majority of the parents (60%, $n = 12$; 6 African American, 5 European American, 1 Asian American) said that they talked to their children to facilitate problem-solving when a poor decision was made by the child. In fact, discussing the issue was the first thing that the parents stated they would do, followed by brainstorming ways to address the problem. Four of the parents (20%; 2 Asian American, 2 European American) said that they would apply consequences such as grounding the child, making the child pay to fix something that was damaged and taking privileges away. Additionally, six of the parents (30%; 3 European American, 2 Hispanic American, 1 Asian American) said they would use the experience as a teachable moment for the child in hopes that the child would make better decisions in the future.

Other parents (30%, $n = 6$; 3 Hispanic American, 2 European American, 1 African American), when faced with a poor decision being made by their children, said they would support and encourage their child and suffer the consequences along with the child. One Hispanic American mother stated, "I can't do things for her, but I can support her and encourage her as much as possible." Also, three of the European American parents said that they would solicit outside sources to help their child, as expressed by one father, "When something like that happens with him, because of his learning disability and everything, we generally, if it's severe enough, we will get other people involved [be]cause he has a tendency to listen to others more than he may listen to the wife and I."

Discussion

The purpose of this study was to gather rich, qualitative information from parents of diverse cultures about their perspectives and practices regarding self-determination. For this purpose, we designed the study to include a couple of strengths. First, participants of the study represented more cultural groups and a wider range of disabilities (including low-incidence and multiple disabilities) than most existing studies that investigated self-determination within cultural contexts. Second, we interviewed 20 parents, which was a relatively large number for an interview study. However, there were also some limitations. One of the limitations was the small number of Asian American parents included in the sample due to the limited availability of parents in this group. Further, both of the children of the Asian American parents had an autism spectrum disorder; therefore, the answers and perspectives of these parents might have had more to do with their child's disability than with their Asian American culture. Another limitation was that all of the parents were interviewed only one time without a follow-up interview. It would have been ideal to have the

parents engage in member-checking to determine if their beliefs and practices were accurately represented. In addition, problems inherent in telephone interviews prevented the researchers from reading facial expressions and body language. As a result, some important information could have been lost. Despite these limitations, the findings of the study revealed certain patterns associated with cultures that could facilitate further understanding of self-determination in various cultural contexts and could be used to guide training and material development.

The study found that 30% of the parents, all from culturally diverse groups, did not know the meaning of self-determination; all of the European American parents explained self-determination in a practical way; and 35% of the parents, including some from diverse cultures, believed that a self-determined individual is the causal agent in one's life. These findings are consistent with other studies (e.g., Bui & Turnbull, 2003; Leake & Boone, 2007; Zhang, 2006; Zhang, et al., 2005) in terms of parents from Western cultures knowing and doing more in the promotion of their children's self-determination skills than parents from diverse cultures. It was obvious that the effort of promoting self-determination in the past two decades has not reached all parents from diverse cultures, although the majority (70%) of them acquired a basic understanding of the concept. Of course, this may mean that certain parents from diverse cultures may not value self-determination; however, we still have the obligation to equip them with the basic knowledge so that they can make an informed choice as to whether to adopt this concept and its related practices. Schools and teachers may need to disseminate more information to parents about the meaning of self-determination and its value in facilitating student transition.

Twenty percent of the parents, all from diverse cultures, did not talk to their children about their strengths and weaknesses. This finding indicates a need for parental education in this area because research has repeatedly shown that it is critical for parents to model how to examine one's strengths and weaknesses beginning during early childhood (Field et al., 1998; Sands & Doll, 1996; Zhang, 2006). Parents of students with disabilities must be informed and trained about their important roles in assisting their children to develop a good understanding of their strengths and weaknesses. Parent training centers, especially those funded by federal grants, should engage in disseminating effective daily activities that parents can use to model the behavior of analyzing one's individual strengths and weaknesses and how to utilize one's strengths in positive ways. The strengths and weaknesses reported by parents in the study seem to match stereotypical understandings of strengths and weaknesses of the general population from each culture. This is not necessarily negative because this reveals that individuals with disabilities carry their cultural strengths, which can then be utilized in transition planning. Compared to the parents from diverse cultures, European American parents seemed to be the most proactive in preparing their children for independent living, albeit only two of the European American parents had taken actions to prepare their children for independent living by ensuring that their children were on the waiting lists for subsidized housing or group home settings. Because most of the parents had not taken these types of actions, it can be assumed that there was a lack of knowledge about independent living resources and how to access these resources. However, this problem is not unique to the parents of this study. On the other hand, a positive finding from the study was that all of the parents involved their children in learning and practicing domestic skills that will facilitate their children's future independent living.

The majority of the parents believed that their children had self-efficacy, with the exception of the two Asian American parents. Although it is not clear whether this was a reflection of cultural differences or a reflection of the child's disability (i.e., an autism spectrum disorder), there is still a need to encourage Asian American parents to help their children enhance their self-efficacy given the collective nature of Asian cultures and the parents' intent to act as the authority and in control (Chao, 1994; Chen, Wang, Chen, & Liu, 2002). Five of the seven European American parents, four of the six African American parents and two of the five Hispanic American parents taught their children self-efficacy by

using praise and encouragement. However, the remainder (25%) of the parents did not teach self-efficacy to their children at all. Given the need to develop self-advocacy skills early and because self-determination skills are essential to the successful transition from school to work for individuals with disabilities (Field, 1996; Field, et al, 1998; Sands & Doll, 1996), there is a need to promote this behavior among all parents of children with disabilities.

It was disappointing to find that 20% of the parents, all from diverse cultures, did not talk to their children about having and setting goals. One of reasons cited was because the child had limited communication skills (an Asian American student with an autism spectrum disorder). Conversely, it was quite encouraging to find that parents who spoke to their children about goals talked about goals related to many aspects of the future, including short-term as well as long-term goals (e.g., postsecondary goals). It seems like the past decades of effort to include parents in the transition planning process might have increased parents' awareness and willingness to help their children with disabilities set goals and prepare for the transition to adulthood.

Along the same line, parents from all cultures taught their children decision-making skills in various ways. In terms of including children in family decision making, three parents (all from diverse cultures) stated that their children were not considered equal decision makers; on the other hand, five parents from three different cultures treated their children as equal decision makers. Regarding decisions that impact the child, parents from all cultures were more willing to let the child make them. Such involvement of children with disabilities in making decisions that impact their own lives will eventually promote their decision-making skills, which is an essential component of self-determination skills as conceptualized by Wehmeyer (1997).

Problem-solving techniques were mainly understood by the parents as a way to deal with a poor decision by the child, rather than a way to overcome obstacles when working toward a goal as conceptualized by Wehmeyer (1997). Although problem-solving can be used as a way to deal with poor decisions, associating this skill set mainly with treating inappropriate behavior limits the power of these skills in pursuing transition goals or any other goals. It seems that the field of special education, particularly parent training centers, needs to identify ways to inform parents about what problem-solving is and how to help students with disabilities develop and use these powerful skills in achieving goals. When dealing with poor decisions made by a child, all of the African American and the majority of the European American parents talked to the child to solve the problem. Hispanic American parents tended to support and encourage the child and even suffer the consequences along with the child. It is clear that there are some cultural patterns in dealing with inappropriate behaviors or poor decisions. However, it is not clear which of the ways benefits students more in their development and exercise of problem-solving skills. More research is needed to determine if these patterns correlate with the student's development and use of problem-solving skills; and if they do, which way is more likely to promote these skills.

Recommendations for Future Research

American society has become increasingly multiethnic and multilingual (Rodriguez, 1990). Any attempt to understand how self-determination is understood and practiced in a certain culture has to link to the group's original culture. For example, to understand self-determination in the context of Hispanic culture, research is needed to compare South American cultures where the U.S. Hispanic cultures originated with the mainstream U.S. culture. Therefore, one type of future research can focus on international comparisons between a U.S. cultural group and its original culture and examine self-determination among these broader cultural backgrounds with the general populations. A second type of future research can limit participants to parents and guardians of students with one type of disability, e.g., autism, so that the characteristics associated with the disability do not interfere with cultural factors for easier inferences of causal relationships. A third area of research that is very much needed is to design interventions and examine their effects in promoting self-determina-

tion practices and skills among culturally diverse parents (Karvonen, Test, Wood, Browder, & Algozzine, 2004). Federal, state and private funds need to be available for the development, field-testing and dissemination of such interventions.

Conclusion

Self-determination has been empirically linked to better student outcomes (e.g., Wehmeyer & Palmer, 2003). Research on examining self-determination within culturally and linguistically diverse contexts has yielded mixed results regarding valuing and practicing skills related to self-determination. However, there is evidence to suggest differences exist in various patterns among parents from diverse cultures. Knowing these differences helps education and service professionals understand how to approach parents of various cultures. Such understanding will further enable the empowerment of parents for working together to promote self-determination of students from diverse cultures. Toward this end, more research is needed, especially research focusing on intervention development.

References

Algozzine, R. F., Browder, D. B., Karvonen, M., Test, D. W., & Wood, W. M. (2001). Effects of interventions to promote self-determination for individuals with disabilities. *Review of Educational Research, 71*, 219–277.

Bremer, C. D., Kachgal, M., & Schoeller, M. (2003). Self-determination: Supporting successful transition. *Research to Practice Brief, 2*(1), 1–5.

Bui, Y. N., & Turnbull, A. (2003). East meets west: Analysis of person-centered planning in the context of Asian American values. *Education and Training in Mental Retardation and Developmental Disabilities, 38*, 18–31.

Chao, R. K. (1994). Beyond parental control and authoritarian parenting style: Understanding Chinese parenting through the cultural notion of training. *Child Development, 65*, 1111–1119.

Chen, X., Wang, L., Chen, H., & Liu, M. (2002). Non compliance and child-rearing attitudes as predictors of aggressive behavior: A longitudinal study in Chinese children. *International Journal of Behavioral Development, 26*, 225–233.

Educational Resources Information Center. (2007). Retrieved November 8, 2007, from the Cambridge Scientific Abstracts database.

Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing naturalistic inquiry: A guide to methods*. Newbury Park, CA: Sage Publications.

Field, S. (1996). Self-determination instructional strategies for youth with learning disabilities. *Journal of Learning Disabilities, 29*, 40–52.

Field, S., Martin, J., Miller, R., Ward, M., & Wehmeyer, M. (1998). *A practical guide for teaching self-determination*. Reston, VA: Council for Exceptional Children.

Frankland, H. C., Turnbull, A. P., Wehmeyer, M. L., & Blackmountain, L. (2004). An exploration of the self-determination construct and disability as it relates to the Dine (Navajo) culture. *Education and Training in Developmental Disabilities, 39,* 191–205.

Goff, C., Martin, J. E. & Thomas, M. K. (2007). The burden of acting White: Implications for transition. *Career Development for Exceptional Individuals, 30*, 134–146.

Karvonen, M., Test, D. W., Wood, W. M., Browder, D., & Algozzine, B. (2004). Putting self-determination into practice. *Exceptional Children, 71*, 23–41.

Kuperminc, G. P., Blatt, S. J., Shahar, G., Henrich, C., & Leadbeater, B. J. (2004). Cultural equivalence and cultural variance in longitudinal associations of young adolescent self-definition and interpersonal relatedness to psychological and school adjustment. *Journal of Youth and Adolescence, 33*, 13–18.

Landmark, L. J., Zhang, D. D., & Montoya, L. (2007). Culturally diverse parents' experiences in their children's transition: Knowledge and involvement. *Career Development for Exceptional Individuals, 30*(2), 68–79.

Leake, D., & Boone, R. (2007). Multicultural perspectives on self-determination from youth, parent, and teacher focus groups. *Career Development for Exceptional Individuals, 30*, 104–115.

Lee, S. H., & Wehmeyer, M. L. (2004). A review of the Korean literature related to self-determination: Future directions and practices for promoting the self-determination of students with disabilities. *Korean Journal of Special Education, 38,* 369–390.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Martin, J. E., Marshall, L. H., Maxson, L., & Jerman, P. (1996). *Choicemaker Self-Determination Curriculum: Self-Directed IEP*. Sopris West, Inc.

Ohtake, Y., & Wehmeyer, M. L. (2004). Applying the self-determination theory to Japanese special education contexts: A four-step model. *Journal of Policy and Practice in Intellectual Disabilities, 1*, 169–178.

Riessman, C. K. (1993). *Narrative analysis*. Newbury Park, CA: Sage Publications.

Rodriguez, F. (1990). *Equity in education: Issues and strategies*. Dubuque, IA: Kendall/Hunt.

Sands, D. J., & Doll, B. (1996). Fostering self-determination is a developmental task. *Journal of Special Education, 30*, 58–76.

Schloss, P. J., Alper, S., & Jayne, D. (1993). Self-determination for persons with disabilities: Choice, risk, and dignity. *Exceptional Children, 60*, 215–225.

Test, D. W., & Neal, M. (2004). Using "The Self-Advocacy Strategy" to increase middle graders' IEP participation. *Journal of Behavioral Education, 13*, 135–145.

Trainor, A. A. (2005). Self-determination perceptions and behaviors of diverse students with LD during the transition planning process. *Journal of Learning Disabilities, 38*, 233–249.

Warger, C., & Burnette, J. (2000). Planning student-directed transitions to adult life. Reston, VA: ERIC Clearinghouse on Disabilities and Gifted Education, Council for Exceptional Children. (ERIC Document Reproduction Service No. ED439577)

Wehman, P. (1998). Foreword. In M. L. Wehmeyer, M. Agran, & C. Hughes. (Eds.), *Teaching self-determination to students with disabilities*, (pp. ix–xi). Baltimore, MD: Brookes.

Wehmeyer, M. L. (1997). Self-determination as an educational outcome: A definitional framework and implications for intervention. *Journal of Developmental and Physical Disabilities, 9*, 175–209.

Wehmeyer, M. L., Garner, N., Yeager, D., & Lawrence, M. (2006). Infusing self-determination into 18–21 services for students with intellectual or developmental disabilities: A multi-stage, multiple component model. *Education and Training in Developmental Disabilities, 41*, 3–13.

Wehmeyer, M. L., & Palmer, S. B. (2003). Adult outcomes for students with cognitive disabilities three-years after high school: The impact of self-determination. *Education and Training in Developmental Disabilities, 38*, 131–144.

Zhang, D. (2006). Parent practices in facilitating self-determination skills: The influences of culture, socioeconomic status, and children's special education status. *Research and Practice for Persons with Severe Disabilities, 30*, 154–162.

Zhang, D. D. (2007, October). Zhang's research on self-determination. In C. Goff, C. Hughes, D. Leake, J. Portley, A. Trainor, & D. D. Zhang, *Human rights and cultural diversity: Research to practice*. Panel presentation at the 14th International Division on Career Development and Transition conference.

Zhang, D., & Benz, M. R. (2006). Enhancing self-determination of culturally-diverse students with disabilities: Current status and future directions. *Focus on Exceptional Children, 38*(9), 1–12.

Zhang, D., Katsiyannis, A., & Zhang, J. (2002). Teacher and parent practice on fostering self-determination of high school students with mild disabilities. *Career Development for Exceptional Individuals, 25*, 157–169.

Zhang, D., Wehmeyer, M. L., & Chen, L. J. (2005). Parent and teacher engagement in fostering self-determination in students with disabilities: A comparison between the U.S. and the R.O.C. *Remedial and Special Education, 26*, 55–64.

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Descriptive Analysis of Single Subject Research Designs: 1983–2007

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Abstract: Single subject research methodology is commonly used and cited in special education courses and journals. This article reviews the types of single subject research designs published in eight refereed journals between 1983 and 2007 used to answer applied research questions. Single subject designs were categorized as withdrawal/reversal, time lagged, comparison, or combination designs. To analyze data for trends, data were aggregated and presented in blocks of five years. Data were used to present a description of changes in the use of single subject designs for each journal reviewed and across each type of single subject design. Though limited by the number of randomly reviewed issues, results indicate specific trends in single subject methodology. A total of 196 randomly identified journal issues containing 1,936 articles were reviewed. Of reviewed articles, 456 employed at least one single subject design and a total of 556 single subject designs were coded. Results indicate time lagged designs were published more frequently than withdrawal/reversal designs. Also, multiple baseline designs were published more frequently than multiple probe designs and replication of effects for time lagged designs occurred more often across participants/groups. For comparison designs, there was an increase in trend concurrent with an increase in published functional analysis. Data collected also indicated an increase in the use of combination designs.

Applied research differs from basic research by (a) focusing on socially significant behaviors, (b) manipulating variables to improve participants' behavior, and (c) studying participants' behavior within natural social settings compared to laboratory settings (Baer, Wolf, & Risley, 1968). Baer et al. suggest seven dimensions in their classic article which can be used by "scientist practitioners" (Barlow, Hayes, & Nelson, 1984) in evaluating applied research conducted with quantitative research methodologies: (a) applied, (b) behavioral, (c) analytic, (d) technological, (e) conceptually systematic (f) effective, and (g) generality. Single subject research "is experimental" (Horner et al., 2005, p. 166) and typically used as an alternative to group designs, particularly with individuals with low incidence disabilities (McDonnell & O'Neill, 2003), or in research where high numbers of participants are unavailable. Scientist practitioners using single subject research ideally manipulate only one variable in their attempt to evaluate a functional relation between independent and dependent variables (e.g., Barlow & Hersen, 1984; Tawney & Gast, 1984). Several single subject research designs have been employed to evaluate a functional relation in the applied research literature. Single subject research designs can be categorized as withdrawal/reversal designs (A-B-A-B, A-B-A, B-A-B), time lagged designs (multiple baseline and multiple probe), comparison designs (multitreatment, alternating treatments design [ATD], adapted alternating treatment designs [AATD], parallel treatment designs [PTD], simultaneous treatment designs [STD]) and combination designs. Table 1 identifies and briefly summarizes each category of single subject research design. Horner et al. characterized single subject research methodology into eight guidelines, including: (a) participant as unit of analysis, (b) participant and setting descriptions, (c) dependent and independent variables, (d) baseline/comparison condition, (e) experimental control, (f) visual

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analysis, (g) external validity and (h) social validity. Each of the eight guidelines can be analyzed to determine the quality of single subject design investigation.

Baseline logic defined as the repeated measurement under both a baseline and an adjacent intervention condition (Tawney & Gast, 1984; Cooper, Heron, & Howard, 2007), is fundamental to single subject research methodology in that a participant's performance during intervention is compared to his/her performance in the preceding baseline condition. According to Cooper et al., initial baseline data are gathered to measure participants' current performance and upon stable data, a prediction is made regarding the dependent variable without implementation of the intervention. Next, research attempts to affirm the consequent, i.e., data patterns established during intervention condition should differ from data patterns (i.e., level, trend) during baseline condition. A return to baseline or the staggering of intervention provides an opportunity to replicate previous baseline levels in the absence of intervention (i.e., verification). If data return to baseline levels upon removal of the independent variable, it increases the likelihood the independent variable was responsible for change in dependent variable. Finally, replication involves reintroduction of the independent variable, attempting to repeat effects both within and across participants, i.e., intra-subject and inter-subject replication, respectively (Gast, in press).

The purpose of this analysis was to evaluate trends in use of single subject research designs in the special education literature by answering the following questions: 1) Has there been an increase in the publication of articles using single subject designs over the past 25 years? 2) Has there been a change in the types of single subject research designs used during this period?; 3) Has there been an increase in the use of single subject comparative research designs?; and 4) Has there been an increase in the use of combination designs?

Method

Sample

Single subject research designs have been published in a variety of special education and psychology journals. Eight journals frequently cited in special education courses were reviewed from December 2007 dating back 25 years or until inception of the journal. Journals reviewed included: *Behavioral Disorders* (BD, 1983-2007), *Education and Training in Developmental Disabilities* (ETDD, 1983–2007), formally titled *Education and Training in Mental Retardation*, *Focus on Autism and Other Developmental Disabilities* (Focus, 1987–2007), *Journal of Autism and Developmental Disabilities* (JADD, 1983–2007), *The Journal of Special Education* (JSE, 1983–2007), *Topics in Early Childhood Special Education* (TECSE, 1983-2007), *Research and Practice for Persons with Severe Disabilities* (RPPSD, 1983–2007), formerly titled *Journal of the Association for Persons with Severe Handicaps*, and *Journal of Applied Behavior Analysis* (JABA, 1983–2007). All journals searched were catalogued by the University of Georgia and shelved at either the university system science or main library. Prior to searching journals, one issue from each volume was selected randomly using a random number table (Wolery, Barton, & Hine, 2005). Articles included for analysis had to, (a) employ a single subject research design, (b) study at least one participant and (c) be published beginning 1983. Articles which did not employ a minimum A-B design were excluded. Research designs were identified and categorized based on descriptions presented in Table 1.

Procedure

The first author reviewed selected issues from identified journals according to the following steps: First, one issue per volume for each journal for the past 25 years or until the journals inception were randomly identified. Second, in all identified journal issues, each article was initially examined to determine if a single subject research design was used. Third, after an article was identified as using a single subject design, the following information was coded for each article: (a) journal name, (b) author(s), (c) publication year, (d) journal volume, (e) journal issue number, (f) article title, (g) single subject research design employed, (h) participant age range, (i) disability/diagnosis, (j) independent variable, (k) dependent variable, (l) increase or decrease of intervention on dependent measure, and (m) study settings. Research articles could in-

TABLE 1

Identification and Summary of Single Subject Research Designs

Design	*Definition/description*	*Source*
Withdrawal A-B-A-B	Withdrawal/reversal designs involve the systematic introduction and removal of the independent variable across baseline and intervention conditions (A-B; A-B-A; A-B-A-B, B-A-B). An A-B withdrawal/reversal design is the most basic single subject design; however, it does not permit functional conclusions, only correlational. A-B-A-B designs, where A refers to baseline and B refers to intervention can have multiple variations including B-A-B. Withdrawal designs apply the independent variable to a target behavior only during intervention conditions. Baseline conditions do not employ any introduction of an independent variable.	Cooper, Heron, & Heward (2007) Kennedy (2005) McReynolds & Kearns (1983) Risley (2005) Skinner (2005)
Reversal Design	A distinction is made between reversal and withdrawal designs. Though visually both look identical, reversal designs involve applying the independent variable to one target behavior in baseline and another target behavior during intervention. The reversing of the independent variable is applied to different behaviors to evaluate the effectiveness of the independent variable on the dependent variable.	Tawney & Gast, (1984)
Time Lagged Multiple Baseline	Multiple baseline, a time lagged strategy, was presented by as an alternative to the withdrawal/reversal design. Recommendations for using time lagged strategies include, when it is unethical to reverse conditions, as in self-injurious behavior or when the target behavior is irreversible as in acquisition of academic skills. Intervention implemented using multiple baseline design can be staggered over participants/groups, skills/behaviors/tasks, and conditions/settings.	Barlow & Hersen,(1984) Gast & Ledford (In press) Richards, Taylor, Ramasamy, & Richards (1999)
Multiple Probe	The multiple probe design is similar to multiple baseline design except baseline data are collected intermittently.	
Changing Criterion	A variation of the multiple baseline design includes the changing criterion design, sometimes referred to as changing conditions design. The changing criterion design is best utilized when changes in dependent variable need to be made in small increments. Upon baseline data collection, the independent variable is introduced. However, intervention is implemented in steps with the criterion changing. As the dependent variable increases or decreases with the criterion, "therapeutic change is replicated and experimental control is demonstrated" (p. 527).	Hartmann & Hall (1976)
Comparison Designs	Comparison designs including, alternating treatments designs (ATD), referred sometimes to as a multielement design; adapted alternating treatments designs (AATD); parallel treatment designs (PTD) and multitreatment designs are typically used to compare intervention strategies known to be effective. Another popular use for ATD is in conducting a functional analysis, the manipulation of environmental conditions to determine effects on participant behavior, typically aggressive or self-injurious behavior.	Cooper, Heron, & Heward (2007) Dattilo, Gast, Loy, & Malley (2000) Kennedy (2005)

TABLE 1—*(Continued)*

Design	*Definition/description*	*Source*
Multitreatment	Multitreatment designs, like withdrawal/reversal designs require a behavior that is reversible. Multi-treatment designs are slow alternating single subject designs which are used to compare multiple interventions either to each other or to a baseline condition (i.e., A-B-A-C-B-C-B, A-B-A-C-A-C).	
ATD	In implementing either ATD or AATD, after the collection of baseline data, treatment conditions are randomly alternated either within or across days. It is possible to continue to the collection of baseline data as a no treatment phase, given baseline is randomly alternated along with interventions (Cooper et al., 2007). Participants must be able to distinguish which treatment is in effect and researchers must counterbalance confounding variables such as time and setting (Gast, 2005). It is not unusual to see a final "best alone" condition follow the alternating treatments condition.	
ATD (M-ED Variation)	Procedurally similar to ATD, used to compare interventions, but more often it is used to assess environmental factors that may be maintaining challenging behavior.	Wolery, Gast, & Hammond (in press)
AATD	AATD is a variation of ATD and though the two designs are similar, AATD is distinguishable because it is used to compare "two instructional strategies and their relative effectiveness and efficiency on the acquisition of two similar but independent behaviors of equal difficulty" (Gast, 2005, p. 1526).	Ulman & Sulzer-Azaroff (1975)
STD	Concurrent implementation of two or more treatments in one session.	Barlow & Hayes (1979)
PTD	Parallel treatment designs (PTD) are single subject designs that simultaneously combines two multiple probes designs and replicates across functionally equivalent behaviors.	Gast & Wolery (1988)
Combination Designs	Researchers could also combine two or more single subject designs to evaluate a functional relation between the independent and dependent variable, often referred to as a combination design.	Kennedy (2005)

clude multiple experiments. If an article included multiple experiments, the single subject research design used for each experiment was coded separately. This allowed for a more accurate evaluation in trends used by applied single subject design researchers.

Fourth, if a multiple baseline or multiple probe design was used, the design was coded as being replicated across participants/groups, conditions/settings, or behaviors/tasks. Fifth, a distinction was made between alternating treatments designs (ATD), adapted alternating treatments designs (AATD) and the multi-element (M-ED) ATD variation (Wolery, Gast, & Hammond, in press) used to conduct functional analysis (FA; Herzinger & Campbell, 2007). Sixth, if a combination design was used, the designs combined were identified and recorded. Finally, the total number of articles published in each selected issue for each journal was recorded and used to calculate percentage of published articles that used a single subject research design. Data were entered directly into Microsoft Excel 2007, a computer database program and percentage automatically computed.

Reliability

An independent observer was provided with a random number table of five issues for each of

the eight journals reviewed. Using a Microsoft excel spreadsheet, the reliability rater coded data as described in the Procedures section. The reliability rater was trained on the coding procedure using journal issues not selected for reliability. First, an issue was pulled from the library and the first author and reliability rater went through the entire issue and identified articles which used single subject research designs. Second, once articles were identified, the first author and reliability rater coded each article according to the procedures together. Finally, another issue was pulled from the shelf and the reliability rater and first author independently coded that issue separately and point by point reliability calculated. Reliability training was discontinued when 90% agreement was achieved. Interobserver reliability data were collected 21% of issues, 5 issues per journal for a total of 40 issues. Reliability data were calculated using point by point method by dividing total number of agreements by number of total agreements plus disagreements and multiplying by 100.

Reliability data were computed for (a) total number of articles published in randomly selected issues of each journal, (b) number of published articles in each randomly selected issue which used a single subject design, (c) type of single subject design employed, (d) replication of time lagged designs, and (e) use of ATD to conduct a FA. Agreement for total number of articles published in randomly selected issues was 92.5% (37 of 40 issues selected) and agreement on the number of articles which published single subject designs was 87.5% (35 of 40 issues selected). Interobserver agreement for (a) type of single subject design used was 86.04% (74 of 84 coded designs), (b) replication of time lagged designs was 90.1% (46 of 51 coded replications), and (c) use of M-ED ATD variation to conduct a FA was 88.89% (8 of 9 coded FAs). Errors in reliability for types of designs occurred when AATDs were coded as ATD ($N = 5$). Frequently, authors make no distinction between the use of an ATD or AATD; however, this analysis identified and defined the ATD and the AATD as separate designs used for different purposes. Errors also occurred when multi-treatment designs were coded as A-B-A-B designs ($N = 3$), when a multiple baseline design was coded as a combination design ($N = 1$) and an AATD was coded as a multiple baseline design ($N = 1$).

Results

A total of 196 journal issues were reviewed and 1,936 articles examined. Of these, 456 published articles used single subject research designs; however, because each design was coded separately, and some articles had multiple studies, a total of 556 designs were coded. To evaluate trends, data were reported and graphed in blocks. Blocking involved aggregating data across 5 years. Five blocks were created; 1983–1987, 1988–1992, 1993–1997, 1998–2002, and 2003–2007. Three specific single subject research designs were not included in graphed data due to small numbers, nonconcurrent or delayed multiple baseline/probe (Harvey, May, & Kennedy, 2004), changing criterion/conditions (Hartmann & Hall, 1976), and simultaneous treatment designs (STD; Barlow & Hayes, 1979). A total of four nonconcurrent or delayed multiple baseline/probe designs (yr. 1992, 1993, 1997 and 2007), six changing criterion designs (yr. 1992, 1994, 2005, 2006, 2007), and one STD were recorded across the 25 year analysis.

Percentage of Articles Using Single Subject Designs

Figure 1 presents percentage of articles using single subject research methodology for each journal reviewed since 1983. Percentages were computed by dividing the number of articles using single subject research methodology in randomly selected issues for the years blocked by total number of articles in randomly selected issues for the years blocked and multiplying by 100. The following are the means and ranges across blocks for each journal reviewed: BD (mean = 13%, range = 5–22%), ETDD (mean = 23%, range = 18–28%); Focus (mean = 8%, range = 0–32%); JABA (mean = 68%, range = 50–82%); JADD (mean = 8%, range = 3–13%); RPPSD (mean = 15%, range = 11–25%); JSE (mean = 4%, range = 0–14%); and TECSE (mean = 8%, range = 0–16%). A quarter-intersect procedure (Tawney & Gast, 1984) was performed on data for each journal and results indicated an accelerating trend in sin-

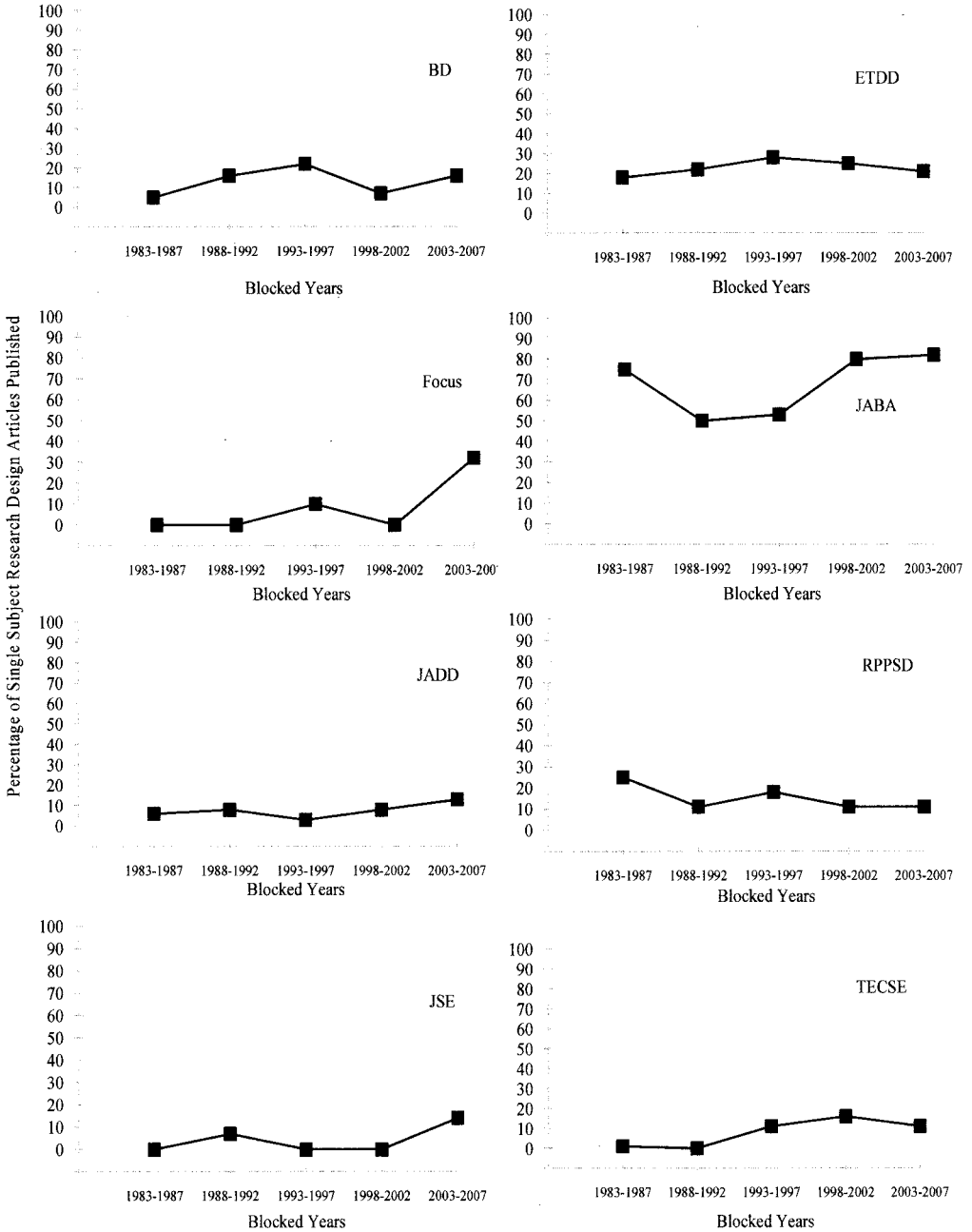

Figure 1. Percentage of single subject design articles in the randomly selected issues of each journal aggregated into five year blocks.

gle subject design article publications for Focus, JSE, TECSE, JABA and JADD, signifying the percentage of published articles using single subject designs increased. A zero-celerating trend was observed for ETDD and BD, indicating the percentage of publications using single subject designs remained relatively constant across blocked years. A decelerating

trend presented for RPPSD, indicating the percentage of published articles using single subject designs decreased.

Number and Percentage of Published Studies Using Single Subject Designs

Figure 2 (top panel), presents the total number of research experiments using single subject research designs in the randomly selected journal issues aggregated together and graphed by block (mean = 109, range = 92–125). Data indicate an increase in the number of single subject research experiments published in selected journals. Table 2 summarizes the number of single subject designs published categorized by design type and journal. Trends were also observed in the types of single subject designs published. In analyzing trends in percentage (Figure 2, bottom panel) of multiple baseline and multiple probe designs compared with withdrawal/reversal designs, time lagged designs accounted for 44% of the total percentage of published single subject designs and withdrawal/reversal designs accounted for 21%. Data indicate time lagged designs were published more frequently than withdrawal/reversal designs. Ac-

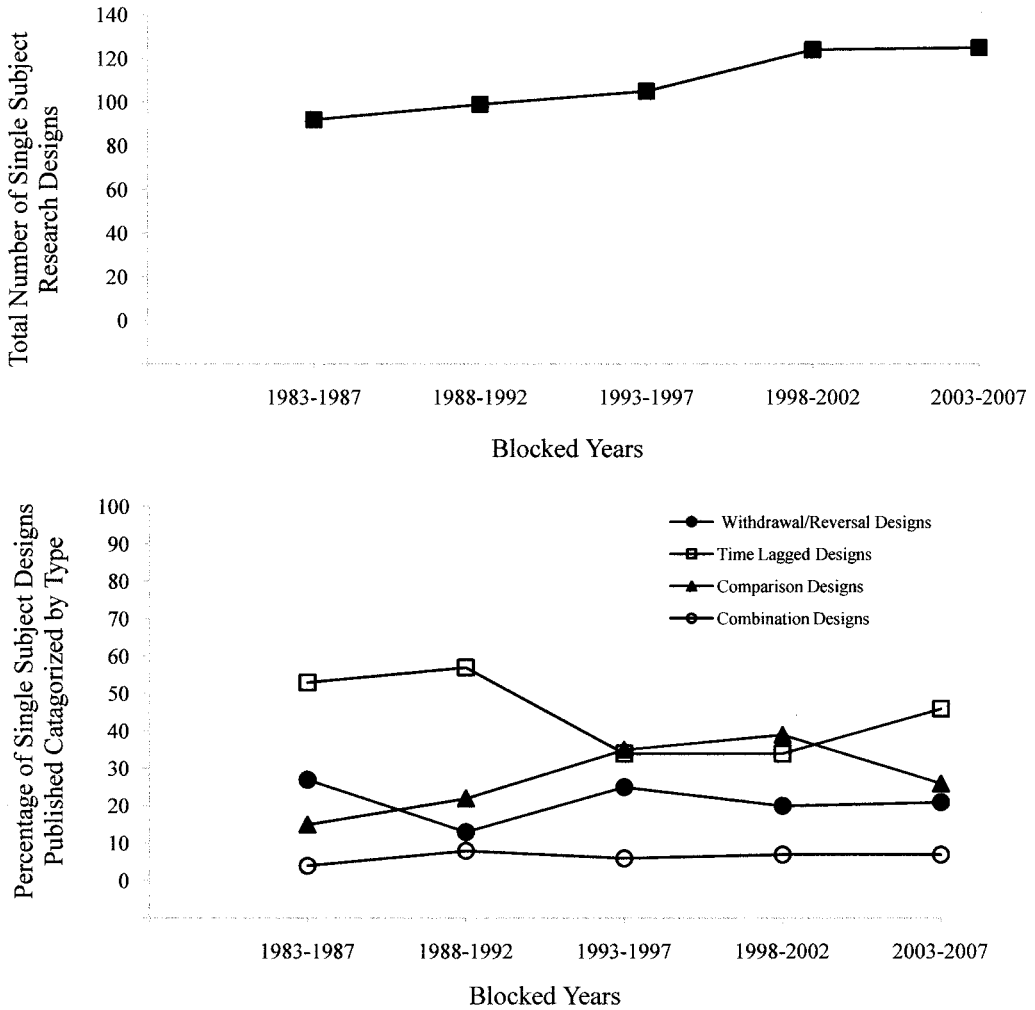

Figure 2. Top panel. Total number of single subject research designs aggregated into 5 year blocks. Bottom panel. Percentage of single subject designs published categorized by type.

cording to data, there was a slight decelerating trend in the publication of time lagged and withdrawal/reversal designs and a slight accelerating trend in the percentage of published comparison designs. During the first block (1983–1987) of the analysis a total of 4 combination designs were published and during the last five year block (2003–2007) a total of 9 combination designs were published. Though the analysis was limited by the relatively few combination designs published ($N = 36$), a slight accelerating trend in the use of combination designs was observed.

Figure 3 (top panel) presents the total number of withdrawal/reversal designs in the literature for each 5 year blocked period. Figure 3 (bottom panel) presents frequency data on withdrawal designs. The A-B-A-B ($N = 91$; 79%) was the most frequently used withdrawal design. There was a decelerating trend in the use of A-B or A-B-C designs and A-B-A designs, a zero-celerating trend for B-A-B designs and an accelerating trend in the use of A-B-A-B designs.

Figure 4 (top panel) displays the total number of time lagged designs employed in randomly selected issues. A total of 240 time lagged designs were coded; multiple baseline accounted for 80% ($N = 191$) and multiple probe accounted for 20% ($N = 49$) of published time lagged designs. According to data (Figure 4, middle panel), multiple baseline designs (mean = 7.3, range = 3–14), were published more frequently than multiple probe designs (mean = 1.8, range = 0–4). However, the trend over the 25 years show an accelerating trend since 2000 in the use of multiple probe designs and decrease in the use of multiple baseline designs. Specifically, for multiple baseline and multiple probe designs, data were analyzed to determine trend of the type of time lagged design (across participants/groups, across conditions/settings, across behaviors/task) published. Figure 4 (bottom panel) shows the trend of each type of time lagged design blocked into 5 years. Trends across blocked years indicated an increase in the across participants design and a

TABLE 2

Number of Single Subject Research Designs Categorized by Type and Journal (1983-2007)

Design	*JABA*	*Focus*	*JADD*	*JSE*	*BD*	*RPPSD*	*TECSE*	*ETDD*	*Totals*
Withdrawal/reversal	**80**	**3**	**6**	**1**	**8**	**8**	**1**	**8**	**115**
A-B-A-B	67	2	5	1	7	5	0	4	91
A-B-C/A-B	9	1	1	0	1	1	1	2	16
A-B-A	3	0	0	0	0	2	0	1	6
B-A-B	1	0	0	0	0	0	0	1	2
Time lagged	**123**	**4**	**21**	**4**	**13**	**27**	**8**	**40**	**240**
Multiple baseline	*111*	*2*	*18*	*2*	*13*	*20*	*5*	*20*	*191*
Participants	70	1	13	2	9	13	5	16	129
Behaviors	25	1	1	0	3	4	0	3	37
Settings	16	0	4	0	1	3	0	1	25
Multiple probe	*12*	*2*	*3*	*2*	*0*	*7*	*3*	*20*	*49*
Participants	5	1	2	1	0	4	2	11	26
Behaviors	7	1	1	1	0	2	1	9	22
Settings	0	0	0	0	0	1	0	0	1
Comparison designs	**124**	**4**	**2**	**1**	**8**	**3**	**2**	**10**	**154**
Multitreatment	34	0	1	0	4	2	0	3	44
ATD	77	2	0	1	1	1	1	4	87
AATD	13	2	1	0	3	0	1	1	21
PTD	0	0	0	0	0	0	0	2	2
Combination designs	**32**	**0**	**0**	**0**	**2**	**0**	**0**	**2**	**36**
Total single subject	**359**	**11**	**29**	**6**	**31**	**38**	**11**	**60**	**545***

* Non-concurrent multiple baseline/probe designs, changing criterion designs and simultaneous treatment designs were not included.

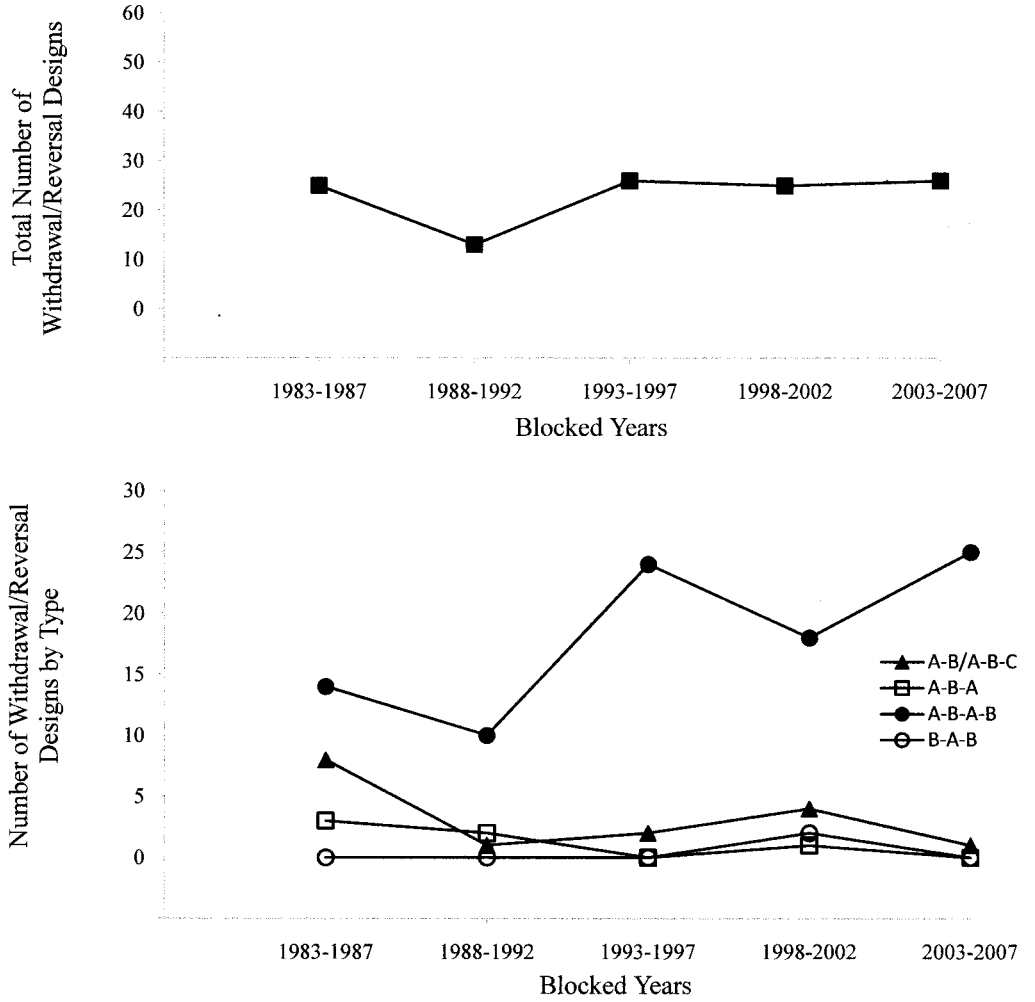

Figure 3. Top panel. Total number of withdrawal and reversal designs published in randomly selected journal issues. Bottom panel. Withdrawal and reversal designs published categorized by A-B/A-B-C, A-B-A, A-B-A-B, and B-A-B, aggregated into five year blocks.

decrease in the across behaviors/task and settings/conditions designs. Across participants/groups accounted for 64.5% (N = 155), while across behaviors/tasks accounted for 24.5% (N = 59), and across conditions were used in 11% (N = 26) of published time lagged designs.

Figure 5 (top panel) shows an accelerating trend of the total number of single subject research designs used to compare interventions. A total of 154 comparison designs were published. Figure 5 (middle panel) presents number of comparison designs published categorized by type (ATD, including M-ED variation; AATD; PTD; multi-treatment). The most frequently published comparison design was the ATD which included the M-ED variation (N = 87; 56%), followed by multi-treatment (N = 44, 28%), AATD (N = 21, 14%) and finally, PTD (N = 2, 1%). Accelerating trends were identified for ATD and multitreatment designs; however, data for AATD and PTD were zero-celerating indicating the number of AATD and PTD designs published remained relatively consistent across blocked years. Data were also analyzed on the use of

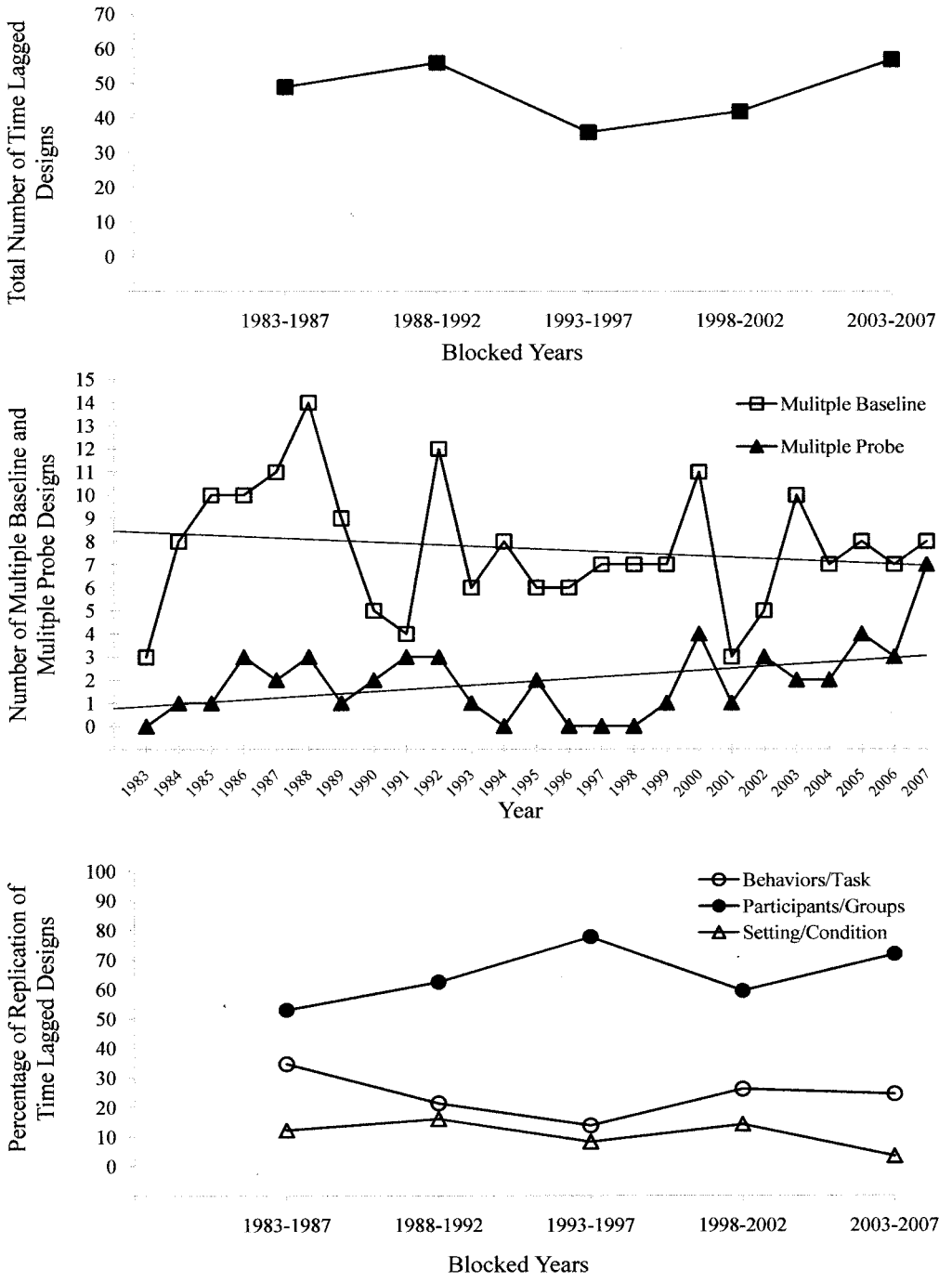

Figure 4. Top panel. Total number of time lagged research designs published aggregated into five year blocks. Middle panel. Number of multiple baseline and multiple probe designs published in selected journal issues plotted by year. Bottom panel. Total number of time lagged designs published in randomly selected journal issues categorized by participants/groups, behaviors/tasks, and conditions/settings aggregated into five year blocks.

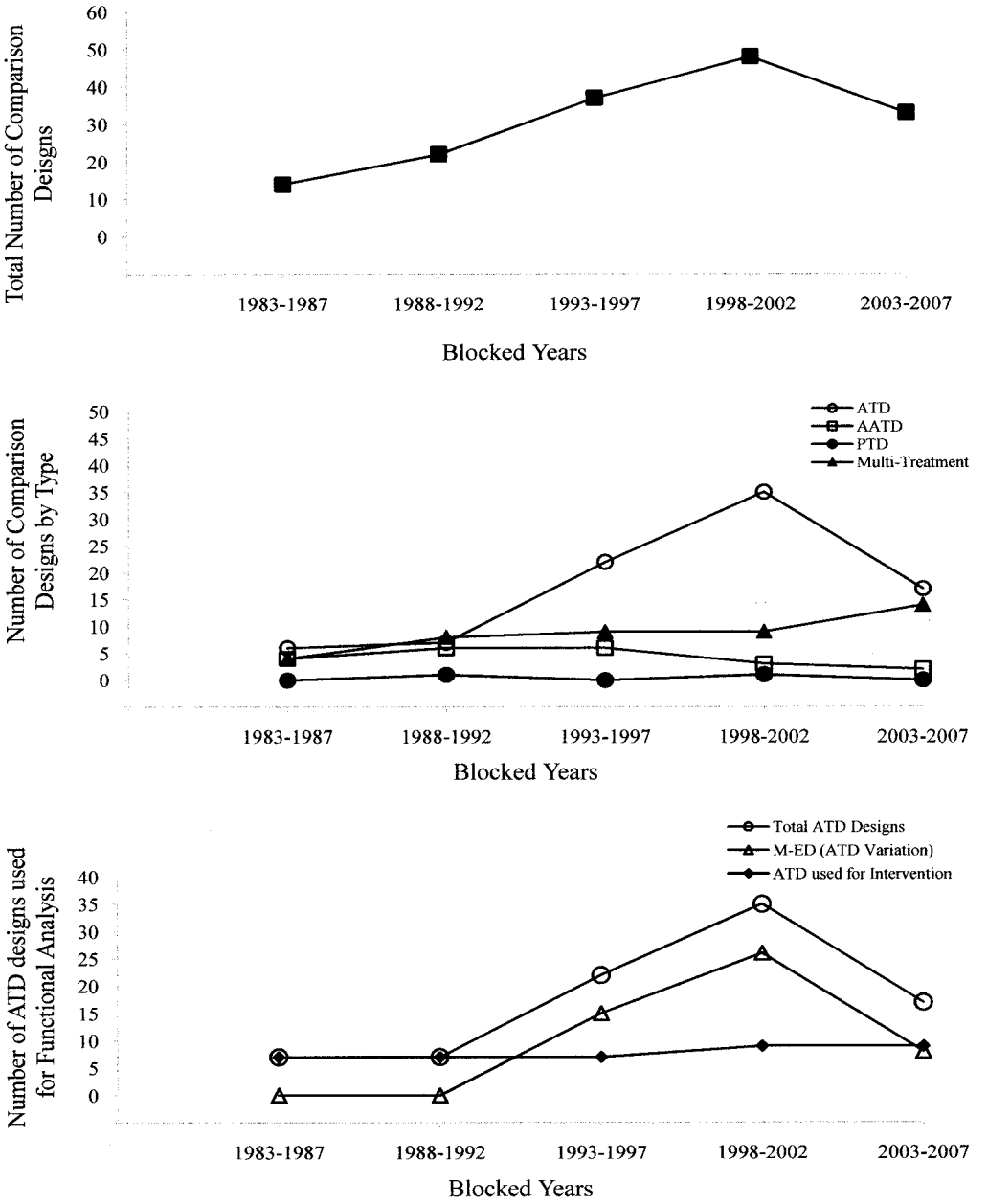

Figure 5. Top panel. Total number of comparison designs published aggregated into five year blocks. Middle panel. Total number of comparison designs published in randomly selected journal issues aggregated into five year blocks and categorized by multitreatment, PTD, AATD, and ATD. Bottom panel. Number of FA and ATD comparison designs published aggregated into five year blocks.

M-ED ATD variation in conducting a FA. M-ED accounted for 56% (N = 49) of all ATD experiments published. According to Figure 5 (bottom panel), there was an accelerating trend in the use of ATD M-ED variation comparison design and zero-celerating trend in the use of ATDs for comparing interventions.

Discussion

Results are limited by the number of issues reviewed, one issue per volume for each year 1983–2007 ($N = 25$). However, eight trends were observed including: (a) accelerating trend in the percentage of comparison and combination designs published, along with deceleration in the percentage of withdrawal/reversal and time lagged designs published; (b) accelerating trend for A-B-A-B designs with decelerating trends for A-B/A-B-C and B-A-B designs; (c) higher percentages of publication of time lagged designs in the literature, when compared to withdrawal/reversal designs; (d) decelerating trend in the use of multiple baseline design, compared to accelerating trend in the use of multiple probe design; (e) accelerating trend in time lagged designs replicated across participants/groups compared to decelerating trend in replication across behaviors/tasks or conditions/settings; (f) accelerating trend in the use of comparison designs; (g) accelerating trend in the use of M-ED ATD variation design; and (h) an increase in the use of combination designs.

A minimum of two replications of effect (i.e., A_2 data replicate A_1 data, B_2 data replicate B_1 data) are preferred in the determination of a functional relation. Researchers continue to use more rigorous withdrawal designs that replicate the effects of both baseline and intervention conditions. Withdrawal/reversal designs require a behavior to be reversible, while multiple baseline/probe designs do not require reversible behaviors. Given the simplicity of withdrawal designs compared to time lagged designs, higher percentages of time lagged designs may indicate researchers are focusing on non-reversible behaviors (i.e., acquisition of academic or functional skills) compared to behaviors which are reversible. Though, in the current analysis, the multiple baseline design was published more frequently than the multiple probe design (Figure 4, middle panel), trends indicate a decrease in the use of multiple baseline designs and an increase in the use of multiple probe designs across 25 years. The multiple probe design is a more "practitioner friendly" design in that pre-intervention data need not be collected as frequently for all participants. Based on the data reported here (Figure 4, bottom panel), applied researchers appear to be relying on multiple baseline and multiple probe designs across participants to evaluate experimental control. These designs do not permit intra-subject direct replication (Gast, in press), thus must be viewed as a less rigorous analysis of a functional relation compared to multiple baseline and multiple probe designs across behaviors/tasks or conditions/settings. Replication of effect across a minimum of three behaviors or conditions with a minimum of three participants is recommended in the determination of a functional relation between the independent and dependent variable.

One purpose of comparison designs is to evaluate the relative effectiveness and efficiency of two or more independent variables in changing behaviors. The type of comparison design used depends on the research question, independent variable, dependent variable, and the researcher's ability to identify functionally equivalent behaviors (Gast, 2005). There appears to be an increased interest in comparison studies, particularly those using multitreatment designs and ATD (Figure 5, middle panel). It appears applied researchers are focusing on refining interventions and analyzing intervention components to construct or deconstruct intervention packages (Wolery et al., in press). Based on studies reviewed, 56% used the M-ED variation of the ATD to complete a FA (Figure 5, bottom panel). Trends in the use of the ATD to compare interventions was zero-celerating (Figure 5, bottom panel), indicating virtually no difference across 25 years. However, an accelerating trend in the use of the general category ATD was observed, concurrent with an accelerating trend in the use of the M-ED ATD variation. This indicates the increase in number of ATDs published was due to researchers conducting and journals publishing FAs, rather than researchers using the ATD to compare interventions. Increasingly, behavior analysts have focused on determining functions or environmental factors which may maintain disruptive or aggressive behavior (Scott & Caron, 2005; Scott, DeSimone, Fowler, & Webb, 2000). Iwata et al. (1994) delineated procedures for conducting such assessments, which involves using the M-ED variation of the ATD. The use of the M-ED is

expected to continue with the increased focus on matching interventions to functions (Horner, 2000).

Combining single subject designs can be beneficial when considering limitations of specific single subject research designs and their ability to evaluate or demonstrate control for threats to internal validity (i.e., history, maturation, etc). Depending on the designs combined, additional intra-and inter-subject replications can be obtained. The combination of multiple probe design across three participants replicated across two behaviors (Figure 6) permits intra-subject and inter-subject replication, something not possible with a multiple probe design across participants alone. To exemplify, prior to instruction, baseline probe measures are collected for all participants on each target behavior. Upon data stability, the independent variable is introduced to Behavior 1 with Participant 1. When Participant 1 reaches criterion on Behavior 1, probe data are collected for both target behaviors across all participants. Upon stable probe data, intervention is concurrently introduced to Behavior 2 with Participant 1 and Behavior 1 with Participant 2. When participants reach criteria, probe data collected gathered on both target behaviors across all participants. This pattern of introducing the independent variable and collecting probe data continues until Participant 3 reaches criteria on the Behavior 2, after which target behaviors are probed a final time with all participants. In this example the primary design is the multiple probe design across participants, with the multiple probe design across two behaviors addressing the primary limitation of the multiple probe design across participants, i.e., direct intra-subject replication.

Considering the total number of combination designs identified, 36 across the 25 years, data should be interpreted cautiously; however there was an increase in the use of combination designs. Data were also collected on specific single subject designs that were combined. The most frequently combined designs were multiple baseline designs with an ATD ($N = 11$), followed by multiple baseline designs with withdrawal/reversal ($N = 9$), and then ATD with withdrawal/reversal ($N = 8$). Other design combinations were multitreatment with ATD ($N = 3$), multiple baseline with multitreatment ($N = 2$), multiple baseline combined with multiple probe ($N = 2$), and multiple baseline with changing criterion/conditions ($N = 1$).

Limitations to this analysis, such as the review of randomly selected issues ($N = 1$ per year per journal) and interobserver reliability (IOA), exist. Specific errors in coding designs were presented in the Reliability section; however, a majority of the errors in reliability occurred in coding JABA. JABA published the majority of single subject research designs and also contained articles which included multiple studies and more complex designs, i.e. combination designs. Reliability training should have occurred using an issue from each of the journals coded rather than two issues from one journal.

Single subject research methodology is important for answering specific research questions including demonstration questions (e.g., "Does this intervention work?), parametric questions (e.g., "Which is more effective in reducing disruptive behavior a 2 min DRO or 5 min DRO procedure?"), component analysis questions (e.g., "Would this intervention be more effective with or without a specific component?"), or comparative questions (e.g., "Which is more effective and efficient in teaching functional skills to children with autism static pictures or video modeling?") (Wolery & Lane, in press) and for those studies in which a limited number of participants can be secured. The use of single subject research methodology will continue to be used by applied researchers as an alternative to group research designs for individuals diagnosed with low incidence disabilities; particularly as personnel preparation programs secure educator's commitment to scientific research (McDonnell & O'Neill, 2003). Single subject research designs remain "practitioner friendly", cost effective, and assist in eliminating ethical concerns associated with a control group (Shadish, Cook, & Campbell, 2002), while providing methods for evaluating and controlling threats to internal validity. Concerns regarding standards for evaluating single subject research studies have been forwarded by Horner et al. (2005).

Recent legislation (No Child Left Behind, 2001) mandates schools and teachers implement interventions which are "evidence-

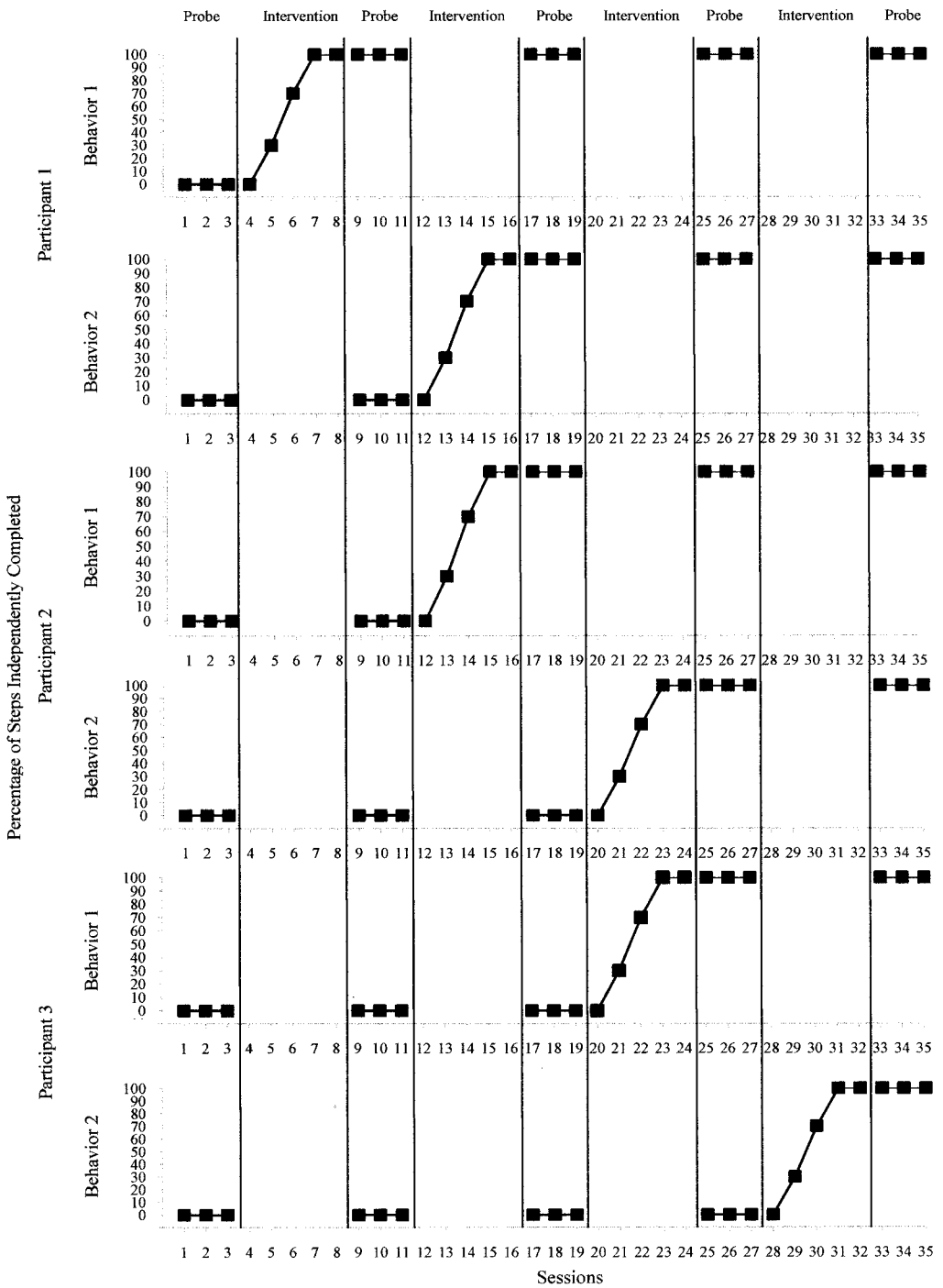

Figure 6. Prototype of single subject research combination design (multiple probe design across three participants replicated across two behaviors).

based". This mandate requires teachers and school based therapist to evaluate intervention programs and procedures quantitatively, making a link between research and practice. Single subject research methodology allows practitioners to collect data on individual students to assess programs effectiveness and when necessary, modify the program in a timely manner. Teachers and school based therapist are ethically required to collect data on Individualized Education Plan (IEP) objectives to document progress. If collected within the context of a single subject research design, these data serve to document program effectiveness and efficiency. Baer et al. (1968; Baer, Wolf, & Risley, 1987) encouraged practitioners to be involved in research because of their being in a position to identify and address real problems under natural conditions.

References

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*, 91–97.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 20*, 313–327.

Barlow, D. H., & Hayes, S. C. (1979). Alternating treatments design: One strategy for comparing the effects of two treatments in a single subject. *Journal of Applied Behavior Analysis, 12*, 199–210.

Barlow, D. H., Hayes, S. C., & Nelson, R. O. (1984). *The scientist practitioner: Research accountability in clinical and educational settings.* NewYork: Pergamon Press.

Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs.* Boston: Allyn & Bacon.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Dattilo, J., Gast, D. L., Loy, D. P., & Malley, S. (2000). Use of single-subject research designs in therapeutic recreation. *Therapeutic Recreation Journal, 34,* 253–270.

Gast, D. L. (2005). Single-subject research design. In M. Hersen, G. Sugai, & R. Horner (Eds.), *Encyclopedia of behavior modification and cognitive behavior therapy* (pp. 1520–1526). Thousand Oaks, CA: Sage Publications, Inc.

Gast, D. L., (in press). Replication. In D. L. Gast (Ed.), *Single subject research methodology in behavioral sciences.* New York: Routledge Publishers.

Gast, D. L., & Ledford, J. (in press). Multiple baseline and multiple probe designs. In D. L. Gast (Eds.), *Single subject research methodology in behavioral sciences.* New York: Routledge Publishers.

Gast, D. L., & Wolery, M. (1988). Parallel treatments design: A nested single subject design for comparing instructional procedures. *Education and Training in Mental Retardation and Developmental Disabilities, 11*, 270–285.

Hartmann, D. P., & Hall, R. V. (1976). The changing criterion design. *Journal of Applied Behavior Analysis, 9*, 527–532.

Harvey, M. T., May, M. E., & Kennedy, C. H. (2004). Nonconcurrent multiple baseline designs and the evaluation of educational systems. *Journal of Behavioral Education, 13*, 267–276.

Herzinger, C. V., & Campbell, J. M. (2007). Comparing functional assessment methodologies: A quantitative synthesis. *Journal of Autism and Developmental Disorders, 37*, 1430–1445.

Horner, R. H. (2000). Positive behavior supports. *Focus on Autism and Other Developmental Disabilities, 15*, 97–105.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children, 71*, 165–179.

Iwata, B. A., Pace, G. M., Dorsey, M. F., Zarcone, J. R., Vollmer, T. R., Smith, R. G., et al., (1994). The function of self-injurious behavior: An experimental-epidemiological analysis. *Journal of Applied Behavior Analysis, 27*, 215–240.

Kennedy, C. H. (2005). *Single-case designs for educational research.* Boston, MA: Pearson/Allyn and Bacon.

McDonnell, J., & O'Neill, R. (2003). A perspective on single/within subject research methods on "scientifically based research". *Research and Practice for Persons with Severe Disabilities, 28*, 138–142.

McReynolds, L. V., & Kearns, K. P. (1983). *Single-subject experimental designs in communicative disorders.* Baltimore, MD: University Park Press.

No Child Left Behind Act of 2001, 20 U.S.C. §§ 6301 et seq. (2001). Retrieved January 29, 2009, from http://www.ed.gov/nclb/landing.jhtml

Richards, S. B., Taylor, R. L., Ramasamy, R., & Richards, R. (1999). *Single subject research: Applications in educational and clinical settings.* San Diego, CA: Singular publishing Group, Inc.

Risley, T. (2005). Montrose M. Wolf. *Journal of Applied Behavior Analysis, 38*, 279–287.

Scott, T. M., & Caron, D. H. (2005). Conceptualizing functional behavior assessment as prevention practice within positive behavior support systems. *Preventing School Failure, 50*, 13.

Scott, T. M., DeSimone, C., Fowler, W., & Webb, E. (2000). Using functional assessment to develop interventions for challenging behaviors in the

classroom: Three case studies. *Preventing School Failure, 44*, 51–56.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton-Mifflin.

Skinner, C. H. (2005). *Single-subject designs for school psychologists*. New York: Haworth Press.

Tawney, J., & Gast, D. L. (1984). *Single subject research in special education*. Columbus, OH: Charles E. Merrill.

Ulman, J. D., & Sulzer-Azaroff, B. (1975). Multi-element baseline design in educational research. In E. Ramp & G. Semb (Eds.), *Behavior analysis: Areas of research and application* (pp. 377–391). Englewood Cliffs, NJ: Prentice-Hall.

Wolery, M., Barton, E. E., & Hine, J. F. (2005). Evolution of applied behavior analysis in the treatment of individuals with autism. *Exceptionality, 13*, 11–23.

Wolery, M., Gast, D. L., & Hammond, D. L. (in press). Comparative intervention designs. In D. L. Gast (Eds.), *Single subject research methodology in behavioral sciences*. New York: Routledge Publishers.

Wolery, M., & Lane, K. (in press). Writing tasks: Literature reviews, research proposals and final reports. In D. L. Gast (Ed.), *Single subject research methodology in behavioral sciences*. New York: Routledge Publishers.

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Training Teachers to Assess the Challenging Behaviors of Students with Autism Using Video Tele-Conferencing

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Abstract: We examined the effects of performance feedback provided via video tele-conferencing (VTC) on the acquisition of functional analysis procedures by six teachers. A university supervisor used VTC equipment (i.e., computers equipped with web cameras and Internet) to provide feedback to teachers learning to implement functional analysis conditions (i.e., escape, attention, and play) with students with autism. Multiple baseline designs across teacher-student dyads with embedded multi-element designs were used to evaluate the effects of performance feedback delivered via VTC on the percentage of functional analysis procedures implemented correctly. Results indicated that teachers learned to implement functional analysis conditions following training (M duration of training = 75 minutes; range = 60–95 minutes). Results were maintained for a number of weeks following the termination of performance feedback (M = 5 weeks; range = 4–9 weeks), but teacher performance declined thereafter. Video conferencing technology may provide supervisors an efficacious way to deliver performance feedback to teachers learning research-based strategies.

The Individuals with Disability Education Act (IDEA) mandates functional behavior assessment and the subsequent development of a behavior intervention plan for students with disabilities who engage in challenging behavior that threatens their educational placement, interferes with his or her learning, or the learning of classmates. (IDEA Improvement Act, 2004; IDEA Amendments, 1997; IDEA, 1990). Functional behavior assessments are critical to the treatment of challenging behavior in school settings, because behavior intervention plans are more likely to result in decreased challenging behavior when based on the results of a prior functional behavior assessment (Didden, Duker, & Korzilius, 1997; Scotti, Evans, Meyer, & Walker, 1991).

In schools, functional behavior assessments have included one or more strategies: record review, interview of the student and others, direct observation and description of challenging behavior, antecedent-behavior-consequence (ABC) analysis, checklists regarding environmental circumstances, scatter plots, functional analysis observation forms, reinforcer identification, development of hypotheses regarding the causes of challenging behavior, and experimental functional analysis (Weber, Killu, Derby, & Barretto, 2005).

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These strategies require a basic understanding of the environmental antecedents and consequences contributing to the maintenance of challenging behavior, and regarding experimental functional analysis, require the assessor to implement antecedents and consequences reliably. Past research demonstrates the need for specific training to assess challenging behavior and develop effective interventions (Durand, 1999; Northup et al., 1994).

Performance feedback, lecture, video and *in vivo* modeling, role-play, and self-monitoring are all routinely used strategies to train teachers and staff (Demchak, 1987; Hastings, 1996; Jahr, 1998), but performance feedback receives the most attention as an effective strategy for modifying staff and caregiver behavior (cf, Alvero, Bucklin, & Austin, 2001). However, teacher preparation programs may find the delivery of performance feedback to teachers burdensome. The physical distance between teachers' field placements and university supervisors coupled with the additional administrative responsibilities of supervisors challenges most university based teacher preparation programs to provide adequate and timely performance feedback to teachers. University supervisors may be forced to choose which skills to expertly supervise and may provide performance feedback to teachers based on the aforementioned constraints, rather than providing supervision in response to individual teacher needs (e.g., 2 hours per teacher provided in 1 hour increments across the semester). Given these types of logistical barriers, research is needed to evaluate the use of available telecommunication technologies to more efficiently deliver expert supervision to teachers learning research-based practices.

Increased consumer availability and decreased cost of such telecommunication technologies as web cameras, video tele-conferencing (VTC) software, smartphones, and the increased availability of broadband Internet access may provide university supervisors innovative tools with which to better provide supervision and performance feedback to teachers learning to implement research-based assessment and intervention strategies for students with developmental disabilities. Other fields use VTC to extend the reach of specialists where shortages exist and to supervise professionals engaged in complicated tasks that require feedback, such as the delivery of psychiatric assessments (Hilty, Luo, Morache, Marcelo, & Nesbitt, 2002). Little VTC research has been conducted in educational settings or with students with disabilities. However, those studies published report positive findings in regards to the distance education of special educators (Ludlow & Duff, 2002), and the supervision of common assessments such as functional analyses (Barretto, Wacker, Harding, Lee, & Berg, 2006; Machalicek et al., in press) and preference assessments (Machalicek et al., 2009).

In the current study, we evaluated the effects of immediate performance feedback provided via consumer ready VTC equipment on six teachers' acquisition and maintenance of functional analysis procedures. The study was carried out in three phases: baseline, intervention, and maintenance. During baseline, teachers were asked to implement functional analysis procedures, but did not receive supervisor feedback. In the second phase, a university supervisor used VTC equipment to deliver immediate performance feedback to teachers learning to implement functional analysis procedures with students with autism. In the last phase, maintenance observations were conducted to provide information regarding teachers' short-term maintenance of functional analysis procedures in the absence of performance feedback.

Method

Participants, Setting, VTC Equipment, and Target Behaviors

Teachers. Six teacher-student dyads participated in this study. All of the teachers were female, and the majority of teachers were of Caucasian ethnicity. One teacher, Christa, reported her ethnicity as Chinese and Polish. The average age of participating teachers was 27 years of age (range = 22–32 years of age). Teachers reported a range of experiences working with students with autism spectrum disorders and related developmental disorders (M = 6 years; range = 4–10 years). Each teacher had earned a Bachelor's degree in a field related to special education (i.e., com-

munication science disorders, psychology), and Susan had earned a Master's of Special Education degree. Three participants (i.e., Jessica, Marla, and Christa) were enrolled in a Master's of Special Education program at the time of the study and had previously completed a graduate seminar on the assessment and treatment of challenging behavior. None of the teachers had previously implemented an experimental functional analysis.

Students. Each teacher was paired with a student who engaged in challenging behavior. Susan was paired with Dakota, Reagan with Stanley, and Julie worked with Ian. Jessica implemented functional analysis conditions with Carter. Marla and Christa were paired with Ethan and Henry, respectively. Target students were 6 years of age on average (range = 5–9 years). Five of the students were Caucasian; Ian was Asian American. With the exception of Dakota, each student had received a diagnosis of autism. Dakota's medical files indicated "autistic like tendencies" and expressive language delays. Target students engaged in a variety of topographies of challenging behavior including aggression (e.g., pinching, hitting), crying or screaming, leaving the instructional area, self-injury (e.g., hand biting), and stereotypy (e.g., hand flapping, repetitive non-word vocalizations). A comprehensive list of each student's topographies of challenging behavior will be provided upon request from the first author.

Setting. All sessions were implemented in a private school serving children with developmental disabilities and autism spectrum disorders. Sessions were conducted in a classroom with instruction continuing normally for children who did not participate in the study. Between two and five non-participating students and between one and three non-participating teachers were present during the sessions. Movable screens separated the participants from the other children and teachers present in the classroom.

VTC Equipment. VTC was achieved using (a) one 2.0Ghz MacBook™ laptop computer connected to one external iSight™ camera, and (b) one iMac™ desktop computer with a built-in iSight™ camera. The laptop computer used in the classroom was placed on the seat of a child size chair beside the teacher. iChat™ videoconferencing software was used on both computers and iChat™ conference recording software was used to record videoconferencing sessions for data collection. Audio communication was achieved with the microphone and speakers of the laptop computer used by the teacher; the university supervisor used the iMac™ built-in microphone. Both computers were connected to a broadband Internet connection by Ethernet cable or wireless connection. The iSight™ camera has a 640X480-pixel video graphics array (VGA), auto exposure, auto focus, and video capture at 30 frames per second. The iSight™ camera used in the classroom was placed on a plastic standing mount and secured to a stationary object (e.g., windowsill, bookshelf) in the classroom so that the supervisor could view the entire assessment area. Data was transmitted via a wireless local area network (LAN) with Wi-Fi protected network access (WPN) maintained by the private school where the research was conducted to a separate LAN maintained by the university. The confidentiality of data transmission was secured through subscription to an Internet-based service providing a virtual private network (VPN) with 128-bit encryption.

Teacher target behaviors. Each teacher implemented 5-min functional analysis conditions (i.e., attention, play, demand) similar to conditions described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982; 1994). Anticipated teacher responses for each functional analysis condition provided condition specific task analyses of teacher behaviors (adapted from Erbas, Tekin-Iftar, & Yucesoy, 2006; Iwata et al., 2000). Target teacher behaviors are reported in Table 1.

Supervisor target behaviors. The supervisor provided feedback according to O'Reilly and colleague's applied behavioral supervision model (1992). Anticipated supervisor behaviors (e.g., praise, error correction, summary of performance) in response to teacher behaviors provided a task analysis of supervisor behaviors. During teacher implementation of functional analysis conditions, if a teacher made an error, the supervisor interrupted the assessment, indicated an error, and asked the teacher how she might remedy the error. If the teacher verbalized the correct action, the supervisor praised the teacher and told them to proceed. However, if the teacher verbalized

TABLE 1

Anticipated Teacher Behaviors During Each Functional Analysis Condition

Attention Condition

1. The teacher directs student towards toys and other items.
2. The teacher tells student what he can do (e.g., play with items) while the teacher works.
3. The teacher sits down at place visible to student.
4. The teacher ignores the student if they do not engage in challenging behavior.
5. If the student engages in challenging behavior, the teacher contingently provides attention for 10 seconds.

Play Condition

1. The teacher directs the student towards his preferred toys and other items.
2. The teacher engages the student in pleasurable activities and delivers attention to the student non-contingently every 10 seconds.
3. If the student engages in challenging behavior, the teacher ignores the behavior.

Demand Condition

1. The teacher directs the student to sit at a table.
2. The teacher provides the student with a clear task direction.
3. If the student does not respond within 5 seconds, the teacher re-states the task direction and uses least to most prompting to promote task completion.
4. If the student engages in challenging behavior, the teacher immediately removes instructional materials from the table and sits with her back to the child for 10 seconds.
5. After 10 seconds, the teacher presents the student with another task demand.

the incorrect action, the supervisor described and modeled the correct action. At the end of each functional analysis condition, the supervisor provided specific praise for procedures the teacher had performed correctly.

Design and Procedure

To evaluate the effects of performance feedback delivered by VTC, multiple baseline across participants designs with embedded multi-element designs were used (Kazdin, 1982).

Baseline. Several days prior to baseline, teachers were asked to read Iwata et al. (1982/1994) describing the procedures of an experimental functional analysis. The supervisor also provided teachers with a brief written explanation of procedural differences between Iwata et al. and the current study. To provide teachers with the maximum practice opportunities, the current study used 10 s as the duration of delivered consequences during all functional analysis conditions and inter-trial lengths. On the first day of baseline assessment, teachers were asked to implement 5-min. functional analysis conditions in a randomized sequence (e.g., play, attention, demand) with their assigned student. The supervisor verbally prompted teachers via VTC to initiate and conclude each 5-min. functional analysis condition, but did not provide further instructions or feedback during baseline. Susan and Jessica implemented three functional analysis conditions. Reagan and Marla implemented six functional analysis conditions and Julie and Christa each implemented nine functional analysis conditions.

Performance feedback. The supervisor provided performance feedback to teachers in real time via VTC as prescribed by an applied behavioral supervision model (O'Reilly et al., 1992). The applied behavioral supervision model consisted of error identification, error correction, and praise as described above in supervisor target behaviors. Training continued until a teacher had implemented each assessment condition with 100% accuracy over three consecutive training sessions (e.g., at least nine 5-min. sessions total). If a teacher achieved criterion performance with some, but not all of the functional analysis conditions, intervention continued only with those conditions that the teacher had not yet achieved 100% accuracy over three consecutive sessions. The training phase lasted a mean of 75 minutes (range = 60–95 min).

Maintenance. Maintenance data collection began one to three weeks following a teacher's demonstration of criterion performance; data continued to be collected at weeklong intervals thereafter. During maintenance observations, teachers were asked to implement several sessions of the functional analysis conditions (e.g., play, demand, escape) with their assigned student without performance feedback from the supervisor. As in baseline, the supervisor provided teachers with verbal

prompts to initiate and terminate each 5-min. functional analysis condition, but did not provide further instruction or feedback. The schedule for maintenance data collection depended on individual teacher availability. Therefore, the total number of maintenance probes ($M = 3.8$; range = 3–6), and the number of weeks between probes varied for each teacher. For Susan and Reagan maintenance probes were obtained at one, three, four, and five weeks following training. For Jessica, maintenance probes were obtained at three, four, and five weeks following training. Maintenance probes were obtained at one, three, four, five, nine, and eleven weeks following training for Christa. For Marla, maintenance probes were obtained at one, three, and seven weeks following training. For Julie, maintenance probes were obtained at one, three, and five weeks following training.

Interobserver Agreement, Treatment Integrity, and Social Validity

The primary author, an advanced doctoral student in special education with board certification in behavior analysis, served as the supervisor during the three experimental phases and collected data regarding the occurrence and nonoccurrence of teacher behavior. To evaluate the efficacy of training provided via VTC, the task analyses described in Table 1 were used as checklists to evaluate teacher performance during baseline, intervention, and maintenance phases of data collection. The delivery of an antecedent teacher behavior (e.g., telling the student to play with toys while the teacher works during attention conditions) was scored as correct if the instruction occurred at the appropriate time and incorrect if the teacher failed to deliver the antecedent behavior or delivered it inappropriately. The delivery of consequences by teachers (e.g., withdrawal of instructional task for 10 s when the student engages in target challenging behavior) was scored as correct if the withdrawal of task followed challenging behavior within 5 s. The delivery of consequences was scored as incorrect if the withdrawal of instructional task did not occur following target challenging behavior or occurred 6 or more seconds after challenging behavior. Functional analysis conditions involving the non-delivery of consequences (e.g., the absence of teacher attention when students did not engage in challenging behaviors time during attention conditions) were scored as correct if the teacher withheld consequences and as incorrect if teachers delivered consequences at the wrong time.

All functional analysis conditions lasted 5-min and were recorded using iChat™ conference recording software for reliability coding. A second advanced doctoral student collected data regarding the occurrence and nonoccurrence of teacher behavior for 30% of each experimental phase. The number of correct teacher behaviors were divided by the number of anticipated teacher behaviors (Table 1) and multiplied by 100 for each functional analysis condition to obtain a percentage of correct teacher responding. Data from the two independent observers were compared for agreements and disagreements. An agreement was scored for a step of the task analysis if both observers recorded an occurrence or nonoccurrence. Any discrepancy between the observer's scoring resulted in a disagreement for that step of the task analysis. Agreement was calculated for each functional analysis condition by dividing the number of scored agreements by the number of agreements plus disagreements and multiplying by 100%. The mean agreement score for teachers' performance of functional analysis procedures was 97% (range = 80–100%).

The first author's implementation of the supervision model was recorded using iChat™ conference recording software. Two advanced doctoral students independently scored 30% of intervention sessions for each teacher. This task analysis of targeted supervisor behaviors described was used as a checklist to evaluate supervisor delivery of performance feedback during intervention. Correct responses were defined as completion of a single step of the task analysis. Incorrect responses were defined as failing to complete a step of the task analysis, or inaccurately completing a step. The number of supervisor behaviors performed correctly was divided by the number of anticipated supervisor behaviors and multiplied by 100 to obtain a percentage of correct supervisor responding. Data from the two independent observers were compared for agreements and disagreements. An agreement was scored

for a step of the task analysis if both observers recorded an occurrence or nonoccurrence. Any discrepancy between the observer's scoring resulted in a disagreement for that step of the task analysis. Agreement was calculated for each functional analysis condition by dividing the number of scored agreements by the number of agreements plus disagreements and multiplying by 100%. The mean correct supervisor implementation of the applied behavior analysis supervision model was 98% (range = 75–100%). Agreement for the fidelity of the delivery of performance feedback was a mean of 98% (range = 80–100%).

Following performance feedback teachers completed an anonymous, 14-item questionnaire aimed at assessing the acceptability and feasibility of the training. The questionnaire was designed to elicit teacher perceptions regarding the use and delivery of performance feedback by VTC (e.g., "The delivery of error correction following my incorrect performance was acceptable to me"; "The technical aspects of video tele-conferencing were effective (clear picture and sound, speed of transmission)"), and teacher satisfaction with training outcomes (e.g., "I feel confident in my ability to implement functional analysis conditions with my students"). A 6-point Likert scale provided numerical ratings with "I disagree" indicating a rating of 1 and "I agree" indicating a numerical rating of 6. Teachers ranked the training procedures and outcomes, performance feedback, and the use of VTC to deliver performance feedback positively with mean ratings of 5.6, 5.2, and 5.1, respectively. The questionnaire is available upon request from the first author.

Results

Figures 1 and 2 show teacher performance during baseline, performance feedback, and maintenance phases in percentage of steps completed correctly. Figure 1 shows teacher performance for Susan, Reagan, and Julie. Figure 2 shows teacher performance for Jessica, Marla, and Christa. Each teacher implemented functional analysis conditions with relatively high, yet variable accuracy during baseline (median performance = 63.5%; range = 20–100%). Teacher implementation of functional analysis conditions (i.e., attention, escape, and play) improved with performance feedback delivered by VTC (median performance = 100%; range = 79–92%). Teachers reached the predetermined performance criteria within 19 sessions (M duration of intervention = 75 min; range = 60–95 min).

Some teachers' ($n = 3$) performance of one or more functional analysis conditions improved during baseline. For example, Reagan's baseline implementation of demand conditions improved from 20% to 40% of steps completed correctly. Similarly, Marla's baseline implementation of attention conditions improved from 40% to 60% of steps completed correctly. Christa's baseline implementation of both demand and play conditions improved from 60% to 80% and 67% to 100% of steps completed correctly, respectively. These findings are similar to the results of previous research evaluating strategies to train psychology students to implement functional analyses (Iwata et al., 2000). As in Iwata et al., the teachers in this study entered baseline assessment having read the methods section of Iwata et al. (1982/1994). The teachers had also likely gained some understanding of functional analysis procedures from their coursework in special education and classroom experiences. These findings suggest that the practice of research-based strategies could contribute to improved performance for some teachers. Indeed, Christa's continued improved performance of play conditions during baseline to 100% accuracy suggests that practice of functional analysis conditions alone might improve performance for some teachers.

During the initial performance feedback session, teachers' performance of functional analysis conditions varied. Some teachers' performance of some functional analysis conditions showed improvement. For example, Susan implemented a baseline attention condition with 20% of steps completed correctly. During the first performance feedback session, Susan implemented the attention condition with 80% accuracy. Reagan's performance of demand and play conditions also improved, with 20% and 33% improvement, respectively. Julie also demonstrated an immediate improvement in her implementation of demand conditions. She implemented base-

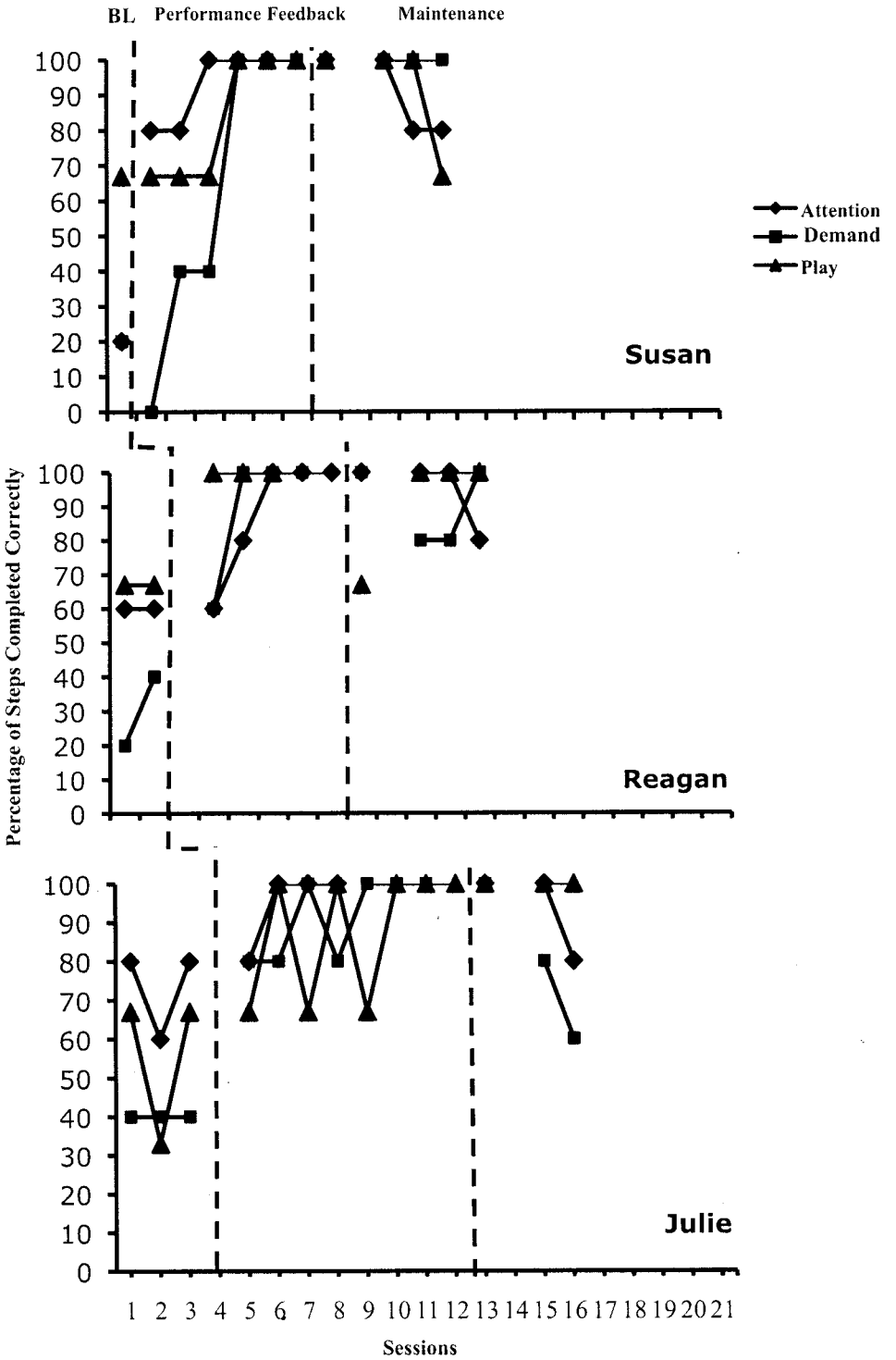

Figure 1. Intervention results for Susan, Reagan, and Julie, including baseline, performance feedback, and maintenance observations.

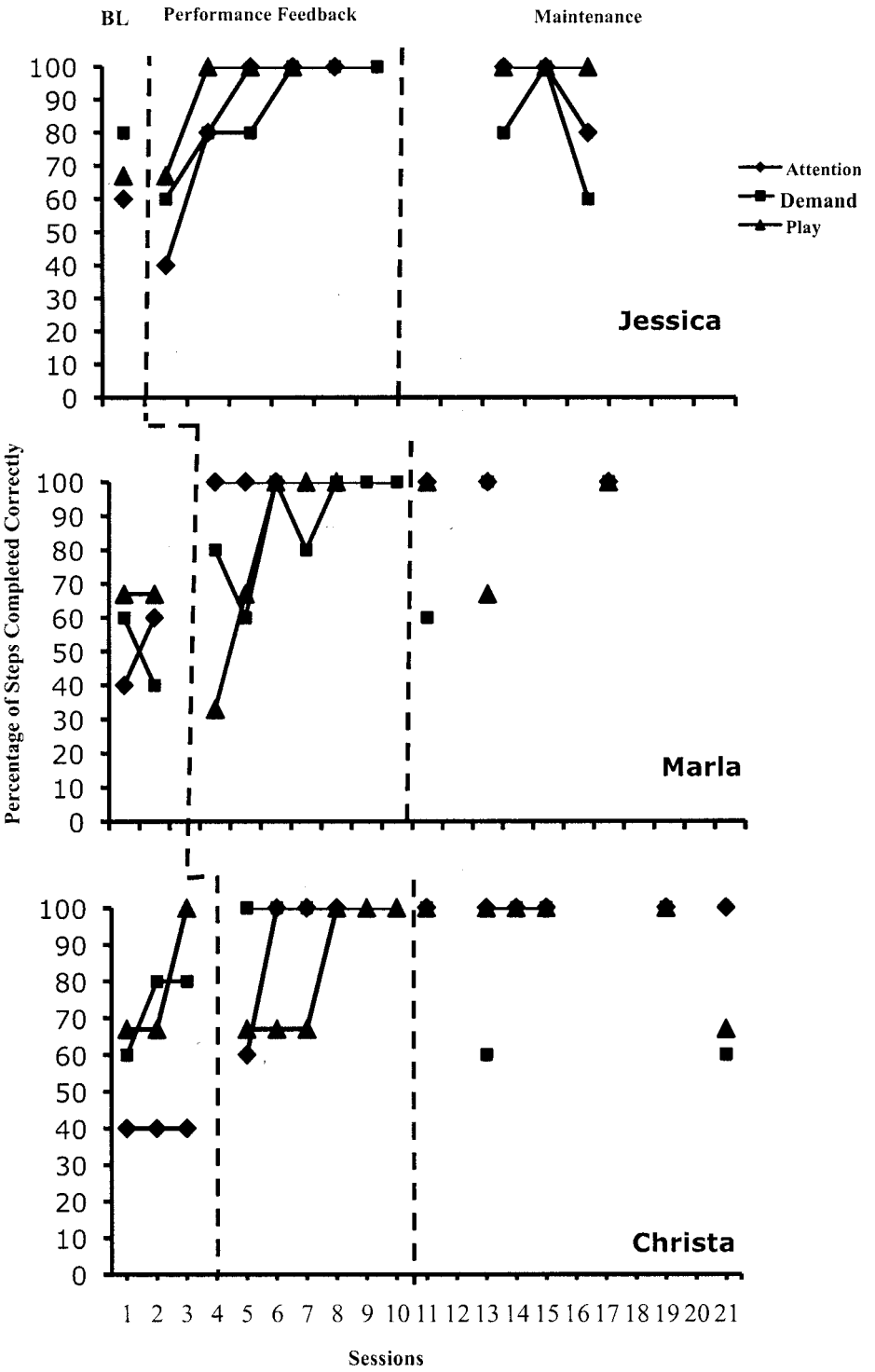

Figure 2. Intervention results for Jessica, Marla, and Christa, including baseline, performance feedback, and maintenance observations.

line demand conditions with 40% of steps completed correctly and subsequently implemented the same condition with 80% accuracy during the initial performance feedback session. Likewise, Marla implemented baseline attention and demand conditions with high scores of 60% of steps completed correctly. During the first performance feedback session, Marla implemented the attention and demand condition with 100% and 80% accuracy, respectively. Christa also demonstrated improved implementation of attention and demand conditions. During baseline, she implemented attention and demand procedures with high scores of 40% and 80% accuracy, respectively. During the initial performance feedback session, she implemented the attention condition with 60% accuracy and the demand condition perfectly. These results might be explained as a continuation of upward data trends observed during baseline and suggest that some teachers' performance of functional analysis conditions improved as the result of a variable other than the introduction of performance feedback. Alternatively, teachers' improved performance during initial performance feedback sessions might be interpreted as the effects of teachers' awareness of performance expectations and anticipation of planned consequences. Just before the first performance feedback session, the supervisor explained performance feedback procedures in detail to teachers. In this study, correct responses were followed by supervisor praise and incorrect or incomplete responses were followed by corrective feedback and modeling as needed. For some teachers, a statement of praise might function to reinforce preceding behavior. Thus, if teachers are aware of the availability of praise, as they were during the first initial performance feedback session, their focus on correctly implementing functional analysis procedures might have sharpened in an attempt to obtain supervisor praise.

However, teachers' performance of other functional analysis conditions worsened during the first performance feedback session. Susan implemented a baseline demand condition with 20% accuracy, but during the first performance feedback session failed to implement any steps of the demand condition correctly. During baseline, Jessica implemented attention and demand conditions with 60% and 80% accuracy. Subsequently, Jessica implemented the same conditions with only 40% and 60% accuracy, respectively. Marla's performance of play conditions declined from 67% of steps completed correctly to 33% of steps completed correctly. Christa responded similarly with perfect baseline implementation of the play condition, but subsequently implemented the play condition with 67% accuracy. Some researchers have explained the effects of performance feedback as negative reinforcement (Mortenson & Witt, 1998). For some teachers, corrective feedback following an error might function to punish preceding behavior. Thus, if teachers anticipate corrective feedback when they make an error, as they did during the initial performance feedback phase, their focus on correctly implementing functional analysis procedures might have increased to avoid receiving corrective feedback from the supervisor.

Teacher implementation of functional analysis conditions during maintenance observations varied. Criterion or near criterion levels of performance were maintained for the majority of teachers for four or more weeks post-intervention (median performance = 100%; range = 60–100%). Susan's performance maintained at one, three and four weeks post intervention (median performance = 100%; range = 67–100%). Five weeks post performance feedback, her implementation of the play condition declined to 67% of steps completed correctly. Although both Reagan and Christa demonstrated below criterion performance of a functional analysis condition during the initial performance feedback sessions, criterion or near criterion performance was maintained for both Reagan (median performance = 100%; range = 67–100%) and Christa (median performance = 100%; range = 60–100%) at three, four, and five weeks post performance feedback. In fact, Christa's performance maintained criterion level performance until eleven weeks post performance feedback, when her performance of escape and play conditions declined. Jessica's performance maintained at three and four weeks post performance feedback (median performance = 100%; range = 60–100%). Her performance of the demand condition declined five weeks post performance feed-

back to 60% of steps completed correctly. At one-week post performance feedback, Marla implemented all conditions, but the demand condition (60%) perfectly. At three weeks post performance feedback, Marla implemented demand and attention conditions perfectly, but her performance of the play condition worsened. However, at seven weeks post performance feedback, Marla implemented each functional analysis condition perfectly (median performance = 100%; range = 60–100%). Julie implemented all conditions with 100% accuracy at one-week post performance feedback and all conditions, but the demand condition perfectly at three weeks post performance feedback (median performance = 100%; range = 60–100%). Although the experience of an "off day" for a teacher could contribute to these variable maintenance findings, other explanations are possible. The end of the semester and school year coincided with the maintenance phase of the current study and teachers' motivation to participate in research might have naturally waned. Additionally, the defining characteristic of the maintenance phase was the absence of performance feedback; thus reinforcement for teachers' correct performance of functional analysis conditions might not have been sufficient to maintain criterion level performance. Given the declined performance across all teachers, these findings suggest that teachers may require additional training or booster sessions of performance feedback following intervention to maintain functional analysis procedures.

Discussion

The findings of the current study extend previous studies evaluating the use of videoconferencing in educational settings by demonstrating that videoconferencing can be used to deliver a research-based training strategy (i.e., performance feedback) to classroom teachers. Using relatively inexpensive videoconferencing equipment (i.e., computers equipped with web cameras and broadband Internet connection), a supervisor, situated in a university office, provided immediate performance feedback to six teachers learning to assess the challenging behaviors of students with autism. The supervisor also inconspicuously collected reliable performance data by watching teachers implement functional analysis in real time on a desktop computer screen. Furthermore, the performance feedback intervention was delivered within a mean of 75 minutes (range = 60–95 min) and was judged by participating teachers to be socially acceptable. This preliminary demonstration suggests that VTC may provide university supervisors with an effective way to provide instruction and feedback to teachers without being physically present. By reducing the need for face-to-face meetings, VTC may help supervisors to overcome some of the barriers (e.g., ratio of supervisors to teachers, distance between schools) to providing adequate supervision to teachers. Additionally, by making supervision more accessible, the use of VTC may assist teachers to become proficient in research-based strategies recommended by educational legislation.

Despite these initial findings suggesting that the use of VTC to deliver training may benefit supervisors and teachers, there are several considerations that require further research. In the current study, a university supervisor provided teachers with instructive models of assessment procedures and responsive feedback as they performed functional assessments with students with autism. However, the assessment and intervention process often requires teachers to interpret available data and make data based instructional decisions. For instance, an important aspect of the treatment of challenging behavior includes the development of a function based behavior intervention plan based on functional assessment results. Indeed, researchers have stressed the importance of research evaluating strategies to train teachers to implement more complex assessment procedures involving a teacher's clinical judgment (e.g., changing the difficulty of the task presented during demand conditions) (Erbas et al., 2006; Iwata et al., 2000; Moore & Fisher, 2007; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004). Training teachers in these skills might require a combination of training strategies, including lecture, the presentation of multiple exemplars, and the use of decision-making tools. In the current study it was unnecessary to share documents or data with the teachers via VTC, but these technological functions would likely be necessary if a

supervisor were training teachers to make data based instructional decisions. Future research should evaluate the use of VTC to train teachers to implement more complex skills, such as the development, implementation, and evaluation of a function based behavior intervention plan. For instance, the intervention selection model described by Mueller, Edwards, and Trahant (2003) might be used to train teachers via VTC to implement a variety of intervention procedures aimed at decreasing challenging behavior and assess a teacher's ability to choose an intervention based on the hypothesized function of the student's challenging behavior.

Additionally, this study was limited in scope to evaluating the effects of performance feedback by VTC on teacher acquisition and short-term maintenance of functional analysis procedures with a single child. Teachers were paired with a child who engaged in a range of behavioral topographies with varying social consequences maintaining their challenging behavior. Thus, each teacher experienced different topographies and distributions of challenging behavior during functional analysis conditions and experienced differential opportunities across functional analysis conditions to deliver antecedents and consequences. For instance, if teachers were paired with a student who screamed only to escape academic demands, the teacher would have had fewer opportunities to implement consequence procedures during attention conditions. Teachers could then have difficulty implementing a functional analysis with a student who engaged in multiple topographies of challenging behavior or engaged in challenging behavior that was maintained by another social consequence (e.g., to obtain attention) or multiply maintained. To better prepare teachers for the range of challenging behaviors they are likely to encounter in their careers, supervisors may need to train teachers to implement functional analysis conditions with several students, through multiple practice opportunities or through the additional use of case studies and role play. Future research should evaluate the effects of using VTC to facilitate the generalization of teacher performance using such strategies as case studies, or role-play.

Finally, although teachers rated the use of VTC to deliver performance feedback positively and described several benefits to using VTC, technical difficulties did occur during training sessions. During the current study, each teacher experienced one to two training sessions with technical issues. Technical difficulties arose when teachers or students had inadvertently changed the settings of the computer (e.g., accidentally pressing the mute button on the computer), or when the student's challenging behavior affected the VTC equipment (e.g., student throws a puzzle piece that hits the web camera). The intrusiveness of VTC equipment may rely in part on the characteristics of the target student. During sessions with students who exhibited more frequent or intense challenging behavior, teachers experienced more frequent technical difficulties. For instance, one student screamed during demand conditions and momentarily precluded communication between the supervisor and teacher. In addition, each of the six students demonstrated varying interest in the VTC equipment. The majority of students were easily re-directed by their teacher, but a couple of students demonstrated more persistent interest. For instance, one child pulled a key cover from the laptop computer's keyboard during the attention condition. From the supervisor's perspective, these difficulties were easily prevented or remedied within a few minutes by asking the teacher to readjust or move the VTC equipment (i.e., placing the web camera on a window ledge above the assessment area or moving the laptop computer beneath the table out of the child's sight). Of course, these difficulties interrupted teacher implementation of the functional analysis and the remedies proved more difficult for teachers assessing students whose challenging behaviors included leaving the assessment area. These aforementioned limitations should be weighed against the benefits of using VTC to train teachers.

Ultimately the social validity of VTC in educational settings relies on the ability of participating teachers to set up necessary equipment and solve intermittent technical difficulties. Whenever both face-to-face and VTC facilitated supervision are available and convenient, supervisors might first explain the known benefits and limitations for each deliv-

ery method and then allow teachers to choose a delivery method. In some situations, face-to-face supervision could be easier for both the supervisor and the teacher (e.g., when target children engage in challenging behavior at a volume or intensity that precludes effective communication between the supervisor and teacher). Alternatively, supervisors may find the use of VTC welcome when field placements are spread across several cities or when teachers require frequent supervision. Future research should continue to evaluate the relative benefits and drawbacks of using VTC in educational settings to train teachers.

References

Alvero, A., Bucklin, B., & Austin, J. (2001). An objective review of recent research on carers supporting people with intellectual disabilities and challenging behaviour. *Journal of Intellectual Disability Research*, *43*, 325–339.

Barretto, A., Wacker, D., Harding, J., Lee, J., & Berg, W. (2006). Using telemedicine to conduct behavioral assessments. *Journal of Applied Behavior Assessment*, *39*, 333–340.

Demchak, M. (1987). A review of behavioral staff training in special education settings. *Education and Training in Mental Retardation*, *22*, 205–217.

Didden, R., Duker, R., & Korzilius, H. (1997). Meta-analytic study on treatment effectiveness for problem behaviours with individuals who have mental retardation. *American Journal of Mental Retardation*, *101*, 387–399.

Durand, M. (1999). Functional communication training using assistive devices: Recruiting natural communities of reinforcement. *Journal of Applied Behavior Analysis*, *3*, 57–61.

Erbas, D., Tekin-Iftar, E., & Yucesoy, S. (2006). Teaching special education teachers how to conduct functional analysis in natural settings. *Education and Training in Developmental Disabilities*, *41*, 28–36.

Hastings, R. (1996). Staff strategies and explanations for intervening with challenging behaviours. *Journal of Intellectual Disability Research*, *40*, 166–175.

Hilty, D., Luo, J., Morache, C., Marcelo, D., & Nesbitt, T. (2002). Telepsychiatry an overview for psychiatrists. *CNS Drugs*, *16*, 527–548.

The Individuals with Disability Act of 1990. 20 U.S.C. §§ 1400.*et seq.*

The Individuals with Disabilities Act Amendments of 1997, Pub. L. No. 17-105, § 101, 111 Stat. 37 (1997).

The Individuals with Disabilities Education Improvement Act of 2004, Pub. L. No. 108–446, § 101, 118 Stat. 2647 (2004).

Iwata, B., Dorsey, M., Slifer, K., Bauman, K., & Richman, G. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis*, *27*, 197–209. (Reprinted from *Analysis and Intervention in Developmental Disabilities*, *2*, 3–20, 1982).

Iwata, B., Wallace, M., Kahng, S., Lindberg, J., Roscoe, E., & Conners, J., et al. (2000). Skill acquisition in the implementation of functional analysis methodology. *Journal of Applied Behavior Analysis*, *33*, 181–194.

Jahr, E. (1998). Current issues in staff training. *Research in Developmental Disabilities*, *19*, 73–87.

Kazdin, A. (1982). *Single-case designs: Methods for clinical and applied settings*. New York: NY: Oxford University Press.

Ludlow, B., & Duff, M. (2002). Live broadcasting online: Interactive training for rural special educators. *Rural Special Education Quarterly*, *21*(4), 26–30.

Machalicek, W., O'Reilly, M. F., Chan, J., Rispoli, M., Davis, T., & Sigafoos, J., et al. (2009). Using videoconferencing to conduct functional analysis of challenging behavior and develop classroom behavior support plans for students with autism. *Education and Training in Developmental Disabilities*, *44*, 207–217.

Machalicek, W., O'Reilly, M. F., Chan, J., Rispoli, M., Lang, R., Davis, T., Shogren, K., Sigafoos, J., Lancioni, G., & Langthorne, P. (2009). Using videoconferencing to support teachers to conduct preference assessments with students with autism and developmental disabilities. *Research in Autism Spectrum Disorders*,*3*, 32–41.

Moore, J., & Fisher, W. (2007). The effects of videotape modeling on staff acquisition of functional analysis methodology. *Journal of Applied Behavior Analysis*, *40*, 197–202.

Mortenson, B., & Witt, J. (1998). The use of weekly performance feedback to increase teacher implementation of a pre-referral academic intervention. *School Psychology Review*, *27*, 613–627.

Mueller, M., Edwards, R., & Trahant, D. (2003). Translating multiple assessment techniques into an intervention selection model for classrooms. *Journal of Applied Behavior Analysis*, *36*, 563–573.

Northup, J., Wacker, D., Berg, W., Kelly, L., Sasso, G., & DeRaad, A. (1994). The treatment of severe behavior problems in school settings using a technical assistance model. *Journal of Applied Behavior Analysis*, *27*, 33–47.

O'Reilly, M., Renzaglia, A., Hutchins, M., Koterbra-Buss, L., Clayton, M., & Halle, et al. (1992). Teaching systematic instruction competencies to special education student teachers: An applied behavioral supervision model. *JASH*, *17*, 104–111.

Scotti, J., Evans, I., Meyer, L., & Walker, P. (1991). A meta-analysis of intervention research with problem behavior: Treatment validity and standards of practice. *American Journal on Mental Retardation*, *96*, 233–256.

Wallace, M., Doney, J., Mintz-Resudek, C., & Tarbox, R. (2004). Training educators to implement functional analyses. *Journal of Applied Behavior Analysis*, *37*, 89–92.

Weber, K., Killu, K., Derby, M. K., & Barretto, A. (2005). The status of functional behavioral assessment (FBA): Adherence to standard practice in FBA methodology, *Psychology in the Schools*, *42*, 737–744.

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Acquisition and Generalization of the Picture Exchange Communication System Behaviors across Settings, Persons, and Stimulus Classes with Three Students with Autism

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Abstract: This study examined the acquisition and generalization of requesting behaviors learned through PECS with three children with autism. A single-subject multiple baseline across participants design was used to determine the effects of PECS. Results indicated that all three participants acquired PECS skills for requesting and generalized the skills across settings and persons. However, only two of the three participants met criterion on the generalization across stimulus class probes. Implications and suggestions for future research are discussed. This study provides preliminary data on generalization of PECS across stimulus classes by persons with autism.

Language and communication competency determines an individual's functioning in many aspects of life including education, employment, and general quality of life. A corollary is that, persons who are not able to develop functional communication and language skills are more likely to live lives of dependency social isolation, and restriction (Warren & Abbeduto, 2007). Competencies in communication enable individuals to realize their goals for communication and to attain the "essence of their humanity" (Light, 1997, p. 1). Yet, research indicates that about 50% of persons with autism fail to develop adequate speech and language for their daily needs (Keen, Sigafoos, & Woodyatt, 2001; Light, Roberts, Dimarco, & Grenier, 1998). Interventions designed to teach functional communication skills are therefore very crucial for future outcomes of children with autism.

Augmentative alternative communication (AAC) strategies have been found successful for augmenting and/or substituting speech or communication for individuals with communication difficulties (Beukelman & Mirenda, 2005). AAC strategies comprise unaided strategies such as sign language and manual signs, and aided systems including synthetic speech generating devices and picture-based strategies (Beukelman & Mirenda). The picture exchange communication system (PECS) is one of the picture-based aided AAC strategies that have been found to be successful with children with autism (Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2002). PECS facilitates communication skills through exchanging pictures for desired items. PECS uses evidence-based procedures such as choice and preference, time delay, environmental arrangement, and differential reinforcement (Kravitz, Kamps, Kremmerer, & Potucek, 2002). PECS does not require any prerequisite skills, such as imitation or attentional abilities in children, except for a few motor movements. In addition, no other language system such as speech or signing is required for communicating with PECS (Charlop-Christy et al., 2002).

Since the 1990s, a number of studies, including descriptive studies (Bondy & Frost, 1994; Schwartz, Garfinkle, & Bauer, 1998), single-subject designs studies (Charlop-Christy et al., 2002; Ganz & Simpson; 2004, Tincani,

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2004; Tincani, Crozier, & Alazetta, 2006), and randomized control trials (Howlin, Gordon, Pasco, Wade, & Charman, 2007) have examined the effectiveness of PECS. However, little has been documented regarding the extent to which PECS promotes generalization. Despite the reported successes at teaching individuals to use AAC devices, research indicates that these individuals continue to exhibit problems with generalization (Schlosser & Lee, 2000). Yet, researchers have observed that an important measure of the functionality of a newly acquired communicative behavior is whether it results in a generalized use across settings, behaviors, and persons (Mirenda, 2003; Schlosser, 2003). After all, what is the benefit of acquiring a communication skill if it does not result in "utility within the demands of daily living" (Light, 1989, p.138). In addition, generalization of skills has been cited as one of the indicators of appropriate use of newly acquired skills (Schlosser). It is therefore reasonable that intervention programs that have been proven to be effective for persons with disabilities are also assessed on their capacity to promote generalization.

A number of investigators have examined the effectiveness of PECS, including generalization and maintenance. Generalization measures were reported in several published single-subject design studies (see Charlop-Christy et al. 2002; Frea, Arnold, Vittimberga, & Koegel, 2001; Kravitz et al., 2002; Marckel, Neef, & Ferreri, 2006; Tincani et al., 2006; Yokoyama, Naoi, & Yamamoto, 2006). For example, Tincani et al. found that PECS use resulted in increased independent manding, which was generalized to the classroom teacher. Similarly, Yokoyama and colleagues determined that the verbal behavior acquired through the use of PECS would generalize across persons and settings. Also, Frea et al. found a reduction in aggressive behaviors following PECS use across all settings. The findings revealed an increase in total frequency of spontaneous language (using icons or icons plus verbalization) across settings and across communicative partners (mother, teacher and peers), and in social interaction with peers. In another study, Kravits et al. studied the effect of PECS on the spontaneous communication skill of a six-year-old female student with autism across the home and school settings. Yet, in only one study did the investigators (Marckel et al.) report generalization across all three measures (i.e., items, persons, and settings). Marckel et al. evaluated the extent to which improvisation training resulted in generalized use of the skill to request items for which specific symbols were not available. However, in this study, the items used for training and generalization were within the same stimulus classes.

Stimulus class is the term used by behavior analysts to describe events or a group of stimuli that share physical, temporal, and functional features (Cooper, Heron, & Heward, 2007). For example, one would describe cookies, candy, bread, and juice as belonging to the same stimulus class because they share the function of being food items. Similarly, cookies and a swing will be described as belonging to different stimulus classes because they differ in physical and functional features. Consequently, the question still remains whether, after acquiring requesting behaviors through PECS, young children will be able to use such skills to request items different in form and function from those used in training. For example, if food items are used during PECS training, can young children with autism generalize the skill to request for play-related activities? There are no known published reports about systematic efforts to evaluate PECS in terms of generalization across stimulus classes.

Functional communication skills enable the individual to express basic needs and wants (Sigafoos et al., 2004). Collins (2007) observed that functional skills are skills that are meaningful and useful in the person's life across settings. According to Mirenda (2003), for communication to be functional it must result in generalized use. Sigafoos and colleagues suggested that acquired functional communication skills must be demonstrated through different requesting skills. For example, a communicative requesting skill should enable the learner to request a drink as well as a leisure activity. Therefore, the purpose of this study was to examine the effects of PECS training on requesting skills of three young children with autism and determine if the acquired skills would generalize across persons, settings, and stimulus classes.

Method

Participants and Settings

Participants were three preschool-aged children receiving early childhood educational services from school districts in their respective communities. Each participant was medically and educationally diagnosed with autism. Participants were recruited from parent support groups because they were either nonverbal, or verbal with very limited vocabulary, and displayed limited or no functional communication skills. Although these children were all receiving speech related services, none was receiving AAC training including PECS.

At the time of this study, Tony was three years, eight-months-old. At the age of 36 months, Tony's expressive language, age-performance profile on the Rossetti Infant-Toddler Language Scale (Rossetti, 2006) was within 0 to 3 months range, with splinter skills up to 15 to 18 months, indicating a severe communication delay. Tony's IEP goal in the area of communication was to request items such as food and water. Tony had a vocabulary of up to 10 words and phrases that he used appropriately, which were intelligible to strangers. However, according to the parents, he would rather point or grab items he desired, and when he was frustrated due to communication breakdown, would hit and kick.

Brooke was three years eight-months-old, and was living with both parents and her newborn baby sister. Her most current assessment confirmed the autism diagnosis with an index of 100 on the Gilliam Autism Rating Scale-Second Edition (GARS-2: Gilliam, 2006), and standard scores of 47, 64, 61, and 72 on communication, daily living skills, socialization skills, and motor skills respectively, and a composite score of 58. Prior assessment on the Developmental Profile II (Alpern, Boll, & Shearer, 2000) conducted at 36 months of age, specified an IQ age equivalence of 33 months and communication age equivalence of 8 months indicating significant delays. The Vineland Adaptive Behavior Scale (VABS: Sparrow, Balla, & Cicchetti, 1984) yielded a communication score of 51 and 52 on the adaptive behavior composite indicating moderate deficits in adaptive behavior. Brooke's IEP goals stipulated acquisition of appropriate communication using AAC.

Ray was a five years, one-month-old male. His autism quotient on the GARS-2 (Gilliam, 2006) was 102, which indicated the presence of autism. The information gathered from Ray's IEP indicated that he was nonverbal but had vision and hearing within normal limits. Ray's intellectual functioning as measured by the Battelle Developmental Inventory-Second Edition (Newborg, 2004) was 80, indicating moderate cognitive delay. On the Developmental Profiles-II (Alpern et al., 2000), Ray scored 53 for communication, 56 for daily living, 57 for socialization, and 67 for motor skills on the VABS (Sparrow et al., 1984). His expressive and receptive language skill age-equivalent scores were 6-months and 16-months according to the parent and teacher reports respectively.

Settings

Training sessions were conducted in a university-based autism center, home, and community settings. Training sessions that took place at the university center were conducted in a room with child-sized tables and chairs arranged to enable the trainer and the child to sit facing each other. This room also had a one-way mirror, thus allowing parents to observe the sessions without any distraction. The days and times of training were scheduled at the convenience of the families of the participants. For one of the participants (Ray), a few sessions of PECS Phase II (distance and persistence) were conducted in the home because the parents could not bring him to the university. These sessions were conducted in the family living room, which contained living room furniture and TV with no other distracting objects beside those needed for training. Generalization probes were conducted at the university center, home, a school campus, and a community park.

Trainers

PECS training trials were conducted by the first author, who participated in a two-day PECS training and was conversant with PECS procedures as outlined in the training manual. Generalized PECS use in the home setting

was conducted by the participants' mothers at home. However, for generalization across communicative partner probes, various individuals were used. For Ray, his older sisters and the teacher served as the communicative partners during the generalization probes. In the case of Brooke, a neighbor and a family friend acted as the communicative partners. Tony also had his older sister as his communicative partner. All data were collected by the first author.

Materials

Materials were comprised of snack items, small toys, and playground equipment identified through a preference assessment (see preference assessment results in subsequent sections). Other materials included 2" by 2" laminated photographs of preferred items, a communication book (a three-ring binder with several strips of Velcro), preferred items, data collection sheets, a timer, and pencil/markers for marking correct or incorrect responses.

Target Behaviors

Two behaviors were targeted in the study. The first behavior was requesting desired items/objects. Requesting was defined as picking up a picture of the item, gaining the attention of the communication partner, and releasing the picture into the communicative partner's hand. The communicative partner in turn would give the student the item that the participant was requesting. Two types of responses were recorded: independent and prompted. An independent response was recorded when the child requested an item (handed the correct picture to the trainer) within 10 seconds after the presentation of the items without any prompt. A prompted response was recorded when the child did not make a request until the delivery of a physical prompt such as touching some part of the participant's elbow, wrist, hand, or pointing to a picture by the trainer.

The second behavior was generalization of requesting skills learned through PECS training. The purpose was to determine if the participating children could perform the acquired skills across persons, settings, and more importantly across stimulus classes. Generalization probes were conducted after mastery of Phase IIIB of PECS (conditional discrimination). A minimum of three probes were conducted for each of the three conditions. The skills assessed in each probe were (a) scanning for a picture of a preferred item from the communication book, (b) reaching for the hand of the communication partner, and (c) releasing the picture into the hands of the communicative partner.

Measurement and Data Recording Procedures

The two dependent measures evaluated during training sessions were percentage correct responses and number of trials to criterion. For each participant, data was collected on the number of sessions and trials to criterion to evaluate the rate of PECS acquisition. Two sessions of data were collected each day with a minimum of 10 minute interval. The trainer created opportunities for requesting during each session and recorded the type of response made by the participants (i.e., independent or prompted performance and the level of prompting needed to perform the skill). Responses were recorded for each participant during each training trial and session. When a child reached criterion at Phase IIIB, generalization probes across persons, settings, and stimulus classes were conducted with both edible and small toy items in different settings, with different persons, and with different stimulus classes. Responses were recorded in the same manner as during PECS Phase I of the training sessions (exchange of items).

During generalization phases, the data were collected on the percentage of correct responses of requesting with items that were different in function and form from trained items, persons other than the trainer, and settings different from those in which training was implemented. Percentage correct of requesting responses were calculated for each session by summing the total independent responses and dividing it by the total number of trials in that session, and multiplying the calculated number by 100. Participants were required to reach a criterion of 80% correct response, and maintain it for three consecutive sessions in each phase before he or she could proceed to the next PECS phase.

Interobserver Agreement

Interobserver agreement data were collected by an independent observer (graduate student in special education) who was familiar with PECS training procedures. Data were collected for 33% of all sessions. A percentage of agreement was calculated at the end of each observation session by dividing agreements by agreements plus disagreements and multiplying by 100. Average range of agreements for PECS training phases were 90–100% (Phase I), 95–100% (Phase II), 95–100% (Phase IIIA), and 88–100% (Phase IIIB).

Procedural Integrity

Procedural agreement data were collected for 33% of randomly selected training sessions. An independent observer completed a checklist of training procedures for the three PECS Phases I, II, IIIA, and IIIB. A percentage was calculated with a "yes" response indicating fidelity and a "No" response indicating a digression. The average "yes" responses for Phase I was 98%, Phase II was 98%, and 95%, and 97% for phases IIIA and IIIB respectively.

Experimental Design

A multiple baseline across participants design (Cooper et al., 2007) was used in this study to examine the effects of PECS. The first step of this design was to evaluate the skill levels of target behavior under baseline conditions until stable baseline conditions were established. The intervention was then applied in a staggered fashion until all three participants received the treatment. Generalization probes were conducted immediately after all treatment phases.

Procedure

Approval for the study was sought from an Institutional Review Board (IRB), and parents through a written consent. Prior to the PECS training, an orientation meeting was convened with the parents who were briefed about the procedures involved in the various phases of PECS training as outlined in the second edition of the PECS Training Manual by Frost and Bondy (2002).

Preference Assessment

A preference assessment was conducted for all three participants. First, each parent was asked to complete a preference assessment worksheet in which they listed food, toy items, and activities that the child liked and disliked. Second, a single stimulus presentation method was used to determine preferred stimuli involving presenting one item at a time to the participant randomly in 10-trial blocks of three 10-minute sessions (Pace, Ivanicic, Edwards, Iwata, & Page, 1985). When the participant reached for an item, he or she was given a small amount of the item (if it was an edible) or 10 to 15 seconds to interact with the object (if toy item). If the participant did not reach for the presented item, the researcher waited for five seconds before presenting another item. This process was repeated until three to five highly preferred food and toy items were identified. Items that were chosen during 80% or more of opportunities were considered as high preference stimuli. Items used for generalization across stimulus class probes were large playground equipment/activity selected through parent interviews and direct observation by observing the child in the activity at least once with the parent or another family member at the park.

Preference assessment results indicated that three food items and five toy items were identified as preferred by Tony. The two top food items included potato chips (100%), Hershey's® chocolate kisses (100%), and M&Ms® (90%). Toy items included a group of worms (100%), magnetic rods (100%), a ball (90%), a fire truck (90%), and a train (80%). The most preferred food items for Brooke include M&Ms® (100%), Coca Cola® (100%), potato chips (100%), chocolate (100%), and candy pop (90%), respectively. While toy items include worms (100%), magnetic rods (90%), a spiky ball (90%), polished stones (80%), and dice (80%). Results for Ray indicated that he preferred Reese's Pieces® (100%), Pringles® potato chips (100%), kool aid (90%), and cookies (80%), respectively. For toy items, flying disks (100%) and worms (100%) were at the top of the list with magnetic rods (90%) and music maker (80%) in the third and fourth positions of the preference hierarchy.

Baseline

Probes were conducted to determine the participants' levels of requesting skills, and to ensure that the participants did not possess the skills to be taught in their repertoire specifically, how to communicate using PECS. The trainer placed either a food item or activity item within the view of the participant but out of his/her reach. A communication book containing the corresponding pictures of these items was also placed in front of the participant. The trainer waited for five seconds for the participant to make a request by using the picture, physically reaching for the item, or through any prelinguistic behavior (e.g., grabbing, holding the hand of the adult towards the item etc.) in his or her repertoire. The participant was given the requested item upon request. Regardless of the displayed behavior, no physical or verbal prompts, or models were provided during this phase.

Intervention

All PECS training sessions were of 15 minute duration across participants. Training sessions were conducted at the same time, three times a week, except for Tony whose parents could only schedule two days in the week.

Phase I. The objective for this phase was for the participant, upon seeing highly preferred item, to pick up a picture of the item, reach toward the communication partner, and release the picture into the communicative partner's hand (Frost & Bondy, 2000). The communicative partner, in turn, would give the student the item that the participant was requesting. The purpose was for the student to learn to initiate communication. The communicative partner (the researcher) sat in front of the student holding a preferred item in one hand. The second trainer (prompter) stood behind the participant. When the participant reached for the item, the communicative partner opened the other hand and aligned it in front of the hand holding the item. The prompter, sitting behind the student, gently guided the participant's hands to pick up the picture, reach towards the open hands of the communicative partner, and release the picture into the communicative partner's hand. The communicative partner would, in turn. give the item to the student. If it was an edible, the participant was allowed some time to eat it. If on the other hand, it was a toy, he/she was allowed to play with the item for a couple of minutes before the next trial began. No verbal prompting was used in this phase. Physical prompts were gradually withdrawn until the participant attained 80% independent correct responding.

Phase II. The skill taught in this phase was persistence to recruit the attention of a communication partner. In this respect, the participant was trained to *travel* to his communication book, pull out a picture, go to the trainer, get the trainer's attention, and release the picture into the hands of the trainer. Training in this phase also required full physical or partial prompting from the prompter.

Phase III. This phase was designed to teach picture discrimination and consisted of two stages described in the PECS training manual as Phases IIIA and IIIB. Although both phases involved discrimination, they were different in terms of the type and range of pictures that must be discriminated. In Phase IIIA, the discrete trial instruction format was used to teach the participants to discriminate between pictures of preferred and nonpreferred items. When the student committed an error, the trainer took the item back and quickly began a new trial. If, on the other hand, the participant got it correct, he/she was given the item. The target skill in Phase IIIB involved discriminating among an array of preferred items. Since this phase involved discriminating among items that were highly desirable to the participant, the procedure involved a correspondent check (presenting the item and observing the participant's response) to ensure that the participant picked the picture of the item that he/she actually wanted. If the participant reacted negatively to the item that was presented, it was assumed that he/she chose the wrong picture, and the trial was considered as unsuccessful. The communicative partner gradually increased the array of pictures with each successful trial until criterion was met.

Generalization

Generalization probes were conducted after mastery of Phase IIIB. As in the training ses-

sions, the communicative partner either sat or stood across the participant and presented an array of preferred items (depending on the array size mastered) to the participant. There were no physical prompts provided. Data were collected and recorded as in the training phase. The skills assessed in each probe were (a) picking up a picture from the communication book, (b) reaching for the hand of the communication partner, and (c) releasing the picture into the hands of the communicative partner and receiving the item. A minimum of three 15-minute probes were conducted for each of the three conditions.

Two sessions of data were collected on the same day with a minimum of 10-minute intervals. Since some of the items used in the probes were too large or not movable to be presented (i.e., slide, see-saw, climber and a big rock), the pictures were put in the communication book and shown to the participants to pick what or where they wanted to play, and they were taken only to the item which corresponded to the picture that was presented. If the participant rejected the presented item, the trial was scored as incorrect.

Generalization across persons. The generalization across persons data were collected just as in the training phase. The indicator for a successful trial was for the participant to pick up the picture of the desired item, reach for the hands of the communication partner, release the picture, and receive the item. The trials were similar to those in Phase IIIB in terms of discriminating from an array of preferred items and the exchange of the icon for a desired item.

Tony's 10-year old sister played the role of the communication partner. She was trained prior to implementing the phase. In addition, the investigator sat across to provide prompting if required. The communication book contained eight pictures in the first session, but was increased to 10 pictures by Tony himself during the second session. For Brooke, the sessions were conducted in the same room as the intervention phase. However, in case of Brooke, two different partners were used: a neighbor and a family friend because the parent could not get the same person to come for all probe sessions. Consequently, the two probe sessions were conducted with each of the communicative partners, making four data points for Brooke against three data points for Ray, and two for Tony. For Ray, the procedures and expectations for the generalization were the same as in the case of Brooke. The trainer was Ray's seven-year-old sister. Prior to this session, she was trained by allowing her to watch the training sessions from the observing room throughout most of the training sessions and then directly in a one-to-one session. During the probe sessions, the investigator sat across to provide promptings to her, in case she needed it, while the mother and another sibling observed through the one-way mirror. Three probes were conducted over three 15-minute sessions over two days.

Generalization across settings. The generalization across settings probes were conducted to determine if the participants would be able to use PECS behaviors for making requests in settings different from those in which training was conducted. The procedures were the same as in the generalization across person probes, except that the investigator acted as the communicative partner. The items used were the same items used during training.

Tony's generalization probes were conducted in a neighborhood elementary school. The probes were conducted in the hallway of the school because it was difficult for Tony to focus at the park. He preferred to play in the park equipment. The probes were conducted in the presence of Tony's siblings and his mother. Brooke's data was collected at the community park with the trained items. Although there were many other people at the park, the sessions were conducted at a bench in a quiet area of the park. The probes involved selecting from an array size of eight.

Ray's generalization across settings data were collected in the home and park. A session was conducted in the living room area and the backyard respectively. The third session was conducted in the sand pit at a community park in the presence of Ray's mother, siblings, school teacher, and the teacher's son. The array size was three because that was the size he was able to acquire at the end of training.

Generalization across stimulus classes. The procedures for these probes were different from those of generalization across persons and settings in a fundamental way: the reinforcer was not delivered immediately upon

the release of the picture because the items were large playground equipment. Instead, upon the release of the picture into the hands of the communicative partner, the participant was given a verbal praise and taken to the item. If the participant rejected the item, he/she was given the communication book to make another choice.

All probes were conducted at the park for Tony. The items used for Tony included the slide, climber, see-saw, and a sand scoop. The sessions were conducted in the afternoon, so there were only a few people at the park. The sessions for Brooke were conducted at the same park as for the generalization across settings. All sessions occurred in the morning when the weather was more tolerable. The items included large play ground equipment such as swing, slide, climbers, see-saw, and sand play toys (bucket, spade, sand molds, and sieve). There were a number of other people in the park. However, there were only four people within the immediate environment including Brooke, her mother, her baby sister, and the trainer. The items used for Ray included trampoline, picture book, number blocks, and large play ground toys such as swing, slide, and climber. The probe sessions occurred in the home and two different community parks. During the first two sessions, Ray's mother and two siblings were present. The mother was sitting by Ray while the two others were playing in different parts of the living room. The living room contained sitting room furniture and a television set, so there was a lot of free space for movement. The backyard contained a large trampoline, which the mother indicated that Ray loved, and sand play toys. The slides, swings, and climbers were used at the park for generalization probes.

Results

PECS Acquisition

The results for both requesting and generalization for all participants are presented in Figure 1. Tony's total training comprised 13 sessions (167 trials). Tony emitted no correct independent responding during baseline (0%). He attained 60% correct responding during the first session of Phase I, and reached criterion in four sessions (42 trials), with an average of 81% correct responding. Tony mastered Phase II in three sessions (45 trials), with an average correct responding of 97%. Phase IIIA was also mastered in three sessions (36 trials). In Phase IIIB, Tony's responding increased to 100% in all three sessions of 34 trials. Tony's training ended with an array size of eight pictures.

Brooke participated in a total of 24 training sessions (313 trials), and nine generalization probes. In baseline, she did not request any preferred item using the PECS icons. However, when training began, Brooke's independent correct requesting (using icons) increased from 0 to 22% at the end of the first session and mastery criterion with 100% by the end of the sixth session. Overall, Brooke reached criterion in six sessions (87 trials). Phase II also consisted of six sessions (112 trials). This phase began from about 20% at the end of session 1 to 100% by the end of the sixth session. Phase IIIA included four training sessions (37 trials). Brooke attained 80% correct by the end of the third session, thus reaching criterion at the end of the fourth session with an average correct responding of 88%. Phase IIIB required the most number of sessions to criterion with relatively low number of trials. The data also shows that Brooke exhibited unstable patterns of correct responding as the number of pictures in the display increased. Eventually Brooke attained criterion at 100% correct responding with six pictures by the end of the eighth session.

Ray demonstrated 0% correct responding during baseline. Ray had a total of 15 training sessions comprising 263 trials. Five training sessions comprised Phase I (87 trials), with an average of 90% correct responding. Phase II was mastered in four sessions (77 trials) with an average of 94% correct. Ray mastered Phase IIIA in three sessions (47 trials) with an average of 100% correct responding. Phase IIIB was also mastered in three sessions (52 trials) at 100% average. Ray's training phase ended with an array size of three pictures.

Generalization of PECS Skills

The data indicated generalization of PECS skills across all three conditions. Tony attained 100% correct responding in all of the

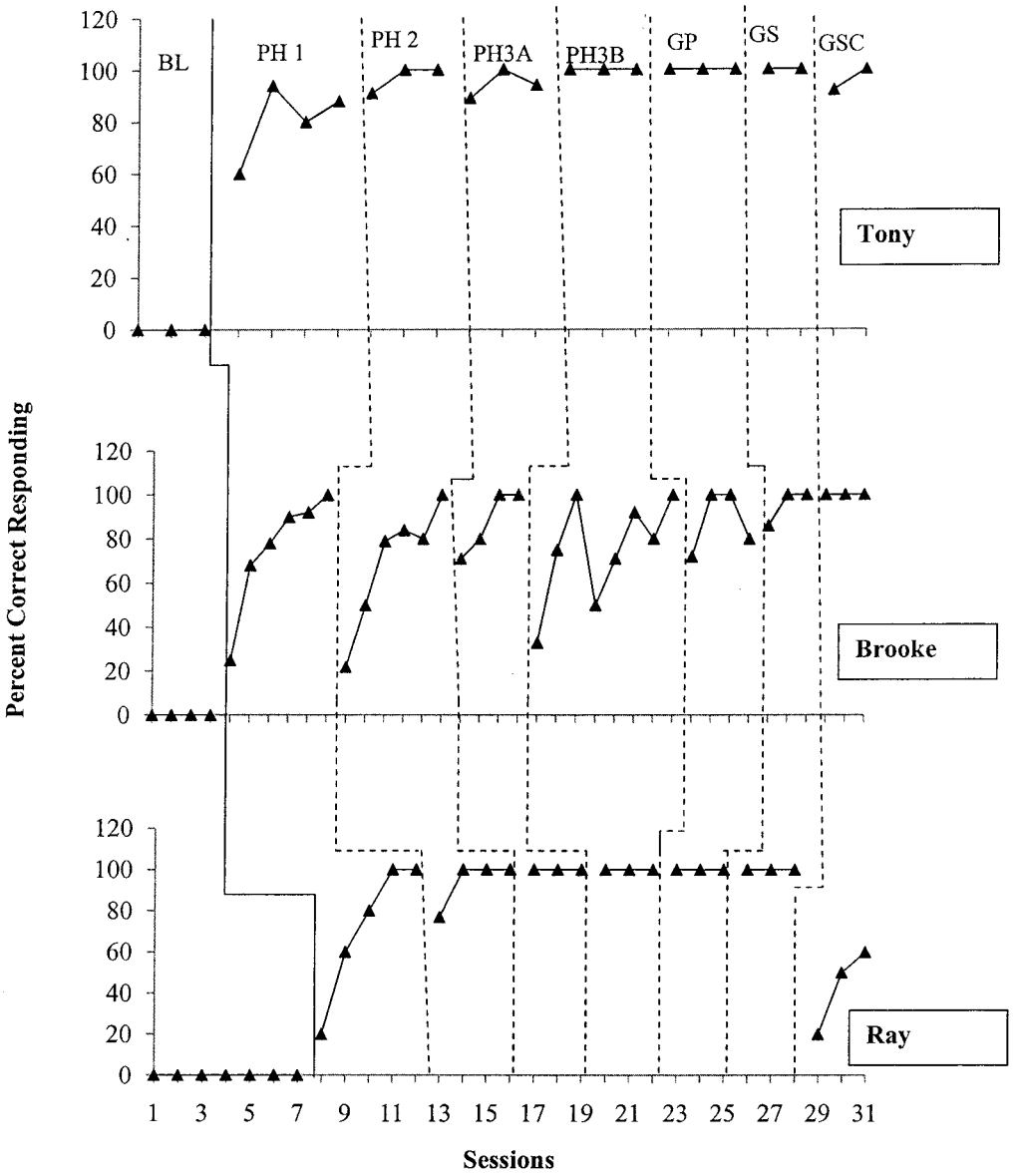

Figure 1. Percentage of independent responses across baseline, PECS phases, and generalization for Tony, Brooke, and Ray. ***Note.*** **BL = Baseline, PH = Phase, GP = generalization across persons, GS= generalization across settings, GSC = generalization across stimulus classes.**

generalization probes. Brooke's generalization data indicated that she obtained 88% average on the generalization across persons probes, 95% across settings, and 100% across stimulus classes. Ray, on the other hand, obtained averages of 100% correct response on the generalization probes across persons and settings respectively. However, he failed to reach criterion (80% or higher) for the skills across stimulus classes; he could only attain 43% of correct responding. Overall, the data revealed that all participants displayed generalized use of PECS behaviors across two of the three conditions (persons and setting) mea-

sured. However, with regards to generalization across stimulus classes, only two participants were successful while the third participant (Ray) failed to attain mastery criterion.

Social Validity

Two of the three parents responded to the social validity questionnaire. With regards to the question concerning parent's understanding of the treatment package, both parents indicated they had *very clear understanding* of the treatment. Similarly, the two found the treatment to be *very acceptable*. When parents were asked about their perception of the effectiveness of the treatment, one parent responded that she found it *very effective,* while the other thought it was just *effective*. Both parents thought it was *not at all costly* to implement PECS, and that it was *not at all likely* that there will be any disadvantages related to this treatment. On the contrary, permanent improvements were thought to be *very likely*. When asked how the treatment fitted into the family routine, one parent responded it fitted *very well*, while the other thought it fitted *well*. Finally, when asked how they perceived the applicability of the treatment for other settings, one parent answered *very well* while the other responded *well*. In general, the parents seemed to be satisfied with the treatment package. The two parents thought it was easy to implement, cost effective and likely to have positive outcomes for their children. Most importantly, they thought the treatment fitted into the family's routine and it was applicable to other environments.

Discussion

This study examined the effects of PECS training on requesting and generalization skills of three young children with autism. The findings suggested that all three children acquired PECS behaviors through Phase IIIB in an average of 17 sessions. This confirms findings from previous studies that children with autism acquire communication skills through PECS intervention (Anderson, Moore, & Bourne, 2007; Charlop-Christy et al., 2002; Ganz & Simpson, 2004; Kravitz et al., 2002; Tincani, 2004). There were, however, variations in the rate of acquisition and ability to generalize the skills across the conditions stipulated in the study. While Ray acquired all four phases (I, II, IIIA & IIIB) in a total of 15 sessions (263 trials), Brooke acquired the skills in 24 sessions (313 trials). Tony, on the other hand, made a total of 13 sessions of 157 trials. Evidently, Tony had the highest acquisition rate (highest percentage accuracy within the lowest number of trials to criterion). Variances in rate of acquisition have been reported in previous research (Ganz & Simpson, 2004; Kravitz et al., 2002; Charlop-Christy et al., 2002) as well.

There were also differences in the array of discrimination (the total number of pictures on display from which they had to choose). For Ray, the highest number of pictures he could discriminate was three. Brooke was able to discriminate from an array of six pictures, while for Tony, the total was 10. Again, similar discrepancies were reported in Bondy and Frost (1994). Differences in performance may be linked more to participant characteristics than to instructional variables. For example, during the training sessions, Brooke exhibited problem behaviors, especially during Phase IIIB, as depicted by the erratic nature of the data. She would perform very well in one session, and if there was any attempt to do error correction or sometimes take the items back, she would begin to hit her head on the floor. Thereafter, she began to respond incorrectly. In addition, Brooke did not focus on the board most of the time. This may have impacted the rate of acquisition. Ray displayed behavioral difficulties, particularly to change. He found transitions very challenging. For example, when the number of pictures was increased from one to two, or two to three pictures, he would remove the additional picture(s) and throw it off the board. It took a couple of sessions for him to get comfortable with two pictures. He exhibited similar behaviors when changing from having the pictures on the front of the communication book to putting them in the book. These behaviors may have impacted the limited range of display he could use. However, Tony was much more focused and displayed problem solving skills. For example, when the display increased in range, he devised a strategy for picking the right picture. He would track the

pictures with his fingers until he found what he was looking for. This disposition must be the reason for his higher rates of acquisition and accuracy.

Although there are many published research studies on PECS, it is difficult to compare the rate of acquisition in this study with other studies because the majority of the single-subject design studies reviewed were either comparing PECS acquisition with another training program or measuring another variable simultaneously (see Kravitz et al., 2002; Marckel et al., 2006; Rosales & Rehfeldt, 2007) and therefore, reported acquisition data differently from the current study. For instance, Stoner et al. (2006) reported acquisition rate from Phases I through IV in terms of total percent correct and total number of sessions, without reporting performance phase by phase, so it was not possible to compare the data of the current study comprising Phases I through IIIB with their report. One study that was similar in design and mode of reporting, and therefore could have been a good comparison study was that conducted by Tincani and colleagues (2006). However, the mastery criterion in their study was 80% or better independent correct responding during at least one session, while the mastery criterion for the current study was 80% or better during three consecutive sessions. As a result, it was not possible to make a phase by phase or general comparison of rate of acquisition based on trials to criterion/sessions to criterion. Nevertheless, since participants in these two studies and all others met criteria for mastery, one can argue that PECS training results in independent requesting behaviors.

The fast acquisition of communication behaviors through PECS may be attributed to a number of factors. First, PECS uses the visual learning style of people with autism (see Cafiero, 1998; Quill, 1995). Mirenda (1985) argued that pictures require minimal response effort and symbolic ability on the part of students, which may explain the acquisition of PECS by persons with moderate to severe disabilities. Yet another factor may be that pictures or photographs are close in resemblance to the real objects, thus facilitating identification and learning.

Second, the use of potent reinforcers including food and play items identified through preference assessments allowed identification of items that served as powerful reinforcers for the participants. The quality of reinforcement is one of the factors affecting the efficiency of a response (Lalli, Mace, Wohn, & Livezey, 1995). For example, two food items used in this study, which were very powerful across all participants, were potato chips and M&Ms® or Reese's® pieces (for Ray). These items had powerful effects on the response rate of participants.

Third, the schedule and immediacy of reinforcement may have also contributed to the rate of acquisition. The participants were presented with a reinforcer immediately after they emitted the appropriate response. A case in point is, in the initial stages of learning, some participants were frustrated when the trainer had to take the toy item back. However, once they learned they could always get the item back upon presenting the corresponding picture, they would quickly reach for the picture before the trainer could even place the item back in the pool.

Fourth, the use of instructional strategies such as discrete trials training, errorless learning, and use of prompts in PECS training may have also facilitated learning. For example, the discrete trials instructional method enable mass trials, which may have offered opportunities for repetition hence fluency of the skills while errorless learning and prompts provide the needed support for learning. Cafiero (1998) presented a compelling argument that pictorial language systems double up as "a buffer and a bridge between the individual with autism and his or her typical communication partners" (p. 2) by mediating some of the challenges that occur in normal communication situations. This makes pictorial communication systems such as PECS friendlier for individuals with autism.

Fifth, it may also be that, because PECS studies taught requesting function as the initial step in training and most of the participants already had requesting in their repertoire (albeit idiosyncratic), it was easier to teach a replacement behavior (an appropriate form of requesting via PECS), which provided them with much more reinforcement than the old form of behavior. One can also argue that the idea of beginning instruction from preexisting behaviors in the child's repertoire

(Mirenda, 2003), coupled with the differential reinforcement component in PECS, make PECS a viable method for teaching functional communication to beginning communicators. In addition, requesting skills afford the learner a means of gaining and maintaining access to desired objects and activities (Schlosser & Sigafoos, 2002).

Last, PECS involves choice-making, which in itself is a natural reinforcer. As observed by Stoner et al. (2006), increased choice-making results in feelings of control over one's environment and one's life, and a reduction of helplessness. Although these observations were made with regards to adult participants used in their study, it seems to hold true for all humans. PECS is successful with most children with autism because it capitalizes on natural reinforcers, which abound in the environment, hence serving as the source of motivation to communicate.

Generalization data indicate that all three participants scored an average of 80% correct or higher on generalization across persons and settings probes. However, when it came to generalizing across stimulus classes, only two participants (Brooke and Tony) were successful. Ray failed to generalize the skills across stimulus classes. This is an important contribution to the PECS literature, as no known studies assessed generalization across stimulus classes. These findings demonstrate that the use of PECS could provide the capacity for choice-making and requesting to children with autism in a variety of settings and across a variety of stimuli. PECS literature has hitherto been limited to only two types of generalization conditions: persons and settings. Marckel et al. (2006) measured generalization across items condition, but these items were of the same class as the trained items. Future researchers may therefore program generalization across stimulus classes in addition to other conditions. Researchers may also investigate the relative impact of using siblings as communicative partners during the generalization sessions versus the use of other adults such as parents, teachers, and other professionals. Most importantly, researchers should replicate this finding to confirm the generalization of PECS behaviors across stimulus classes.

A number of factors may explain why the participants were able to generalize PECS skills. First, PECS involves teaching requesting skills, which are very functional for gaining and maintaining access to naturally occurring events in the environment (Stokes & Baer, 1977). Second, the training items were real items that facilitated the creation of a history of correspondence between the symbols and their referents. Third, the requesting skill taught under training conditions is the actual skill required in the natural environment (Donnellan & Mirenda, 1983). Finally, as mentioned earlier, the use of multiple exemplars (Stokes & Baer, 1977) could be a factor for promoting generalization.

Implications for Practice

The present findings may have implications for practice for persons working with children with autism who have functional communication needs. An important implication for practitioners is that PECS can easily be acquired by children with autism, and it is effective for teaching functional communication skills. This study also demonstrated that PECS can be successfully implemented in different environments (the home, school, community settings), and that the acquired skills generalize to non-treatment contexts (settings, persons, and items). It is also important to realize that the rate of acquisition will vary from learner to learner, and that these variations may be due to participant characteristics and other variables such as home/school environments, trainers, preferences, and so on.

Another implication relates to the degree of parental involvement needed to enhance social validity of PECS. In this study, parents were not just informed that their children were being trained in PECS behaviors. Parents were also introduced to the basic tenets of PECS and coached in the procedures and target skills for each phase prior to training. Parents were also offered pre-session orientation at the beginning of each PECS phase. In this regard, parents knew what to expect and how to reinforce the skills at home. Yet another aspect of this study worth noting is that, as much as possible, siblings were involved in the study enhancing family ownership of the treatment.

Conclusions

The present study findings suggest that PECS is a viable AAC system for children with autism. The study also provides empirical support to previous research that PECS can be easily acquired in a reasonable amount of time (Charlop-Christy et al., 2002; Bondy & Frost, 1994; Sigafoos, Didden, & O'Reilly, 2001; Sigafoos & Drasgow, 2001; Son, Sigafoos, O'Reilly, & Lancioni, 2006). In addition, this study expands the research literature of PECS in three important ways: (a) the level of family involvement, the use of siblings in the generalization condition, and (c) the evaluation of generalized use of PECS across stimulus classes.

References

Alpern, G. D., Boll, T., & Shearer, M. (2000). *Developmental profile. II.* Los Angeles, CA: Western Psychological Services.

Anderson, A., Moore, D. W., & Bourne, T. (2007). Functional communication and other concomitant behavior change following PECS training: A case study. *Behaviour Change, 24*, 173–181.

Beukelman, D. R., & Mirenda, P. (2005). *Augmentative alternative communication: Supporting children and adults with complex communication needs.* Baltimore, MD: Paul Brookes.

Bondy, A. S., & Frost, L. A. (1994). Picture exchange communication system. *Focus on Autistic Behavior, 9*, 1–19.

Cafiero, J. (1998). Communication power for individuals with autism. *Focus on Autism and Other Developmental Disabilities, 13*, 113–121.

Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A., & Kellet, K. (2002). Using the picture exchange communication system (PECS) with children with autism: Assessment of acquisition, speech, social communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35*, 213–231.

Collins, B. C. (2007). *Moderate and severe disabilities: A foundational approach.* Upper Saddle River, NJ: Pearson.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River, NJ: Pearson.

Donnellan, A. M., & Mirenda, P. (1983). A model for analyzing instructional components to facilitate generalization for severely handicapped students. *Journal of Special Education, 17*, 317–331.

Frea, W. D., Arnold, C. L., Vittimberga, G. L., & Koegel, R. L. (2001). A demonstration of the effects of augmentative communication on the extreme aggressive behavior of a child with autism in an integrated preschool setting. *Journal of Positive Behavior Interventions, 3*, 194–198.

Frost, L., & Bondy, A. (2002). *The picture exchange communication system training manual* (2nd Ed.). Newark, DE: Pyramid.

Ganz, J. B., & Simpson, R. L. (2004). Effects on communicative requesting and speech development of picture exchange communication in children with characteristics of autism. *Journal of Autism and Developmental Disorders, 34*, 395–409.

Gilliam, J. E. (2006). *Gilliam Autism Rating Scale-II.* Austin, TX: Pro-Ed.

Howlin, P., Gordon, R. K., Pasco, G., Wade, A., & Charman, T. (2007). The effectiveness of picture exchange communication system (PECS) training for teachers of children with autism: A pragmatic, group randomized control trial. *Journal of Child Psychology and Psychiatry, 48*, 473–481.

Keen, D. K., Sigafoos, J., & Woodyatt, G. (2001). Replacing prelinguistic behaviors with functional communication. *Journal of Autism and Developmental Disorders, 31*, 385–398.

Kravits, T. R., Kamps, D. M., Kemmerer, K., & Potucek, J. (2002). Brief Report: Increasing communication skills for an elementary-aged student with autism using the picture exchange communication system. *Journal of Autism and Developmental Disorders, 32*, 225–230.

Lalli, J. S., Mace, F. C., Wohn, T., & Livezey, K. (1995). Identification and modification of a response class hierarchy. *Journal of Applied Behavior Analysis, 28*, 551–559.

Light, J. (1989). Towards a definition of communication competence for individuals using augmentative and alternative communication systems. *Augmentative and Alternative Communication, 5*, 137–144.

Light, J. (1997). Communication is the essence of life: Reflections of communication competence. *Augmentative and Alternative Communication, 13,* 61–70.

Light, J. C., Roberts, B., Dimarco, R., & Grenier, N. (1998). Augmentative and alternative communication to support receptive and expressive communication for people with autism. *Journal of Communication Disorders, 31,* 153–180.

Magiati, I., & Howlin, P. (2003). A pilot study of the picture exchange communication system (PECS) for children with autistic spectrum disorders. *Autism, 7,* 297–320.

Marckel, N., Neef, N. A., & Ferreri, S. J. (2006). A preliminary analysis of teaching improvisation with the picture exchange communication system to children with autism. *Journal of Applied Behavior Analysis, 39*, 109–115.

Mirenda, P. (1985). Designing pictorial communi-

cation systems for physically able-bodied students with severe handicaps. *AAC: Augmentative and Alternative Communication, 1,* 58–64.

Mirenda, P. (2003). Toward functional augmentative and alternative communication for students with autism: Manual signs, graphic symbols, and voice output communication aids. *Language, Speech, and Hearing Services in Schools, 34,* 203–216.

Newborg, J. (2004). *Battelle Developmental Inventory* (2nd ed.). Rolling Meadows, Illinois: Riverside Publishing.

Osterling, J., & Dawson, G. (1994). Early recognition of children with Autism: A study of first birthday party home videotapes. *Journal of Autism and Developmental Disorders,* 24, 247–257.

Pace, G. M., Ivancic, M. T., Edwards, G. L., Iwata, B. A., & Page, T. J. (1985). Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. *Journal of Applied Behavior Analysis, 18*, 249–255.

Quill, K. A. (1995). *Teaching children with autism: Strategies to enhance communication and socialization.* Albany, New York: Delmar Publishers Inc.

Rossetti, L. (2006). *Rossetti Infant Toddler Language Scale.* East Moline, Illinois: Linguistic Systems.

Rosales, R., & Rehfeldt, R. A. (2007). Contriving transitive conditioned establishing operations to establish derived manding skills in adults with severe developmental disabilities. *Journal of Applied Behavior Analysis, 40,* 105–121.

Schlosser, R. W. (2003). *The efficacy of augmentative and alternative communication: Toward evidence-based practice.* San Diego, CA: Academic Press.

Schlosser, R. W., & Lee. D. L. (2000). Promoting generalization and maintenance in augmentative and alternative communication: A meta-analysis of 20 years of effectiveness research. *AAC: Augmentative and Alternative Communication, 16*, 208–226.

Schlosser, R. W., & Sigafoos, J. (2002). Selecting graphic symbols for an initial request lexicon: Integrative review. *AAC Augmentative and Alternative Communication, 18*, 102–123.

Schwartz, I. S., Garfinkle, A. N., & Bauer, J. (1998). The picture exchange communication system: communicative outcome for children with autism. *Topics in Early Childhood Special Education, 18*, 144–159.

Sigafoos, J., Didden, R., & O'Reilly, M. (2003). Effects of speech output on maintenance of requesting and frequency of vocalizations in three children with developmental disabilities. *Augmentative and Alternative Communication, 19,* 37–47.

Sigafoos, J., & Drasgow, E. (2001). Conditional use of aided and unaided AAC: A review of clinical case determination. *Focus on Autism and Other Developmental Disabilities, 16*, 152–161.

Sigafoos, J., O'Reilly, M. F., Seely-york, S., Weru, J., Son, S. H., & Green, V. A. et al., (2004). Transferring AAC intervention to the home. *Disability and Rehabilitation, 26,* 1330–1334.

Son, S. H., Sigafoos, J., O'Reilly, M., & Lancioni, G. E. (2006). Comparing two types of augmentative and alternative communication for children with autism. *Pediatric Rehabilitation, 9,* 389–395.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *The Vineland Adaptive Behavior Scales (Interview Edition).* Circle Pines, MN: American Guidance Service.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10*, 349–367.

Stoner, J. B., Beck, A. R., Bock, S. J., Hickey, K., Kosuwan, K., & Thompson, J. R. (2006). The effectiveness of the picture exchange communication system with nonspeaking adults. *Remedial and Special Education, 27*, 154–165.

Tincani, M. (2004). Comparing the picture exchange communication system and sign language training for children with autism. *Focus on Autism and Other Developmental Disabilities, 19,* 152–163.

Tincani, M., Crozier, S., & Alazetta, L. (2006). The picture exchange communication system: Effects on manding and speech development for school-aged children with autism. *Education and Training in Developmental Disabilities, 41,* 177–184.

Warren, S. F., & Abbeduto, L. (2007). Introduction to communication and language development and intervention. *Mental Retardation and Developmental Disabilities Research Reviews, 13*, 1–2.

Yokoyama, K., Naoi, N., & Yamamoto, J. (2006). Teaching verbal behavior using the picture exchange communication system (PECS) with children with autistic spectrum disorders. *Japanese Journal of Special Education, 43*, 485–503.

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Computer-Based Video Instruction to Teach Students with Intellectual Disabilities to Use Public Bus Transportation

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Abstract: This study investigated the effectiveness of computer-based video instruction (CBVI) to teach three young adults with moderate intellectual disabilities to push a "request to stop bus signal" and exit a city bus in response to target landmarks. A multiple probe design across three students and one bus route was used to evaluate effectiveness of the CBVI program. All instructional sessions occurred in simulation with generalization and maintenance measures conducted in-vivo on a public bus route. Results indicate that CBVI was an effective means for creating a simulation to teach the bus route to all three students. Students were able to generalize the skill to the actual bus route with no in-vivo instruction. Maintenance measures further indicate that students were able to maintain the skill across time.

It is recognized that in addition to living, working, recreating, and accessing community services, community integration also includes movement in and around urban settings using public transportation (Taber, Alberto, Hughes, & Seltzer, 2002). The ability to safely move about one's community can increase independence for adults with disabilities by offering more employment opportunities and means to access community settings such as shopping malls, grocery stores, restaurants, and places for recreation. Because many do not have the cognitive ability to obtain a drivers license and drive a car, persons with intellectual disabilities are limited to walking, riding a bicycle, or being transported by others if they do not learn to access public transportation when it is available. Although students have been shown to acquire safe pedestrian skills (Branham, Collins, Schuster, & Kleinert, 1999; Horner, Jones, & Williams, 1985; Matson, 1980; Page, Iwata, & Neef, 1976; Spears, Rusch, York, & Lilly, 1981; Vogelsburg & Rusch, 1979), walking may limit them to employment within walking distance to their home; living directly next to a shopping center; or not being able to access recreational facilities (i.e. attending a professional baseball game) that are not within walking distance.

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Early studies teaching use of public transportation for community mobility occurred in the 1970s and 1980s when persons with disabilities were exiting institutional settings and an emphasis was being placed on preparing them to function in communities (Coon, Voglesberg, & Williams,1981; Kubat, 1973; LaDuke & LaGrow, 1984; Marchetti, Cecil, Graves, & Marchetti, 1984; Marholin, O'Toole, Touchette, Berger, & Doyle, 1979; Neef, Iwata, & Page, 1978; Robinson, Griffith, McComish, & Swashbrook, 1984; Sowers, Rusch & Hudson, 1979; Welch, Nietupski, & Hamre-Nietupski, 1985). Of the nine studies identified, six studies relied on some type of classroom or simulated instruction. These studies demonstrated that simulated practice may be a means for teaching transportation skills, but will unlikely result in generalization of skills to natural environments without inclusion of community-based instruction (Snell & Brown, 2006; Westling & Fox, 2004). Preferably, community skills are taught as much as possible in the natural environments where they will be used, however community-based instruction can be more expensive and limited due to travel time to sites, money for purchasing and accessing community activities, availability of transportation to and from

sites, and staff availability. Because of these constraints and limited resources, teachers continue to find themselves challenged when providing community-based instruction and finding realistic means to simulate these environments in the classroom setting. Teaching public bus transportation poses additional challenges when trying to teach in-vivo. Trials are often limited to one per route due to time constraints and the inability of bus drivers to allow repeated practice for skills such as boarding the bus, signally the driver to stop, and exiting the bus. In addition, instruction will likely be limited to one trial per route and one route per day due to the amount of time it requires to wait for a bus, arrive at a destination, re-board the bus and return to the original bus stop.

Use of simulation is a means to balance the challenges of providing community-based instruction with the need for teaching skills that will generalize to the natural environments in which they will be used. While research by Neef et al. (1978) found simulation to be as effective as in-vivo instruction, they also report that in-vivo instruction was more time consuming and expensive than simulation. In early studies, slide presentations were frequently used as a form of technology for providing realistic simulations. Slides were used to simulate boarding of a bus, riding the bus, signally the bus driver to stop (pulling the cord), and exiting the bus (Coon et al., 1981; Marchetti et al., 1984; Neef et al.; Robinson et al., 1984; Sowers et al., 1979). Of the five studies using slides as simulation, four reported that students were unable to generalize all skills until instruction in the natural environment was included. LaDuke and LaGrow (1984) also reported that one of four students in their study had difficulty generalizing identification of the correct destination in the community when using photograph albums to prompt step completion of the bus riding task analysis. Similarly, Welch and others (1985) reported 3 of 6 students were unable to generalize to community bus stops until in-vivo training was included for using schedule cards. In particular, the studies found that students frequently committed errors when looking for landmarks in community settings (to determine when to signal the driver to stop) and actually pulling the cord at the correct time.

Although community mobility skills are considered critical for accessing community settings such as shopping malls, grocery stores, and restaurants (Welch et al., 1985) and a primary barrier to accessing and maintaining competitive employment for persons with moderate to severe disabilities (Hutchins & Renzaglia, 1998), teaching these skills has received little to no research attention over the past two decades. Due to new technologies such as video modeling, computer-based instruction, virtual reality, and portable hand held devices, practitioners may wish to revisit research for teaching use of public transportation which incorporates innovative technologies.

A number of studies have evaluated the use of computer-based video instruction (CBVI) and video instruction to teach community skills. These skills have included: vocational skills (Mechling & Ortega-Hurndon, 2007); grocery shopping (Alcantara, 1994; Mechling & Gast, 2003); operation of a debit card machine (Mechling, Gast, & Barthold, 2003) or ATM machine (Alberto, Cihak, & Gama, 2005); ordering at fast food restaurants (Mechling, Pridgen, & Cronin, 2005); and purchasing (Ayres & Langone, 2002), yet none have been used to teach bus transportation skills.

Because city buses are likely one of the most common forms of public transportation used by persons with intellectual disabilities (LaGrow, Wiener, & LaDuke, 1990), the purpose of the current study was to investigate use of computer-based video instruction (CBVI) to create a "life-like" public bus riding scenario in a simulated environment to teach city bus transportation skills to persons with intellectual disabilities. The study focused on students' abilities to generalize bus riding skills to a real-life bus route when only simulated instruction was provided. The primary question addressed was: "Will CBVI be effective in teaching students to push the "request to stop" signal at a specific landmark and exit a public bus system?"

Method

Participants

Three students (two females and one male) participated in the study. Students were se-

lected based on their diagnosis of an intellectual disability, age, IEP (Individualized Educational Program) objectives for increasing public bus transportation skills, and transition plans which identified competitive employment and semi-independent living arrangements upon completion of high school. All students had previous experience using public bus transportation and could board a bus using a university student identification card (free access to the system), locate a seat and sit down, push the "request to stop signal" when told, and stand and exit the bus. Each had experience with computer-based instruction, but not computer-based video instruction. In addition, students were screened for the following entry level skills: (a) visual ability to see photographs and video recordings on the computer screen; (b) visual ability to see landmarks and bus stops in the community; and (c) wait response of 3s. The students' classroom was located on the campus of a university which partnered with the local high school's Transition Program for Young Adults (TPYA) to provide an educational setting which focused on community based instruction.

Melissa was a 20 year, 11 month old female diagnosed with a moderate intellectual disability (IQ 52, *Kaufman Assessment Battery for Children*: Kaufman and Kaufman, 1983; Adaptive Behavior Composite Score 67, Vineland Adaptive Behavior Scales: Sparrow, Balla, & Cicchetti, 1984). She was characterized as being unsure of herself, as having low self-esteem, and easily frustrated by tasks. She was able to speak in complete sentences and was learning to self-advocate for herself in social situations and to answer yes/no questions rather than saying, "I don't know." She was able to follow a daily written checklist for completing tasks and could read functional words including those for simple meal preparation. She was able to write her signature, copy a shopping list, and used a visual guide to write personal information on a job application and other forms. She used the "next dollar strategy" when making purchases and could also count bill combinations up to $15. Her instructional objectives included increasing her home living skills (planning, purchasing, and preparing meals), riding a public bus (including locating bus stops), and obtaining a competitive employment position. She enjoyed playing bocce, being with friends, playing basketball, bike riding, playing "Wii", and listening to music. She expressed interest in obtaining a job at a restaurant.

Michael was a 19 year, 2 month old male diagnosed with a Pervasive Developmental Disorder not Otherwise Specified and described as having stronger verbal than nonverbal skills [IQ 70, Wechsler Intelligence Scale for Children–Third Edition (WISC-III): Wechsler, 1997; Adaptive Behavior Composite Score 75, Scales of Independent Behavior–Revised (SIB-R): Bruininks, Woodcock, Weatherman, & Hill, 1996]. He also had a seizure disorder, AD/HD, severe allergies, and was easily overheated. He was unsure of new tasks and extremely cautious which interfered with daily routines such as crossing the street (i.e. looking back and forth multiple times). He had difficulty pacing himself when working, following simple step directions, and was taking medication to assist with focusing. He used a calculator for math computation and used the computer for word processing, exploring the internet, and to play computer games. He could count coins and bills to sums of $20 and was learning to construct a monthly personal budget. He was composing paragraphs using correct punctuation and capitalization with assistance in spelling and staying on topic. He was able to decode words when reading using context cues. Michael was able to use a microwave and make a sandwich, but was not able to use a stove or oven. He was independent in caring for his personal needs. His instructional objectives included locating correct bus stops and describing specific bus routes. He spoke in complete sentences, however he was described as always having a story to tell and needed to limit the amount of information he provided in social conversations and to know when it was appropriate to talk or listen. He was described as a talented singer who belonged to his church choir. He enjoyed computer games, drawing elaborate figures (full of detail), visiting relatives, and caring for animals. He expressed an interest in pursuing a career as a massage therapist or a bowling instructor.

Fanny was a 19 year, 2 month old female diagnosed with a moderate intellectual disability [IQ 46, Wechsler Intelligence Scale for

Children–Third Edition (WISC-III): Wechsler, 1997; Adaptive Behavior Composite Score 62, Vineland Adaptive Behavior Scales: Sparrow et al., 1984). She was described as being friendly and polite and enjoyed being with peers. She used appropriate communications skills, was eager to please others, and often sought verbal reinforcement and praise. She required a quiet working environment with minimal distractions and visual presentation of material. She was able to read a calendar for information, kept a personal calendar (daily/weekly/monthly), and followed simple directions written onto lists. She was able to locate grocery advertisements in the newspaper, but needed assistance with reading such words and compiling a shopping list. She could recognize coins and their values and was learning to count simple coin combinations counting by fives. One of her greatest needs was to increase her personal hygiene skills and to complete these tasks without reminders. Other identified instructional objectives included operating a washing machine, add and subtracting with a calculator, and writing basic information on a job application. She tended to go to sleep on the city bus and rode with supervision, requiring verbal assistance to locate different bus stops and routes. She enjoyed playing basketball, soccer, and swimming. She was employed two nights a week at a local restaurant as a greeter and expressed an interest in obtaining more work hours at the same establishment.

Settings

All generalization probe sessions were conducted in-vivo on the public city bus route "102." The instructor sat next to the student on the bus and the reliability data collector sat two rows behind them. CBVI sessions were conducted in a classroom or office area at the TPYA site. The laptop computer with touch screen was placed directly in front of the student on a desk or table. The instructor sat to the left of the student and when present the reliability data collector sat approximately 2 feet behind the student.

Target Behaviors, Materials and Equipment

One destination near a retail outlet mall was selected and targeted for instruction for each student. The destination was located approximately 10 minutes from the students' TPYA site. The destination was chosen based on teacher and student interviews of where they needed to shop and one which did not require a transfer.

Equipment. Video recordings (with voice over) and still photographs were made using a *Canon ZR830* digital video camcorder. Video recordings were made for the destination route, downloaded through the fire wire port of the camera and laptop, edited using *Windows Movie Maker*, and saved on the hard drive of a *Dell Latitude* $\times$ *300* laptop.

PowerPoint was used to develop the CBVI program which simulated the bus route and destination using video and photographs. Students accessed the program using a *Magic Touch* touch screen (Keytec, Inc). The first slide for each video model contained a photograph of the destination store and recorded voice with the task direction, "Riding the bus to Target." The slide was advanced to the next slide which contained an inserted video model of the bus route and three photographs of the landmarks (Figure 1).

Video models. Video recordings were developed from a person first perspective as if the student was walking to the bus stop, boarding the bus and using a bus pass, sitting down, riding the bus, looking out the window for landmarks and bus stops, pushing the "request to stop signal" and exiting the bus. While recording the video model the person operating the camera also recorded (voice over) verbal cues associated with the three landmarks: "Look for Advanced Auto Parts", "Look for Olive Garden," "Push the request to stop signal when you see the Chick-Fil-A and Target sign." At the beginning of each session the student watched the entire video model for the target route and destination followed by the first trial using video prompting (Mechling et al., 2003).

Video prompts. Video segments were recorded for the bus route for use during 0s and 3s video prompting instructional trials. These recordings were also made from a person first perspective, but did not include voice over. The video segments were for: a) walking to the bus stop, boarding the bus, using a pass, sitting down, riding the bus, passing landmarks, pushing the "request to stop signal" at the

Figure 1. PowerPoint slide depicting video model of the bus route and three photographs of the landmarks.

target landmark; and b) standing up and exiting at the correct bus stop. During the first trial using CBVI (following video modeling) the student saw the first *PowerPoint* slide of a video segment (from a person first perspective) of walking to the bus stop, boarding the bus, using a pass, sitting down, riding the bus, and looking out the window for landmarks. Because the bus stops were located on the right side of the street, video recording of the bus route with landmarks focused out the window of the right side of the bus. As the bus passed the three landmarks there were no verbal cues provided during video prompting. During the playing of this video segment (looking out the window for landmarks), a photograph of the "request to stop bus signal" was positioned at the bottom right corner of the *PowerPoint* slide (Figure 2). When selected (using the touch screen) the photograph button was programmed to stop the video. If correct (selecting the photograph at the correct landmark) the instructor advanced the program to the next slide which contained a voice over, "Yes, that's right. Push the request to stop signal when you see the Chick-Fil-A and Target sign" and a video segment showed the bus stopping and exiting the bus.

Experimental Design

A multiple probe design across participants and one bus route (Tawney & Gast, 1984) was used to evaluate the effectiveness of CBVI to teach public bus transportation skills.

General Procedure

Three target landmarks were selected to visually cue students. The purpose of the first two landmarks was to cue or prime the student to look for the third landmark which was a visual cue to push the "request to stop bus signal." The third landmark was approximately 500 yards from the target bus stop destination and positioned between the previous bus stop and

Figure 2. PowerPoint slide depicting video prompt with photograph of the "request to stop bus signal".

the target bus stop on the route. The actual Target store was not visible from the final landmark which was a Target and Chick-Fil-A advertising sign).

Students were not required to identify the correct bus for boarding because only the route "102" bus stopped where the students boarded the bus. Students were taught to identify landmarks using a 3s constant time delay (CTD) procedure and CBVI. CBVI included video modeling (presentation of the entire bus route to its target destination with verbal cues) for the first trial of each session and video prompting (presentation of bus route with target landmarks as decision points for pushing the "request to stop bus signal" at the target landmark) for three trials. Each prompting video lasted 9 minutes and 59 seconds. Instructional sessions occurred 2–3 days per week and consisted of watching the video model one time followed by three trials using video prompting. When students performed 100% unprompted correct for one session, the video model was removed. Criterion was met when each student performed 100% unprompted correct responses without the video model.

Bus Riding Generalization and Maintenance Probe Condition Procedures

Prior to CBVI, each student's ability to push the "request to stop bus signal" at the target landmark and exit the bus was evaluated in the natural environment. Probe sessions were conducted in a one-to-one arrangement for a minimum of three sessions or until data stabilized (Probe 1). Each session consisted of one trial. The student was taken to the bus stop and verbally directed to, "Take the bus to Target." No other instructions or prompts were provided for identifying landmarks, pushing the "request to stop bus signal", or exiting at the correct stop.

During probe trials students could perform the target step correctly, incorrectly, or not

respond. A correct response was defined as initiating and pushing the "request to stop bus signal" within 3s of the target landmark appearing in the student's bus window. An incorrect response was defined as the student pushing the "request to stop bus signal" at an incorrect landmark and a no response was defined as the student failing to push the "request to stop bus signal" within 3s of the target landmark appearing in the student's window. If the student did not respond, the instructor and the student remained on the bus and returned to the school site. If the student responded incorrectly or correctly, the instructor and the student exited at the stop where the signal was pushed. Incorrect responses resulted in the instructor and student boarding the next available bus and returning to the school site. Correct responses were reinforced by walking to the destination and making a purchase before boarding the bus and returning to the school site. Students also received non-specific verbal praise such as, "You're doing a nice job," on the average of one time per bus route for general attending and completion of mastered steps (i.e. "You sat down quickly when you got on the bus").

Following each CBVI condition students returned to the community bus stop and evaluated across three trials on their ability to generalize location of the target landmarks, pushing the "request to stop bus signal", and exiting at the correct bus stop. Maintenance data were collected up to 52 days after the final probe session and sessions were conducted identical to generalization sessions.

Computer-Based Video Instruction Condition Procedures

Following the first probe condition, CBVI was conducted individually with each student. Each session began with the first *PowerPoint* slide with a photograph of the destination store, three landmarks, and the recorded task direction, "Riding the bus to Target" (Figure 1). Following the task direction the program automatically advanced to the next slide which contained the video model. At the conclusion of the video model, the first trial began with video prompting. Intervention began using CTD with a 0s delay. Each student remained at 0s until 100% correct wait responses (correct responses after the instructor prompt) for one session (three trials). The controlling prompt for each student was the instructor touching the photograph of the "request to stop bus signal" on the computer screen. When the target landmark appeared in the video the instructor delivered the controlling prompt (gesture) and pointed to the photograph of the "request to stop bus signal" and said, "When you see the Chick-Fil-A and Target sign push the request to stop signal." Correct wait responses (touching the photograph) resulted in the instructor advancing the program to the next slide which contained a voice over, "Yes, that's right. Push the request to stop signal when you see the Chick-Fil-A and Target sign" and a video segment showed the bus stopping and exiting the bus.

Following 0s delay trials, CTD trials implementing a 3s delay interval were provided. Using the CTD procedure a student response was recorded as: (a) unprompted correct (initiating and touching the photograph of the "request to stop bus signal" within 3s of the target landmark appearing on the screen); (b) unprompted incorrect (touching the photograph before the target landmark appeared on the screen); (c) prompted correct (touching the photograph within 3s of the instructor prompt); (d) prompted incorrect (touching something else on the screen); and (e) no response (failure to initiate touching the photograph within 3s of the instructor prompt). An unprompted or prompted correct response resulted in the instructor advancing the program to the next slide which contained a voice over, "Yes, that's right. Push the request to stop signal when you see the Chick-Fil-A and Target sign" and a video segment showed the bus stopping and exiting the bus. An incorrect or no response was followed by the instructor restarting the video prompting segment, pointing to the video and saying, "Look for Advanced Auto Parts", "Look for Olive Garden", "When you see the Chick-Fil-A and Target sign push the request to stop signal" and touching the photograph when the target landmark appeared. Students also received non-specific verbal praise on the average of one time per trial for general attending and attempts to complete the task.

After a student performed 100% unprompted correct for one session (three tri-

als) the video model was discontinued and CBVI with 3s CTD continued with only video prompting until a student performed 100% unprompted correct for one session.

Reliability Measures

Data were collected simultaneously on students' ability to push the "request to stop bus signal" during CBVI and generalization sessions in the natural environment (interobserver agreement) and on the instructor following condition procedures (procedural reliability). Data were collected on 100% of in-vivo generalization probe and maintenance sessions and 20% of all CBVI sessions.

Interobserver agreement was calculated using the point-by-point method in which the number of agreements was divided by the number of agreements plus disagreements. Inter-observer agreement was 97.9% for student performance using CBVI (range = 66.7–100) and 100% in-vivo.

Procedural reliability agreement was determined by dividing number of each observed investigator behavior by the number of opportunities to emit that behavior or function, multiplied by 100 (Billingsley, White, & Munson, 1980). Procedural reliability data were collected on the following instructor and computer behaviors: (a) delivery of task direction; (b) delivery of controlling prompt (CBVI only); (c) error correction (CBVI only); (d) advancement of computer program to next slide; (e) exiting or remaining on the bus in response to student errors in-vivo; and (f) delivery of intermittent reinforcement. Mean procedural agreement was 97.9% (range = 91.7–100) for CBVI and 100% for in-vivo sessions. Errors during CBVI occurred most frequently for advancement to the correct slide.

Results

Figure 3 displays the percentage of correct responses for each student for pushing the "request to stop bus signal" during computer-based video instruction (CBVI) and while riding the actual bus in-vivo. The figure indicates that CBVI was an effective and efficient method for teaching students to locate landmarks and the target bus stop. Two of the three students met criteria for correctly pushing the "request to stop bus signal" using CBVI within the minimum possible number of sessions (five). Melissa was the only student who made an error during CBVI. Visual analysis of the data also indicated that with the exception of Fanny, each student was able to generalize the skill with 100% correct performance on all in-vivo sessions. Fanny did not push the request to stop signal on her first session in-vivo following CBVI. She verbally identified the two landmarks as they were passed. When the bus approached the last landmark she turned to the instructor and asked, "Do I push it now?" The instructor did not answer (probe data) and she did not push the signal. When she saw the Target store, she said, "I should have pushed it." She correctly pushed the signal to stop on the next two in-vivo sessions. Melissa maintained the ability to push the signal at the correct landmark after 52 days and Michael maintained the skill for 17 days after his last CBVI session. Maintenance data was after only 7 days for Fanny who also maintained the skill at 100% accurate performance.

Social Validity

During the last maintenance session each student was asked by the instructor to, "Tell me about what you know about riding the bus" followed by "Did you like using the computer?" and "Would you like to use the computer again?" and if so, "What would you like to learn on the computer?" Megan said, "I know route 102" in response to the first question and that she liked pressing the button on the computer. She also said she liked shopping. When asked what she would like to learn on the computer she said, "What time the bus comes." Matthew provided the following responses to the first question: "When you see the land points press the stop button", "The bus is 102 and the land points are Advanced Auto Parts, Olive Garden, and Target." To the second question he responded, "It was fun and it makes everything high tech." He said that he would like to learn to ride the bus to his favorite place, Mayfair Mall, using the computer. Fanny said that she had learned, "Not to fall asleep on the bus" and "I can use the new route." To the second question she responded, "I liked doing the computer thing

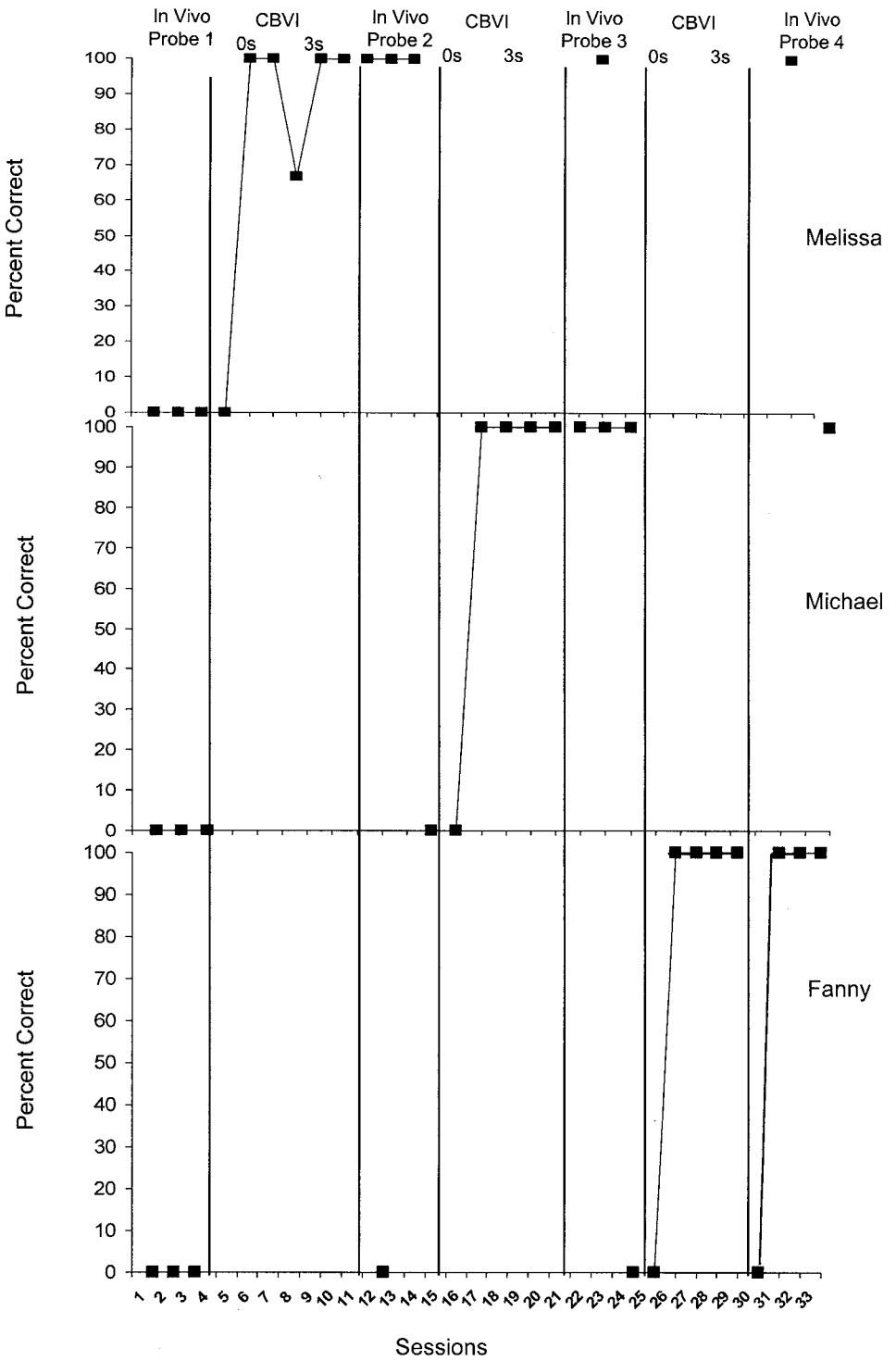

Figure 3. Percentage of correct responses for each student for pushing the "request to stop bus signal" during computer-based video instruction (CBVI) and while riding the actual bus in-vivo.

and it tried to teach me where to go." She said that she would like to learn to go to Wal-Mart when asked what else she would like to learn with the computer.

Discussion

The ability to safely move about one's community can increase the independence of persons with disabilities and expand their opportunities in areas such as living options, employment, and recreation when they experience a greater freedom to decide where to go and have a means for getting there. The purpose of this study was to evaluate the use of computer-based video instruction (CBVI) to teach use of a public bus transportation system and to promote generalization of the skill to the natural environment. Results indicated that CBVI was an effective and efficient (maximum of 6 instructional sessions for Melissa and 5 instructional sessions for Michael and Fanny) method for teaching each student to use landmarks on the bus route and to push the request to stop signal to exit at the correct bus stop. The current study adds to previous research by providing a means for students to accurately use landmarks for determining when to push the request to stop signal. Previous work in this area found that students frequently failed to look for landmarks while riding the public bus and therefore were unable to pull or push the signal at the correct time (Marchetti et al., 1984; Robinson et al., 1984).

Other possible advantages of teaching bus riding skills through computer-based video simulations include financial savings and a decrease in time allotted for teaching the skill in community settings. Students in the current study were able to board the bus at no extra charge due to their classroom being located on the campus of the local university and their use of student identification cards. Unlike the current study, most high school programs for persons with disabilities must pay to ride the bus each trip. In addition to cost of the bus fare, time is a consideration and constraint for many school programs. In the current study each student rode the bus in-vivo 8 times for the sake of research fidelity. It is likely that students learning to ride a bus route using CBVI in an applied school setting could do so with even fewer trips on the actual bus. In this study, the bus route to Target took approximately 10 minutes one way after boarding at the students' program site, however use of the public bus will likely include longer routes for many students. Because of issues surrounding such time constraints, teachers are often limited to using one trial per session (verses three trials using CBVI) and fewer instructional sessions per week. With CBVI students can be presented with repeated trials for steps such as locating landmarks and pulling the cord or pushing the signal to stop.

It is also possible that although the instructor in the current study sat with the student during CBVI, that some students could interact independently with this or similar programs. Consideration should also be made for the amount of time required for a single trial. The program used in this study required approximately 10 minutes for completion of the route during video prompting (one trial). Other routes will be longer and teachers may wish to use fewer than three trials during one session.

Although positive, results of the current study must be interpreted with caution due to the small number of students and the use of only one bus route. Future research may wish to extend the limited research evaluating the effectiveness of teaching riding of a city bus through CBVI by using multiple destinations and more complex routes. Of the identified studies only Coon et al. (1981) measured the generalized effects of simulation (slides and a simulated bus in the classroom) across multiple bus stops in the natural environment. Future research may further wish to address the limitations in the scope of the current study whereby students did not use transfers or follow a bus schedule (printed or adapted).

Future studies should also include examples of unexpected events (i.e. someone stands in view of the landmark or a seat is not available on the right side of the bus) and teach related functional skills such as what to do when a stop is missed [i.e. keep riding or use a cell phone (Taber et al., 2002)].

A further limitation to the current study and its evaluation of functional bus riding skills is that students were not provided an opportunity to ride the bus alone. Due to liability concerns the instructor always rode

with the student, but school programs may wish to have teachers ride in a car following the bus in order to gain a clearer measure of generalization.

Although the purpose of this study was to evaluate the effects of CBVI when used alone, future studies and practitioners may prefer to use a combined system of instruction through CBVI, community-based instruction, and some means of permanent prompting for identification of bus numbers, route names, and location of destinations while riding the bus. Earlier studies such as that by LaDuke and LaGrow (1984) relied on photograph systems as permanent prompts. Advancements in technology now permit evaluation of electronic hand held systems such a personal digital assistant (PDA) to provide visual task analysis using photographs (Cihak, Kessler, & Alberto, 2007; Riffel et al., 2005) video recordings (Taber-Doughty, Patton, & Brennan, 2008; Van Laarhoven, Van Larrhoven-Myers, & Zurita, 2007), or a combination of both photographs and video prompts (Mechling, Gast, & Seid, in press).

In summary, the current study supports the use of CBVI as an effective and cost efficient means to teach use of public bus transportation by students with moderate intellectual disabilities. While the current study presented all instruction via the computer-based program, future studies may wish to evaluate the concurrent use of in-vivo instruction and CBVI to teach this skill. Although CBVI may hold the advantages of lower cost, decreased time, and increased repetitive practice, its use cannot over-ride the importance of including instruction within the natural environments in which skills will be used. It is unlikely that most students will be able to generalize all skills to the natural environment without a community-based component to instruction (Westling & Fox, 2004).

Independence and self-determination are recognized goals for persons with disabilities. Among the skills linked to each is the ability to decide where one wants to go and the ability to get there. Movement into more independent living arrangements and competitive work environments may be hindered if persons with disabilities do not have adequate means of transportation in order to access these environments. Research evaluating available technologies holds continued potential in assisting persons with the development of these skills.

References

Alberto, P., Cihak, D. F., & Gama, R. I. (2005). Use of static picture prompts versus video modeling during simulation instruction. *Research in Developmental Disabilities, 26,* 327–339.

Alcantara, P. R. (1994). Efects of videotap instructional package on purchasing skills of children with autism. *Exceptional Children, 61,* 40–55.

Ayres, K. M., & Langone, J. (2002). Acquisition and generalization of purchasing skills using a video enhanced computer-based program. *Journal of Special Education Technology, 17,* 15–28.

Billingsley, F. F., White, O. R., & Munson, R. (1980). Procedural reliability: A rationale and an example. *Behavioral Assessment, 2,* 229–241.

Branham, R. S., Collins, B. C., Schuster, J. W., & Kleinert, H. (1999). Teaching community skills to students with moderate disabilities: Comparing combined techniques of classroom simulation, videotape modeling, and community-based instruction. *Education and Training in Mental Retardation and Developmental Disabilities, 34,* 170–181.

Bruininks, R. H.,Woodcock, R. W., Weatherman, R. F., & Hill, B. K. (1996). *Scales of Independent Behavior–revised.* Itasca, IL: Riverside.

Cihak, D. F., Kessler, K., & Alberto, P. (2007). Generalized use of a handheld prompting system. *Research in Developmental Disabilities, 28,* 397–408.

Coon, M. E., Vogelsberg, R. T., & Williams, W. (1981). Effects of classroom public transportation instruction on generalization to the natural environment. *Journal of the Association for the Severely Handicapped, 6,* 46–53.

Hutchins, M. P., & Renzaglia, A. (1998). Interviewing families for effective transition to employment. *Teaching Exceptional Children, 30,* 72–78.

Horner, R. H., Jones, D. N., & Williams, J. A. (1985). A functional approach to teaching generalized street crossing. *Journal of the Association for Persons with Severe Handicaps. 10,* 71–78.

Kaufman, A. S., & Kaufman, N. L. (1983). *Kaufman Assessment Battery for Children.* Circle Pines: American Guidance Service.

Keytec, Inc. (2003). *Magic touch.* Richardson, TX.

Kubat, A. (1973). Unique experiment in independent travel: Use of public transit provides freedom for the mentally handicapped. *Journal of Rehabilitation, 39,* 36–42.

LaDuke, R. O., & LaGrow, S. J. (1984). Photo-bus-route-map: An intervention to produce independence in bus travel for mentally retarded adults.

The Mental Retardation and Learning Disability Bulletin, 12, 71–75.

LaGrow, S., Wiener, W., & LaDuke, R. (1990). Independent travel for developmentally disabled persons: A comprehensive model of instruction. *Research in Developmental Disabilities, 11,* 289–301.

Marchetti, A. G., Cecil, C. E., Graves, J., & Marchetti, D. C. (1984). Public transportation instruction: Comparison of classroom instruction, community instruction, and facility-grounds instruction. *Mental Retardation, 22,* 128–136.

Marholin, D., O'Toole, K. M., Touchette, P. E., Berger, P. L., & Doyle, D. A. (1979). "I'll have a Big Mac, large fries, large coke and apple pie". . .or teaching adaptive community skills. *Behavior Therapy, 10,* 236–248.

Matson, J. L. (1980). A controlled group study of pedestrian skill training for the mentally retarded. *Behavior Research and Therapy, 18,* 99–106.

Mechling, L. C., & Gast, D. L. (2003). Multi-media instruction to teach grocery word associations and store location: A study of generalization. *Education and Training in Mentally Retardation and Developmental Disabilities, 38,* 62–76.

Mechling, L. C., Gast, D. L., & Barthold, S. (2003). Multi-media computer-based instruction to teach students with moderate intellectual disabilities to use a debit card to make purchases. *Exceptionality, 11,* 239–254.

Mechling, L. C., Gast, D. L., & Seid, N. (in press). Evaluation of a personal digital assistant as a self-prompting device for increasing multi-step task completion by students with moderate intellectual disabilities. *Education and Training in Autism and Developmental Disabilities.*

Mechling, L. C., & Ortega-Hurndon, F. (2007). Computer-based video instruction to teach young adults with moderate intellectual disabilities to perform multiple step, job tasks in a generalized setting. *Education and Training in Developmental Disabilities, 42,* 24–37.

Mechling, L. C., Pridgen, L. S., & Cronin, B. A. (2005). Computer-based video instruction to teach students with intellectual disabilities to verbally respond to questions and make purchases in fast food restaurants. *Education and Training in Developmental Disabilities, 40,* 47–59.

Neef, N. A., Iwata, B. A., & Page, T. J. (1978). Public transportation training: In vivo versus classroom instruction. *Journal of Applied Behavior Analysis, 11,* 331–344.

Page, T. J., Iwata, B. A., & Neef, N. C. (1976). Teaching pedestrian skills to retarded persons: Generalization from the classroom to the natural environment. *Journal of Applied Behavior Analysis, 9,* 433–444.

Riffel, L. A., Wehmeyer, M. L., Turnbull, A. P., Davies, D., Stock, S., & Fisher, S. (2005). Promoting independent performance of transition-related tasks using a palmtop PC-based self-directed visual and auditory prompting system. *Journal of Special Education Technology, 20,* 5–14.

Robinson, D., Griffith, J., McComish, K., & Swashbrook, K. (1984). Bus training for developmentally disabled adults. *American Journal of Mental Deficiency, 89,* 37–43.

Snell, M., & Brown, F. (2006). *Instruction of students with severe disabilities* (6th ed.). Upper Saddle River, NJ: Merrill Prentice-Hall.

Sowers, J, Rusch, F. R., & Hudson, C. (1979). Training a severely retarded young adult to ride the city bus to and from work. *AAESPH Review, 3,* 15–24.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland adaptive behavior scales.* Circle Pines, MN: American Guidance Service.

Spears, D. L., Rusch, F. R., York, R., & Lilly, S. (1981). Training independent arrival behaviors to a severely mentally retarded child. *Journal of the Association for Severely Handicapped, 6,* 40–45.

Taber, T. A., Alberto, P. A., Hughes, M., & Seltzer, A. (2002). A strategy for students with moderate disabilities when lost in the community. *Research & Practice for Persons with Severe Disabilities, 27,* 141–152.

Taber-Doughty, T., Patton, S. E., & Brennan, S. (2008). Simultaneous and delayed video modeling: An examination of system effectiveness and student preferences. *Journal of Special Education Technology, 23(1),* 1–18.

Tawney, J. W., & Gast, D. L. (1984). *Single subject research in special education.* Columbus, OH: Merrill.

Van Laarhoven, T., Van Laarhoven-Myers, T., & Zurita, L. M. (2007). The effectiveness of using a Pocket PC as a video modeling and feedback device for individuals with developmental disabilities in vocational settings. *Assistive Technology Outcomes and Benefits, 14(1),* 28–45.

Vogelsburg, R. T., & Rusch, F. R. (1979). Training severely handicapped students to cross partially controlled intersections. *AAESPH Review, 4,* 264–273.

Wechsler, D. (1997). *Wechsler Adult Intelligence Scale-III.* San Antonio, TX: Psychological Corporation.

Welch, J., Nietupski, J., & Hamre-Nietuspki, S. (1985). Teaching public transportation problem solving skills to young adults with moderate handicaps. *Education and Training of the Mentally Retarded, 20,* 287–295.

Westling, D. L., & Fox, L. (2004). *Teaching students with severe disabilities (*3rd ed.). Upper Saddle River, NJ: Merrill Prentice-Hall.

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Review of the Literature on Community-Based Instruction across Grade Levels

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Abstract: As community-based instruction has been recognized as a variable leading to postschool success for all students with disabilities, early transition planning has become vital in students' preparation for adulthood. Based upon the need and importance of students receiving community-based instruction, this literature review examined 23 transition intervention studies to identify vocational, community, daily living, and recreation skills taught across grade levels using CBI. The majority of studies included in the review showed positive results for all participants while more than half of the studies were conducted at the high school level. In addition, findings indicated mixed generalization and maintenance results. These findings suggest the need for practitioners to use evidence-based strategies in the community across grade levels.

Adult outcomes for students with disabilities are dismal (Blackorby & Wagner, 1996; Gaylord & Hayden, 1998; Wagner & Blackorby, 1996). Findings from the original National Longitudinal Transition Study (NLTS) suggest that adults with disabilities are employed at lower rates than those without disabilities (Blackorby & Wagner; Wagner & Blackorby). Although the employment rate of youth with disabilities increased by 2003, youth were not anymore likely to be competitively employed (Wagner, Newman, Cameto, & Levine, 2005).

The NLTS data also show that youth with disabilities do not live independently in the community after high school (Brown, 2000; Gaylord & Hayden, 1998). Only one in eight youth with disabilities lived independently two years after leaving high school and changes in living arrangements did not occur between 1987 and 2003 (Wagner et al., 2005). Students with disabilities are also not adjusting to the community once they leave high school (Sample, 1998). For example, only 25% of youth with disabilities belonged to a community group after high school (Wagner et al.). These findings indicate that there is still a need to better prepare youth with disabilities to successfully transition from school to adulthood.

Numerous studies have been conducted to determine the variables that lead to better postschool outcomes for students with disabilities (e.g., Baer et al., 2003; Heal & Rusch, 1995; Kohler, 1993; Phelps & Hanley-Maxwell, 1997; Rabren, Dunn, & Chambers, 2002; Repetto, Webb, Garvan, & Washington, 2002; Sample, 1998). Variables that have been consistently identified as contributing to successful outcomes for students include paid work experience while in school (Sample), employment support from Vocational Rehabilitation and/or Mental Health/Mental Retardation at time of graduation (Rabren et al.), interagency collaboration (Kohler; Sample), work study participation, vocational education, and regular academics (Baer et al.) and community-based instruction (CBI; Repetto et al.). For example, Repetto et al. found that interagency characteristics, transition programs, services, and supports were positively correlated with increased numbers of students in post-secondary education in 1997. Results in-

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dicated that in 1997, 85% of school districts included community training as part of their transition program and 90% of these districts included life skills instruction. These results indicated that these experiences lead students to learn valuable knowledge and gain necessary supports to be successful after high school.

CBI, also referred to as community-referenced instruction or life skills instruction, is a form of instruction in which the community serves as the classroom (Kluth, 2000). The purpose of CBI is to teach students functional skills in natural environments (Hamill, 2002). That is, instruction occurs in settings that are practical and facilitate meaningful experiences so that students can practice skills in places they would most likely use them (Kluth). Some skills that have been taught using CBI include purchasing, pedestrian safety, riding a bus, and community social skills (Beakley & Yoder, 1998; Burcroff, Radogna, & Wright, 2003; Kluth). For example, students might be taught how to make purchases at a department store and restaurant. Further, students could learn pedestrian safety by crossing streets in their neighborhood or navigating the parking lot at a local mall. Students could also learn to read a bus schedule and develop appropriate social skills for riding the bus. Providing instruction in the community prepares students for life after high school, promotes students' ability to function independently, and enhances their quality of life (Hamill).

As CBI has become a valuable component of transition programs, early transition planning (Agran, Snow, & Swaner, 1999; Cummings, Maddox, & Casey, 2000; deFur, 2003; Neubert, 2003; Sitlington, Frank, & Carson, 1992) has been identified in the literature as an emerging variable leading to successful outcomes for students with disabilities. deFur stated that educational decisions made about a student with a disability will impact his/her postschool life. Decisions made in elementary school will affect programming in middle school, which, in turn, affect decisions about high school courses (deFur). Each subsequent decision is impacted by previous educational planning decisions.

Brolin and Gysbers (1989) also indicated that early transition planning is essential for all students with disabilities. Brolin and Gysbers also consider career development, the process by which students become aware of the different careers available to them, to be a major part of transition planning that should begin as early as elementary school. As students move through their education, they become increasingly prepared for adulthood by exploring careers and building occupational competencies that prepare them for the world of work. Because successful adult outcomes for students with disabilities depend on school programming, it is important that all decisions made about a student's course of study focus on the transition from school to adult life (Kohler, 1993). Since community-based instruction is one variable that leads to successful postschool outcomes (Fabian, Lent, & Willis, 1998), it stands to reason that it might be important for students to receive this type of instruction at all levels of their education. Therefore, the purpose of this article is to review the transition intervention literature to identify the vocational, community, daily living, and recreation skills that have been taught using CBI to students with disabilities across grade levels.

Method

A comprehensive review of the literature was conducted on interventions that taught functional life skills to students in the community since 1990, the year Individuals with Disabilities Education Act (1990) first stated that when students reach age 16 they must have transition services included on their Individualized Education Plans (IEP) to 2007. Using this start date, an electronic database search using Educational Resources Information Center (ERIC), MasterFILE Premier, and Academic Search Premier was conducted. First, search terms included full and truncated forms of *community based instruction*, *community*, *disability*, *vocational*, *daily living*, *community living*, *community participation*, *transportation*, *mobility*, *orientation*, *street crossing*, *pedestrian traffic*, *safety*, *grocery*, *shopping*, *math*, *budget*, *saving*, *account*, *banking*, *ATM*, *money*, *laundry*, *cleaning*, *restroom*, *recreation*, *leisure*, *play*, *sport*, *movie*, *club*, *social skill*, *functional*, *academic*, *residential*, *home*, *emergency*, *hygiene*, *self-care*, *bath*, *health*, *meal preparation*, *cooking*, and *dining*. Second, the

reference lists of the articles included in this review were analyzed to determine additional articles. Third, Morse and Schuster's (2000) literature review of grocery shopping skills, Lancioni and O'Reilly's (2002) review of food preparation skills, and Xin, Grasso, Dipipi-Hoy, and Jitendra's (2005) review of purchasing skills were analyzed. Fourth, authors also reviewed the literature map of transition research articles developed by Alwell and Cobb (2006). Finally, the first three authors conducted a hand search of the following journals, *Education and Training in Developmental Disabilities, Career Development for Exceptional Individuals, Journal of Vocational Special Needs Education, Journal of the Association for Persons with Severe Handicaps/Research and Practice for Persons with Severe Disabilities, Exceptional Children, Focus on Autism and Other Developmental Disabilities, Journal of Applied Behavior Analysis, Journal of Positive Behavior Interventions, Behavior Disorders,* and *American Journal on Mental Retardation.*

Inclusion/Exclusion Criteria

Articles included in the review: (a) were published in a peer reviewed journal from the United States; (b) were published after 1990; (c) reported quantitative results; (d) included participants who were students in elementary school, middle school, high school, or an 18-21 program; (e) included students who received instruction during school at a community setting, including articles that taught skills at both school and the community; and (f) described studies that aimed to teach a functional skill in one of four domain areas, including vocational (e.g., work skills), daily living (e.g., grocery shopping), community (e.g., eating at a restaurant), and recreation (e.g., participating on a basketball team).

Each study was analyzed to determine the type of skill being taught in the community and the corresponding domain. For example, eating at McDonald's was categorized as daily living if the skill being taught was purchasing (e.g., money handling skills) or community if the skill being taught was using a fast food restaurant (e.g., entering store, ordering food, eating food). Since not all articles included both a grade level and age for participants, grade levels were defined as follows: (a) elementary school, including kindergarten through sixth grade (i.e., ages 5-11), (b) middle school, including seventh and eighth grades (i.e., ages 12-14), and (c) high school, including ninth through twelfth grades (i.e., ages 15-21).

We excluded articles that examined the relationship between leisure/recreation skills and personal skills, promoting achievement, or reducing inappropriate behaviors since these studies were not designed to directly teach a leisure/recreation skill (e.g., youth development programs; Keller, Bost, Lock, & Marcenko, 2005). Studies were also excluded from this review if the instruction took place in the classroom and only generalization probes occurred in the community (e.g., Frederick-Dugan, Test, & Varn, 1991; Hutcherson, Langone, Ayres, & Clees, 2004).

Analysis of Literature

Twenty-three articles met the search criteria. The first two authors agreed on the inclusion of 95.8% of the articles based on the inclusion criteria. Review forms were completed for each article and included the following information: (a) authors and date; (b) purpose; (c) participant demographic information including grade, age, and disability; (d) setting; (e) domain and skill; (f) research design; (g) dependent and independent variables; and (h) results. Interrater reliability was conducted by the first three authors for 20% of the articles on information included on these forms. Reliability was established by adding the total number of agreements and dividing this sum by the total number of possible responses. Disagreements in reliability were addressed by the third author who reviewed the article in question to gain consensus on information on the review forms among all authors. Reliability ranged from 86.7% to 100%, with a mean of 95.6%.

Results

Twenty-three studies met the inclusion criteria. Six (26.1%) studies were at the elementary school level, eight (34.8%) at middle school, and fourteen (60.1%) at high school (studies may have included more than one grade level). The domains included 10 (43.5%)

studies dealing with daily living skills, 8 (34.8%) related to community skills, 4 (17.4%) studies dealing with vocational skills, and 2 (8.7%) related to recreation skills [Rynders, Schleien, & Mustonen (1990) included two domains: vocational and recreation] (see Table 1).

The studies included 161 participants with ages ranging from 5 to 21. Individuals in the studies had a variety of disabilities, including mental retardation (n = 20, 87.0%), autism (n = 4, 17.4%), multiple disabilities (n = 2, 8.7%), orthopedic disability (n = 1, 4.3%), behavior and emotional disability (n = 1, 4.3%), and traumatic brain injury (n = 1, 4.3%).

Setting

The majority of studies taught skills at a community site only (n = 15, 65.2%). However, a few of the studies included simulation in the classroom either as a comparison to CBI (n = 4, 17.4%) or before teaching the skill in the community (n = 7, 30.4%). Alberto, Cihak, and Gama (2005) used video modeling and picture prompts in the classroom before CBI. In Bates, Cuvo, Miner, and Korabek (2001) one group received community-based training only to teach grocery shopping skills, while the other group received community-based training after simulated instruction. Branham, Collins, Schuster, and Kleinert (1999) used three techniques to teach daily living skills, (a) classroom simulation plus CBI, (b) videotape modeling plus CBI, or (c) videotape modeling plus classroom simulation plus CBI. Cihak, Alberto, Taber-Doughty, and Gama (2006) used static pictures and video prompting in the classroom before instructing students in the community.

Cihak, Alberto, Kessler, and Taber (2004) used four techniques to teach vocational skills including (a) simulation only, (b) CBI, (c) simulation and CBI on consecutive days, and (d) simulation and CBI on the same day. Students were taught using all techniques over four skills. Collins, Stinson, and Land (1993) compared classroom simulation plus CBI with CBI only. For classroom simulation activities, the teacher used materials similar to those found in the community. Cuvo and Klatt (1992) used three instructional methods, flash cards in school setting, videotaped recordings in school setting, and naturally occurring signs in community to teach community-referenced sight words; all students received instruction with all three methods. Domaracki and Lyon (1992) taught students janitorial and housekeeping skills in a simulated setting (i.e., special education facility) before teaching in a community setting. Next, Haring, Breen, Weiner, Kennedy, and Bednersh (1995) gave students videotaped training on how to purchase items either before, after, or during in vivo training at different types of stores in the community. Pattavina, Bergstrom, Marchand-Martella, and Martella (1992) used photos of streets to teach street crossing in the classroom before CBI to ensure safety. Finally, Taber, Alberto, Hughes, and Seltzer (2002) taught students how to call for assistance in the classroom before moving instruction into the community.

Most studies were conducted at more than one location (n = 15, 65.2%). The settings included 10 studies (43.5%) at grocery stores (Alberto et al., 2005; Cihak et al., 2006; Bates et al., 2001; Berg et al., 1995; Cihak et al., 2004; Ferguson & McDonnell, 1991; Haring et al., 1995; Morse & Schuster, 2000; Taber et al., 2002; Taber, Alberto, Seltzer, & Hughes, 2003), 4 studies (17.4%) on public streets (Branham et al., 1999; Collins et al., 1993; Pattavina et al., 1992; Taber et al., 2003), 3 studies (13.0%) at department stores (Taber et al., 2002; Taber et al., 2003; Westling, Floyd, & Carr, 1990), 3 studies (13.0%) at shopping malls/centers (Berg, et al.; Cuvo & Klatt, 1992; Taber et al., 2003), 2 studies (8.7%) at restaurants (Bates et al.; Berg et al.), 2 studies (8.7%) at convenience stores (Haring et al.; Westling et al., 1990), 2 (8.7%) at bowling alleys (Schloss et al., 1995; Vandercook, 1991), 2 studies (8.7%) at home (Hall, Schuster, Wolery, Gast, & Doyle, 1992; Murzynski & Bourret, 2006). One study each (4.3%) was conducted at each of the following settings: a (a) pool (Schloss et al.), (b) laundromat (Bates et al.), (c) on hiking and biking trails (Schloss et al.), (d) library (Taber et al., 2002), (e) public restroom (Bates et al.), (f) post office (Branham et al.), (g) bank (Branham et al.), (h) hotel (Domaracki & Lyon, 1992), (i) camp (Rynders et al., 1990), (j) jobsite (i.e., food preparation facility; Davis, Brady, Williams, &

TABLE 1

Study Characteristics

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Alberto, Cihak, & Gama (2005) (Community)	To compare the effectiveness of classroom simulation strategies in combination with in vivo instruction.	8 participants; Middle school; Ages: 11-15; Moderate cognitive disabilities	School resource classroom and a local grocery store	Alternating treatments design	Use of a debit card to withdraw $20 Use of a debit card to purchase two items (Percent of correct responses, number of errors, and number of sessions to acquisition)	Static picture prompts and video modeling	All students acquired and maintained skills necessary to use a debit card to (a) withdraw $20 and (b) purchase two items. Students made fewer errors and attained mastery in fewer instructional sessions when static pictures were used in simulated instruction rather than video modeling. Seven of eight exhibited the same success with static picture prompts and video modeling; however, one student was more successful with static picture prompts. Overall, combined with CBI, students were more successful with (a) static picture prompts over (b) video modeling. Maintenance: All students maintained skills (no time reported).

Bates, Cuvo, Miner, & Korabek (2001) (Daily living)	To examine simulated and community-based instructional arrangements across a common set of functional living tasks and across two levels of retardation (moderate and mild).	40 participants; High school and adults; Ages: Mean age for participants with moderate mental retardation: 17.4 Mean age for participants with mild cognitive disabilities: 16.9	Large national chain grocery store, a commercial laundromat, community restaurant, public restroom in a local rehabilitation facility	Multi-factor mixed design with two repeated measures, replicated for each of the four functional living skills tasks	Grocery shopping, use of a commercial laundromat, purchasing a soft drink in a restaurant, janitorial skills associated with cleaning a restroom. (Percent of steps completed independently on task analyses)	Least to most prompt hierarchy	*Half of the participants received community-based instruction after they had received 10 simulated instructional trials on the targeted task while the other half received community-based training only. The following results are based on students receiving 10 community-based instruction trials.* Both persons with mild and moderate MR performed better in the community following community-based instruction. In comparison to the intervention phase, both groups decreased in performance at follow-up; however, the follow-up scores were still significantly better than the pre community performance. Generalization: Both groups performed significantly better in one of the two sites (grocery, laundry, and janitorial) for each of the tasks.

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Berg, Wacker, Ebbers, Wiggins, Fowler, & Wilkes (1995) (Daily living)	To examine the applicability of generalization training procedures in combination with community-based instruction in promoting the acquisition, generalization, and maintenance of performance of age-appropriate skills.	4 participants; Middle & High school; Ages: 13-17; Profound mental retardation and multiple handicaps	A sandwich counter at a shopping mall, a fast food restaurant, a cookie store at a shopping mall, a deli counter at a grocery store	Concurrent and noncurrent multiple baseline experimental designs	Ordering and purchasing items (Percentage of task steps completed independently and correctly)	Treatment package consisting of multiple training examples in community setting and instruction using verbal and physical prompting	Ordering items: All participants increased the percentage of steps performed independently within six sessions. Maintenance: Two students maintained skill at 100% accuracy over 20 weeks after an initial decline in performance. Generalization: Generalized skill to new setting, materials, and motoric response. Purchasing items: Data showed high variability in training. Maintenance: Two students maintained skill at same rate as intervention over 20 weeks. Generalization: Generalized skill to new setting, materials, and motoric response.

Branham, Collins, Schuster, & Kleinert (1999) (Daily living)	Will the constant time delay procedure used with the combined techniques of classroom simulation plus CBI, videotape modeling plus CBI, and classroom simulation plus videotape modeling plus CBI result in generalization in community settings for the skills of cashing a check, crossing a street, and mailing a letter?	3 participants; High school; Ages: 14-20; Cognitive disabilities	Post offices, banks, and streets.	Multiple probe across behaviors	Cashing a check, crossing a street, mailing a letter (Percent correct of steps performed on the task analyses)	Constant time delay procedure with one of the following techniques: (a) classroom simulation plus CBI, (b) videotape modeling plus CBI, (c) videotape modeling plus classroom simulation plus CBI	Each student showed an immediate increase in the target behavior after intervention. Classroom simulation plus CBI was the most efficient of the 3 techniques. Generalization: All participants generalized the skills to different settings with 100% accuracy.

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Cihak, Alberto, Kessler, Taber (2004) (Vocational)	To examine the impact of four instructional scheduling arrangements (i.e., simulated-only instruction, community-based instruction only, combination of simulated and CBI instruction on the same school day, and combination of simulated and CBI instruction on consecutive school days) on functional and vocational skills.	5 participants; High school; Ages: 17-19; Moderate cognitive disabilities	School resource classroom, local grocery store	Multiple probe across students	Task completion of functional and vocational skills	System of least prompts Four instructional scheduling arrangements, including: (a) simulation-only instruction, (b) CBI, (c) combination of simulation instruction and CBI on consecutive days, (d) combination of simulation and CBI on the same day	All students acquired, generalized, and maintained the four skills. Overall, students exhibited highest scores in the skill taught in the combination of simulated and CBI setting on the same day, followed by the skill taught in the CBI-only setting. Students exhibited lower scores on the skill taught with simulated and CBI instruction on consecutive days. Lowest scores were identified for the skill taught in the simulated-only setting. Maintenance: All students maintained 100% accuracy over 4 weeks. Generalization: All students generalized skill to new setting.

Cihak, Alberto, Taber-Doughty, & Gama (2006)	To determine the effects of static picture prompts or video prompts taught in a group instructional format on the ability of students to withdraw money from an ATM and purchase items.	6 participants; Middle school; Ages: 11-15 years old; 6 Moderate cognitive disabilities, 2 ADHD (secondary diagnosis)	Classroom and grocery stores	Adapted alternating treatments design	Use of a debit card to withdraw $20 Use of a debit card to purchase two items (Percent of correct responses, number of errors, and number of sessions to acquisition)	Static picture prompts or video prompts	All students acquired the skills of using a debit card to withdraw money and purchase items. No differences were found between the static picture prompts and video prompts for four of six students. The two students with a secondary diagnosis with ADHD performed better with picture prompts. Maintenance: All students maintained skills over 2 weeks.
Collins, Stinson, & Land (1993) (Community)	To compare in vivo and simulation prior to in vivo instruction on street crossing and pay telephone use.	Experiment 1: 4 participants; High school; Ages: 15-19 years old; Moderate disabilities Experiment 2: 4 participants; Elementary; Ages: 10-11 years old; Moderate disabilities	Corner of the street and public telephones adjacent to street	Experiment 1 & 2: Multiple probe design across subjects with a counterbalance of treatments and skills trained	Safety skills –street crossing and pay telephone use (Experiment 1 & 2: Number of unprompted correct responding of steps in task analysis	Experiment 1 & 2: Task analysis –progressive time delay	Experiment 1: All participants increased number of correct responding after instruction, regardless of task or setting. Data did not support simulation instruction prior to in vivo instruction. Maintenance: Three students maintained skill for one month. Generalization: Not reported. Experiment 2: All participants increased level of responding after instruction. Maintenance: Not completed due to lack of time.

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Cuvo & Klatt (1992) (Community)	To compare the effects of 3 instructional methods (flash cards in school setting, videotaped recordings in school setting, and naturally occurring signs in community) on acquisition of community-referenced sight words.	6 participants; Middle school; Ages: 13-17 years old; 5 Moderate cognitive disabilities, 1 Mild cognitive disabilities	Room adjacent to special education room and community (school building, school grounds, and shopping center)	Multiple baseline across students	Sight words (9 signs -% of correct responses)	Constant time delay Groups of 3 signs were taught using each instructional method (flash cards in school setting, videotaped recordings in school setting, and naturally occurring signs in community) in counterbalanced order across participants.	Correct response: Attained criterion of 100% correct shortly after intervention. Maintenance: 5 of 6 students maintained 100% correct responding (except one student who missed 1 sign during 1 probe) for 3-5 weeks after intervention ended. 6th student needed retraining.
Davis, Brady, Williams, & Burta (1992) (Vocational)	To determine the effects of auditory prompting tapes on fluency of performance.	3 participants; High school; Ages: 16-20 years old; 2 BED, 1 orthopedic impairment	Community-based food preparation facility	Multiple baseline across students	Filling salt and pepper shakers Drying and lining serving trays (Shakers –½ full, number filled correctly lined on collection table Tray drying and lining –number of trays completely dry with liner in position Fluency-Number of correct of each task divided by duration of task)	Auditory prompts interspersed throughout music.	All students increased fluency once prompts were introduced. All students made no errors. Only 1 student increased fluency to normative rate of production (4 shakers/min).

Domaracki & Lyon (1992) (Vocational)	To compare the effect of general case simulation and in vivo instruction on janitorial and housekeeping work skills.	4 participants; High School; (no age given); Moderate and severe cognitive disabilities	Hotel and restaurant complex and special education facility	Multiple probe across behaviors.	Janitorial and housekeeping skills (Percentage of steps performed independently)	Prompting using a graduated assistance hierarchy	Simulation training: All participants increased percentage of steps performed independently, but did not reach criterion. Naturalistic training: Students reached criterion and took 12-15 sessions to reach. Generalization: Students did not generalize skills to a new setting (percentage of steps performed independently ranged from 1% to 65%).

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Ferguson & McDonnell (1991) (Daily living)	To compare the relative efficacy of serial and concurrent sequencing strategies in teaching a community-based activity.	6 participants; High school; Ages: 16-18; Moderate to severe cognitive disabilities	3 grocery stores	Two-level multiple baseline across subject	Grocery shopping (Percent of items correctly located in generalization probe stores) (Topography and frequency of specific errors made during generalization probe session) (Number of item presentations during training and minutes of instruction to criterion)	Concurrent and serial sequencing	Items correctly located: Students who received serial sequence training on average located 69% of the items in the generalization probe stores. Students who received concurrent sequence training on average located 86% of the items in the generalization probe stores. Errors: Data showed students had less aisle errors when they received the concurrent sequencing intervention. Item presentations: Student trials ranged from 70 to 125 and 140 to 200 minutes of instruction in the serial training phase. Trials ranged from 32 to 290 and 60 to 520 minutes of instruction in the concurrent training phase.

Hall, Schuster, Wolery, Gast, & Doyle (1992) (Daily living)	To determine the effect of dyadic groups on the acquisition of cooking skills.	4 participants; High School; Ages: 16-18 years old; Moderate to severe cognitive disabilities	Kitchen in a home	Multiple probe across behaviors	Cooking (Correct response: independently completing task within 20s of pervious step Incorrect responses: Initiated step within 4s but (a) did not complete within required time, (b) completed task out of order, or (c) performed incorrect motor response No response: Did not initiate step within 4 s)	0-4 s constant time delay. Students worked in dyads and had to perform half of the tasks required for the cooking.	All students increased correct responses after instruction. The time to criterion ranged from 7 to 22 sessions above the minimum required.
Haring, Breen, Weiner, Kennedy, & Bednersh (1995) (Daily living)	To determine the effect of videotape modeling when presented before, after, and concurrent to in vivo shopping training on performance in trained, probed, and untrained stores.	6 participants; Elementary, Middle, and High schools; Ages: 10-16; Severe cognitive disabilities and Autism	Bookstores, convenience stores, drugstores, gift shops, grocery stores, hobby shops, and record stores	Multiple probe across settings	Purchasing skills (Percent of task analysis steps with correct responding and cumulative number of independent purchases)	Modeling of training conducted in 3 ways: (a) in vivo instruction followed by videotape training, (b) videotape training followed by in vivo instruction, and (c) concurrent videotape and in vivo instruction	All participants showed increases in the percent of correct steps on the task analysis in the in vivo training phase. When participants received in vivo training in one store and videotape training in 1 to 3 additional stores, participants made more independent purchases. Maintenance: All students maintained purchasing skills (no time reported). Generalization: All students generalized skill to a new setting at same rate of responding during intervention.

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Morse & Schuster (2000) (Daily living)	To examine the effectiveness of in vivo training with constant time delay and simulation training using pictorial storybook on the acquisition of grocery shopping skills.	10 participants; Elementary school; Ages: 5-12 years old; Moderate cognitive disabilities	Grocery store	Multiple probe across students	Grocery shopping (Percentage of steps performed correctly)	Constant time delay Simulation training using storyboard to construct sequence of skills used when shopping for groceries	(2 students did not start training program) 6 students reached criterion after intervention. Maintenance: 6 students maintained criterion of critical steps 6 weeks after intervention ended. Generalization: 6 students generalized skills to a unique grocery store and performed critical steps of TA with 90-100% accuracy.
Murzynski & Bourret (2006)	To compare video modeling plus least-to-most prompting and least-to-most prompting alone on juice-making, sandwich-making, and shirt and pant folding.	2 participants; Elementary school; Ages 9 and 11 years old; Autism	Home	Parallel-treatment design	Juice-making Sandwich-making Shirt and pant folding (Number of steps performed independently)	Least-to-most prompting with video modeling or least-to-most prompting alone	Students increased the number of steps performed correctly across all skills after intervention. Students acquired the skills in fewer trials with least-to-most prompting with video modeling.
Pattavina, Bergstrom, Marchand-Martella, & Martella (1992). (Community)	To investigate a strategy to teach a student to successfully cross streets in the community.	1 participant; Middle school; Age: 12; Traumatic brain injury	School setting, and streets in the community	AB design	Crossing streets in the community (Number of steps performed independently)	Verbal and visual prompts	Correctly crossed street after 6 weeks of instruction Maintenance: Maintained skill at 2, 4, and 16 week checks. Generalization: Generalized skill to new streets in town.

Rynders, Schleien, & Mustonen (1990) (Vocational) (Recreation)	To determine the effects of an intensive integrated camping experience on social interactions and skill development.	3 participants; Elementary school; Ages: 9-11 years old; 1 Autism, 2 Severe cognitive disabilities	Camp, including lodges, dining hall, farm, greenhouse, orchard, and beach.	Quasi-experimental (pre/post)	Table clearing Swimming preparation (Social interactions: (a) appropriate social behavior (engaged in goal-directed activity, appropriate use of materials) (b) Inappropriate social behavior (nongoal-directed behavior, inappropriate use of materials, not participating in activity) (c) Initiating social interaction (touching, gesturing, vocalizing, or talking to peer; initiation was interaction between 2 children who had not interacted for previous 3 s) (d) Receiving social interactions (child is touched, gestured, given directions, or questioned by peer (interaction coded if initiations were separated by 3 s)	Social interactions –reinforcement of appropriate behavior and contingent reinforcement of peer social interactions Skills –task analytic approach (test-teach) –leaders taught steps that were not completed independently through prompting	Social interactions: Appropriate behavior decreased pre/posttest. Skill: Students increased number of steps performed independently from pretest to posttest. However, significance was not tested because of small number of participants.

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Schloss, Alper, Young, Arnold-Reid, Aylward, & Dudenhoeffer (1995) (Community)	To investigate the effectiveness of a direct instruction procedure involving modeling and guided practice on the acquisition of functional sight words.	3 participants; Elementary and middle school; Ages: 12-14; Mild cognitive disabilities	Public swimming pool (direct instruction), a 32-lane automated bowling alley (control), an arcade (direct instruction), a state park hiking trail (control), a multiplex theater (direct instruction), a movie rental chain, a Department of Conservation bike trail (direct instruction), a public tennis facility (control), and a public lake	Parallel treatment design: Multiple baseline replications across sight words and Alternating treatment to compare instructional procedures	Functional academics (Number of words identified)	Two instructional conditions: (a) direct instruction with in vivo word find which included verbal instruction, modeling, guided practice, and feedback; (b) control with in vivo word identification which involved the authors reading key passages to participants during a recreational activity	Each participant reached criterion of 100% within nine weeks of the direct instruction condition being implemented. Results showed each participant had limited acquisition of the sight words when the control condition was implemented. Maintenance: Each participant maintained performance throughout the 4-week maintenance probe.

Souza & Kennedy (2003) (Daily living)	To increase a student's social interactions in community settings within the context of activities and routines associated with the Individualized Education/Transition Plan (IETP).	1 participant; High School; Age: 20; Severe cognitive disabilities	Bus & cafeteria	Multiple baseline across settings/people	Social skills (Number of social interactions lasting 15 minutes or longer in each setting and quality of interaction)	Process which included: (a) identifying a person without disabilities who frequented the setting when the student was present, (b) approaching the person and asking if they would like to meet the student, (c) the teacher introducing the person without disabilities to the student and discussing possible scheduled interactions, (d) scheduling activities, times, and days in which both visited a particular setting, (e) teacher monitoring interactions between the student and the person without a disability	Increases in social interactions occurred during the 17 week period when the interaction strategy was implemented. Quality of interaction resulted in an increasing trend between weeks 13 and 17.

TABLE 1—(*Continued*)

Reference (Domain)	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Taber, Alberto, Hughes, Seltzer (2002) (Daily living)	To determine if students could identify when they were lost and then use a cell phone to call for assistance.	14 participants; Middle school; Ages: 11-14 years old; Moderate cognitive disabilities	School Grocery store, public library, department store.	Concurrent multiple probe across groups	Calling for assistance (Percentage of task analysis steps performed independently)	Five-level least intrusive prompting system with total task presentation	All students were able to correctly perform 80% of task analysis after 3 sessions of intervention at the school. When the intervention moved to the community, all students sustained 100% accuracy. Generalization: Students were able to call for assistance with a person other than the investigator.
Taber, Alberto, Seltzer, & Hughes (2003) (Community)	To determine if students could assist an adult who recognized the student was lost and use speed dial to call for assistance.	6 participants; High school; Ages: 14-18 years old; Moderate cognitive disabilities	Secondary schools and community settings (grocery store, discount department store, main street, and suburban mall)	Multiple probe across students	Calling for assistance (Event recording to mark level of prompt student needed on each step of TA)	Five level, least-to-most prompts with task analysis	Students reached 80% criterion after intervention. Only 1 instance of overlap between baseline and intervention.

Vandercook (1991) (Recreation)	To examine acquisition and generalization of leisure skills when engaged with a peer.	5 participants; High school; Ages: 18-21 years old; Multiple disabilities	Bowling alley	Multiple probe across activities	Bowling and pinball (Skill demonstration with instructor) (Skill generalization with peer) (Social interactions of peers while engaged in activity) (Attitudes of peers without disabilities toward persons with disabilities)	Task analysis - total task approach with decreasing assistance prompting	Skill demonstration with instructor resulted in increased skill level for each student for each activity (bowling and pinball). Skill generalization with peer occurred. Social interactions of peers while engaged in activity: Cooperative participation increased
Westling, Floyd, & Carr (1990) (Community)	To determine the effects of training students in a single setting or multiple settings on department store shopping.	15 participants; High School; Ages: 13-19 years old; Moderate, severe, or profound cognitive disabilities	Department stores and convenience stores	Quasi-experimental	Purchasing items (Correct number of behaviors (e.g., enter through correct door, looks on correct shelf, takes out money) and social (e.g., asks for help to find correct section, waits turn at check out stand, greets cashier) Functional criterion scores –necessary behaviors performed Number of sessions to reach three consecutive criterion on operational behavior)	Pre-community-Role playing, discussion, and demonstration of skills needed in the community setting. Training sites –least-to-most intrusive prompt system of task analysis: single (one department store) Multiple (3 different sites)	Operational behaviors: Both groups made significant gains at both department stores and convenience stores Social behaviors: Both groups made gains at department stores, but only multiple setting participants made gains at convenience store. Functional criterion: No significant differences. Number of sessions: No significant differences. Maintenance: All students maintained skills for 2 months post-intervention.

Burta, 1992), (k) bookstore (Haring et al.), (l) drugstore (Haring et al.), (m) gift shop (Haring et al.), (n) hobby shop (Haring et al.), (o) record store (Haring et al.), (p) arcade (Schloss et al.), (q) movie theater (Schloss et al.), (r) movie rental chain (Schloss et al.), (s) tennis courts (Schloss et al.), (t) public lake (Schloss et al.), (u) bus (Souza & Kennedy, 2003), and (v) special education facility (Domaracki & Lyon).

Design

The majority of the studies used a single subject design (n = 19, 82.6%). Of these, 10 (52.6%) used multiple probe design, 5 (26.3%) used a multiple baseline design, 2 (10.5%) used an alternating treatments design, 1 (5.2%) used a parallel-treatment design, and 1 (5.2%) used a multiple baseline and alternating treatment design. The remainder of the studies used a quasi-experimental design (n = 3, 13.0%) or a multi-factor mixed design (n = 1, 4.3%).

Skill/Dependent Variable

Results showed a variety of dependent variables across the four domain areas (i.e., vocational, daily living, community, and recreation). Purchasing grocery items was the most common dependent variable (n = 6, 26.1%). Safety skills were measured in four studies (17.4%). Three studies each (13.0%) measured purchasing non-grocery items and cleaning (e.g., janitorial skills, housekeeping skills, and clearing a tray after eating). Community-referenced sight words and using a debit card to withdraw money were taught in two studies each (8.7%). Cashing a check, planning and preparing a meal, purchasing in a restaurant, mailing a letter, dressing, folding shirts and pants, social skills, using a Laundromat, juice and sandwich making and leisure skills (e.g., riding a bicycle, bowling, playing tabletop games, horseshoes, and pinball),were measured in one study each (4.3% each). One study (4.3%) measured job skills (i.e., filling salt and pepper shakers and lining trays) on a work site.

Independent Variable

Fourteen studies (60.9%) used prompting to teach the target skill. Four studies (17.4%) used constant time delay to teach the target skill. Modeling was used in two studies (8.7%) to teach the target skills. One study used progressive time delay (4.3%) and one study (4.3%) used direct instruction. One study (4.3%) used concurrent and serial sequencing and one study used contingent reinforcement (4.3%). One study (4.3%; Souza & Kennedy, 2003) introduced the participant to an individual to increase social interactions. Three studies (13.0%) used two methods to teach skills. Rynders et al. (1990) used contingent reinforcement and task analysis to teach two different skills, including social skills and table clearing. Next, Alberto et al. (2005) used picture prompts and video modeling to teach community skills. Murzynski and Bourret (2006) used least-to-most prompting with video modeling to teach daily living skills.

Results

The interventions resulted in increases in the target skill. All studies showed positive results for all participants, except for two studies. Morse and Schuster (2000) stated that two students out of eight did not reach criterion as a result of the intervention. Domaracki and Lyon (1992) indicated that all students increased the target skill, but students only reached criterion in the naturalistic training phase, not the simulation training phase. It is also important to note that the Davis et al. (1992) study showed increases in the target skill, but only one student met the normative production rate.

Twelve studies (52.2%) collected generalization measures. Nine of these studies (75.0%) had participants generalize the skill at a new site, two (16.7%) measured generalization with a new person, and one (8.3%) measured generalization with new materials and motoric movements and at a new site (Berg et al., 1995). Ten of the 12 studies (83.3%) that measured generalization had positive results (Berg et al.; Branham et al, 1999; Cihak et al., 2004; Collins et al., 1993; Ferguson & McDonnell, 1991; Haring et al., 1995; Morse & Schuster, 2000; Pattavina et al.,

1992; Taber et al., 2003; Vandercook, 1991). One study had mixed results (Bates et al., 2001), while students in one study did not generalize the skill (Domaracki & Lyon, 1992). Finally, 11 studies (47.8%) collected maintenance data, ranging from 1 week to 20 weeks. All studies showed positive maintenance results, except for Cuvo and Klatt (1992) where one of six students did not maintain the skill.

Discussion

Results from the 23 intervention studies provide additional evidence that students with disabilities can learn skills in natural environments (Phillips, Reid, Korabek, & Hursh, 1988; Wehman, 1990). The studies included in this literature review span from 1990 to 2006 and reveal that various skills such as purchasing items, grocery shopping, and banking skills can be taught in the community. Results showed daily living skills as a common domain in which students were taught functional life skills in the community. For example, Branham et al. (1999) used a time delay procedure to teach students of high school age banking, street crossing, and mailing skills in the community. As a result, each participant showed an increase in the target behavior as well as generalized the skill to different settings. Similarly, Berg et al. (1995) used training and prompting to teach middle and high school students how to order and purchase items in various settings in the community such as the shopping mall and grocery store. Results showed that students increased the number of steps performed independently and that several students were able to maintain the skills. Additionally, recreation, community, and vocational skills were also taught across grade levels. For instance, Davis et al. (1992) used auditory prompting to teach the vocational task of filling salt and pepper shakers to students in a community-based food preparation facility. Findings showed that students were able to increase their fluency of performing this task after auditory prompting tapes were introduced.

Although the studies included in this review span from 1990 to 2006, the results are similar to previous literature reviews. According to a meta-analysis conducted by Xin et al. (2005), researchers found 9 out of 28 studies provided in vivo instruction, with a median of 87% nonoverlapping data (PND) points. In addition, Browder and Grasso (1999) conducted a literature review of studies that taught money skills to students with mental retardation. Results showed that of the 43 studies reviewed, 74% of the studies implemented the instruction in the classroom and the community or implemented instruction in the classroom and conducted probes in the community. However, only a few studies taught all skills in the community. Overall, results showed that students with varying levels of mental retardation could learn the skills to make purchases independently.

Limitations

Although evidence has shown that CBI is effective in teaching functional skills, results of this literature review should be viewed with caution due to several limitations. First, since the purpose of the review was to look at studies that taught skills to students in the community, the exclusion criterion resulted in eliminating any studies in which adults were the only participants. There have been several studies that taught functional skills to adults in community settings (e.g., Taylor & O'Reilly, 2000; Test, Howell, Burkhart, & Beroth, 1993.) It is possible that these skills could be taught to students with disabilities during community-based instruction. A second limitation to the current review was only studies in which participants were affiliated with a school were included. For example, Arnold-Reid, Schloss, and Alper (1997) included 3 high school aged participants who lived in a group home. The study was conducted in the group home and therefore was not included in the current review. Finally, studies included in this review only dated back 15 years. This date was selected since it was the first time that federal law mandated transition services to be included on IEPs.

Implications for Future Research

The purpose of this review was to determine the extent of research using community-based instruction across grade levels. The majority of the studies (n = 14) were conducted at the

high school level, while eight studies were at the middle school level, and six studies were at the elementary school level. These results indicate a need for additional research with students in the primary and middle grades. Additionally, students with mental retardation were most common in terms of disability category (87.0%) across the studies included in this review. Therefore, there is a need for CBI studies in which participants with other disabilities are included. Finally, of the 23 studies, 10 taught skills in the daily living domain, 8 in the community domain, 4 in the vocational domain, and 2 in the recreation domain area. The large number of studies in the daily living domain demonstrates a need for more research in the vocational, community, and recreation domain areas in a community setting.

In addition, results showed that slightly more than half (52.2%) of the studies collected generalization data. In order to help facilitate students learning and increase their ability to use their skills in different settings, with different people, or with different items, students should be taught these skills in the community and generalization probes should be administered to determine their ability to draw from their newly acquired skills. Finally, since less than half (48%) of the studies collected maintenance data, it would be beneficial if future researchers included maintenance data in their studies. Particularly, as functional life skills are intended to help students gain the skills needed to help them become independent adults, students who have these skills are likely to be more successful in the real world.

Implications for Practice

The findings of this review offer practitioners many ideas for teaching functional skills in the natural environment and in providing additional simulated instruction across the vocational, daily living, community, and recreation domain areas. Furthermore, skills may be taught to students ranging in age from childhood to adulthood. Specifically, more teachers can teach elementary-aged students skills in the community. For example, teachers can teach social skills to elementary age students in recreational settings such as on the playground during recess. There also appears to be a need for practitioners at the middle school level to teach job skills. Further, research suggests that practitioners at the elementary, middle, and high school levels teach safety skills.

Results of this literature review show that of the 23 studies included in this review, 15 (65.2%) were published before the passage of No Child Left Behind (NCLB) in 2001. The result of this mandate has encouraged more students with disabilities to access the general curriculum. According to Wagner, Newman, and Cameto (2004), NLTS2 data showed 21 percentage point decrease in the number of students with disabilities taking courses in the special education setting. Because of the importance of students with disabilities accessing the general curriculum, students may not be taught functional skills which have been documented in the literature as leading to postschool success (Spooner, Dymond, Smith, & Kennedy, 2006). Additionally, teachers may face challenges such as a lack of (a) community resources to design these experiences, (b) administrative support, or (c) manpower to provide instruction. Therefore, teachers may need to refer to literature reviews such as this one for examples of previous researchers who have used evidence-based strategies to effectively conduct community based instruction. It is also important to note that although the purpose of this literature review was to identify the skills taught in the community across grade levels, practitioners may teach pre-requisite skills in the classroom prior to teaching the intended skill in the community. For example, if a teacher wanted to teach purchasing skills to a student that is unfamiliar with the value of coins he/she may teach the student the values of each coin in the classroom prior to teaching purchasing an item in the community. These and other techniques will help facilitate students' acquisition of skills and knowledge that are essential to their success after high school.

References

(References marked with an "*" were included in the literature review)

Agran, M., Snow, K., & Swaner, J. (1999). A survey of secondary level teachers' opinions on communi-

ty-based instruction and inclusive education. *The Journal of the Association for Persons with Severe Handicaps, 24*, 58–62.

*Alberto, P. A., Cihak, D. F., & Gama, R. I. (2005). Use of static picture prompts versus video modeling during simulation instruction. *Research in Developmental Disabilities, 26*, 327–339.

Alwell, M., & Cobb, B. (2006). A map of the intervention literature in secondary special education transition. *Career Development for Exceptional Individuals, 29*, 3–27.

Arnold-Reid, G. S., Schloss, P. J., & Alper, S. (1997). Teaching meal planning to youth with mental retardation in natural settings. *Remedial and Special Education, 18*, 166–173.

Baer, R. M., Flexer, R. W., Beck, S., Amstutz, N., Hoffman, L., & Brothers, J., et al. (2003). A collaborative follow up study on transition service utilization and post-school outcomes. *Career Development for Exceptional Individuals, 26*, 7–25.

*Bates, P. E., Cuvo, T., Miner, C. A., & Korabek, C. A. (2001). A simulated and community-based instruction involving persons with mild and moderate mental retardation. *Research in Developmental Disabilities, 22*, 95–115.

Beakley, B. A., & Yoder, S. L. (1998). Middle schoolers learn community skills. *Teaching Exceptional Children, 30*, 16–21.

*Berg, W. K., Wacker, D. P., Ebbers, B., Wiggins, B., Fowler, M., & Wilkes, P. (1995). A demonstration of generalization of performance across settings, materials, and motor responses for students with profound mental retardation. *Behavior Modification, 19*, 119–143.

Blackorby, J., & Wagner, M. (1996). Longitudinal postschool outcomes of youth with disabilities: Findings from the National Longitudinal Transition Study. *Exceptional Children, 62*, 399–413.

*Branham, R. S., Collins, B. C., Schuster, J. W., & Kleinert, H. (1999). Teaching community skills to students with moderate disabilities: Comparing combined techniques of classroom simulation, videotape modeling, and community-based instruction. *Education and Training in Mental Retardation and Developmental Disabilities, 34*, 170–181.

Brolin, D. E., & Gysbers, N. C. (1989). Career education for students with disabilities. *Journal of Counseling and Development, 68*, 155–159.

Browder, D. M., & Grasso, E. (1999). Teaching money skills to individuals with mental retardation: A research review with practical applications. *Remedial and Special Education, 20*, 297–308.

Brown, P. (2000). Linking transition services to student outcomes for students with moderate/severe mental retardation. *Career Development for Exceptional Individuals, 23*, 39–55.

Burcroff, T. L., Radogna, D. M., & Wright, E. H. (2003). Community forays: Addressing students' functional skills in inclusive settings. *Teaching Exceptional Children, 35*, 52–57.

*Cihak, D. F., Alberto, P. A., Kessler, K. B., & Taber, T. A. (2004). An investigation of instructional scheduling arrangements for community-based instruction. *Research in Developmental Disabilities, 25*, 67–88.

*Cihak, D., Alberto, P. A., Taber-Doughty, T., & Gama, R. I. (2006). A comparison of static picture prompting and video prompting simulation strategies using group instructional procedures. *Focus on Autism and Other Developmental Disabilities, 21*, 89–99.

*Collins, B. C., Stinson, D. M., & Land, L. (1993). A comparison of in vivo and simulation prior to in vivo instruction in teaching generalized safety skills. *Education and Training in Mental Retardation, 28*, 128–142.

Cummings, R., Maddox, C. B., & Casey, J. (2000). Individualized transition planning for students with learning disabilities. *The Career Development Quarterly, 49*, 60–72.

*Cuvo, A. J., & Klatt, K. P. (1992). Effects of community-based, videotape, and flash card instruction of community-referenced sight words on students with mental retardation. *Journal of Applied Behavior Analysis, 25*, 499–512.

*Davis, C. A., Brady, M. P., Williams, W. E., & Burta, M. (1992). The effects of self-operated auditory prompting tapes on the performance fluency of persons with severe mental retardation. *Education and Treatment in Mental Retardation, 27*, 39–50.

deFur, S. H. (2003). IEP transition planning –From compliance to quality. *Exceptionality, 11*, 115–128.

*Domaracki, J. W., & Lyon, S. R. (1992). A comparative analysis of general case simulation instruction and naturalistic instruction. *Research in Developmental Disabilities, 13*, 363–379.

Fabian, E. S., Lent, R. W., & Willis, S. P. (1998). Predicting work transition outcomes for students with disabilities: Implications for counselors. *Journal of Counseling and Development, 76*, 311–316.

*Ferguson, B., & McDonnell, J. (1991). A comparison of serial and concurrent sequencing strategies in teaching generalized grocery item location to students with moderate handicaps. *Education and Training in Mental Retardation, 26*, 292–304.

Frederick-Dugan, A., Test, D. W., & Varn, L. (1991). Acquisition and generalization of purchasing skills using a calculator by students who are mentally retarded. *Education and Training in Mental Retardation, 26*, 381–387.

Gaylord, V., & Hayden, M. (1998). A decade later: Employment, residential, and social changes in the lives of adults and young adults with moderate and severe disabilities. *Policy Research Brief, 9*(2), 2–12.

Individuals with Disabilities Education Act of 1990, P.L. 101–476, 20 U.S.C. §1400 et seq.

*Hall, M. G., Schuster, J. W., Wolery, M., Gast, D. L., & Doyle, P. M. (1992). Teaching chained skills in a non-school setting using a divided half instructional format. *Journal of Behavioral Education*, *2*, 257–279.

Hamill, L. B. (2002). Teaching students with moderate to severe disabilities: An applied approach for inclusive environments. Upper Saddle River, NJ: Merrill Prentice Hall.

*Haring, T. G., Breen, C. G., Weiner, J., Kennedy, C. H., & Bednersh, F. (1995). Using videotape modeling to facilitate generalized purchasing skills. *Journal of Behavioral Education*, *5*, 29–53.

Heal, L. W., & Rusch, F. R. (1995). Predicting employment for students who leave special education high school programs. *Exceptional Children*, *61*, 472–488.

Hutcherson, K., Langone, J., Ayres, K., & Clees, T. (2004). Computer assisted instruction to teach item selection in grocery stores: An assessment of acquisition and generalization. *Journal of Special Education Technology*, *19*(4), 33–42.

Keller, T. E., Bost, N. S., Lock, E. D., & Marcenko, M. O. (2005). Factors associated with participation of children with mental health problems in structured youth development programs. *Journal of Emotional and Behavioral Disorders*, *13*, 141–151.

Kluth, P. (2000). Community-referenced learning and the inclusive classroom. *Remedial and Special Education*, *21*, 19–26.

Kohler, P. D. (1993). Best practices in transition: Substantiated or implied? *Career Development for Exceptional Individuals*, *16*, 107–121.

Lancioni, G. E., & O' Reilly, M. F. (2002). Teaching food preparation skills to people with intellectual disabilities: a literature overview. *Journal of Applied Research in Intellectual Disabilities*, *15*, 236–253.

*Morse, T. E., & Schuster, J. W. (2000). Teaching elementary students with moderate intellectual disabilities how to shop for groceries. *Exceptional Children*, *66*, 273–288.

*Murzynski, N. T., & Bourret, J. C. (2006). Combining video modeling and least-to-most prompting for establishing response chains. *Behavioral Interventions*, *22*, 147–152.

Neubert, D. A. (2003). The role of assessment in the transition to adult life process for students with disabilities. *Exceptionality*, *11*, 63–75.

*Pattavina, S., Bergstrom, T., Marchand-Martella, N. E., & Martella, R. C. (1992). "Moving on": Learning to cross streets independently. *Teaching Exceptional Children*, *25*(1), 32–35.

Phelps, L. A., & Hanley-Maxwell, C. (1997). School-to-work transitions for youth with disabilities: A review of outcomes and practices. *Review of Educational Research, 67*, 197–226.

Phillips, J. F., Reid, D. H., Korabek, C. A., & Hursh, D. E. (1988). Community-based instruction with profoundly mentally retarded persons: Client and public responsiveness. *Research in Developmental Disabilities*, *9*, 3–21.

Rabren, K., Dunn, C., & Chambers, D. (2002). Predictors of post-high school employment among young adults with disabilities. *Career Development for Exceptional Individuals*, *25*, 25–40.

Repetto, J. B., Webb, K. W., Garvan, C. W., & Washington, T. (2002). Connecting student outcomes with transition practices in Florida. *Career Development for Exceptional Individuals*, *25*, 123–139.

Rynders, J. E., Schleien, S. J., & Mustonen, T. (1990). Integrating children with severe disabilities for intensified outdoor education: Focus on feasibility. *Mental Retardation*, *28*, 7–14.

Sample, P. L. (1998). Postschool outcomes for students with significant emotional disturbance following best-practice transition services. *Behavioral Disorders*, *23*, 231–242.

*Schloss, P. J., Alper, S., Young, H., Arnold-Reid, G., Aylward, M., & Dudenhoeffer, S. (1995). Acquisition of functional sight words in community-based recreation settings. *The Journal of Special Education*, *29*, 84–96.

Sitlington, P. L., Frank, A. R., & Carson, R. (1992). Adult adjustment among high school graduates with mild disabilities. *Exceptional Children*, *59*, 221–234.

*Souza, G., & Kennedy, C. H. (2003). Facilitating social interactions in the community for a transition-age student with severe disabilities. *Journal of Positive Behavior Interventions*, *5*, 179–182.

Spooner, F., Dymond, S. K., Smith, A., & Kennedy, C. H. (2006). What we know and need to know about accessing the general curriculum for students with significant disabilities. *Research & Practice for Persons with Severe Disabilities*, *31*, 277–283.

*Taber, T. A., Alberto, P. A., Hughes, M., & Seltzer, A. (2002). A strategy for students with moderate disabilities when lost in the community. *Research and Practice for Persons with Severe Disabilities*, *27*, 141–152.

*Taber, T. A., Alberto, P. A., Seltzer, A., & Hughes, M. (2003). Obtaining assistance when lost in the community using cell phones. *Research and Practice for Persons with Severe Disabilities*, *28*, 105–116.

Taylor, I., & O'Reilly, M. F. (2000). Generalization of supermarket shopping skills for individuals with mild intellectual disabilities using stimulus equivalence training. *The Psychological Record*, *50*, 49–62.

Test, D. W., Howell, A., Burkhart, K., & Beroth, T. (1993). The one-more-than technique as a strategy for counting money for individuals with moderate mental retardation. *Education and Training in Mental Retardation*, *28*, 232–241.

*Vandercook, T. (1991). Leisure instruction outcomes: Criterion performance, positive interactions, and acceptance by typical high school peers. *The Journal of Special Education*, *25*, 320–339.

Wagner, M., & Blackorby, J. (1996). Transition from high school to work or college: How special education students fare. *The Future of Children*, *6*(1), 103–120.

Wagner, M., Newman, L., & Cameto, R. (2004). *Changes over time in the secondary school experiences of students with disabilities: A report of findings from the National Longitudinal Transition Study (NLTS2).* Retrieved January 16, 2008 from http://www.nlts2.org/reports/2004_04/nlts2_report_2004_04_ch3.pdf

Wagner, M., Newman, L., Cameto, R., & Levine, P. (2005). *Changes over time in the early postschool outcomes of youth with disabilities: A report of findings from the National Longitudinal Transition Study (NLTS) and the National Longitudinal Transition Study-2 (NLTS2).* Retrieved September 12, 2005 from http://www.nlts2.org/pdfs/str6_completereport.pdf

Wehman, P. (1990). School-to-Work: Elements of successful programs. *Teaching Exceptional Children*, *23*(1), 40–43.

*Westling, D. L., Floyd, J., & Carr, D. (1990). Effect of single setting versus multiple setting training on learning to shop in a department store. *American Journal on Mental Retardation*, *94*, 616–624.

Xin, P. X., Grasso, E., Dipipi-Hoy, C. M., & Jitendra, A. (2005). The effects of a purchasing skill instruction for individuals with developmental disabilities: A meta-analysis. *Exceptional Children, 71*, 379–400.

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Review of Teacher Involvement in the Applied Intervention Research for Children with Autism Spectrum Disorders

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Abstract: This review examined the involvement of teachers in the intervention research for children with autism spectrum disorders (ASD) from 1996 through February 2008. Forty-nine studies involving teachers of children with ASD were coded for different types of involvement. Findings are discussed in regards to three issues: (a) the manner in which teachers have been involved in autism research, (b) how teachers were trained to implement research based practices, and (c) teachers' perceptions of interventions (i.e. social validity). Results showed that teachers have been included in a variety of meaningful ways in recent research. However, our review also highlights the need for additional research regarding teachers' perceptions and training teachers to effectively implement research-based interventions.

The number of public school children diagnosed with Autism Spectrum Disorders (ASD) increased by 600% between 1994 and 2004 (U.S. Department of Education, 2006). Children with ASD often experience delays in social and communication skills, struggle with basic self-help skills, and engage in challenging behavior. Specialized instructional strategies and behavioral interventions are often required to address these issues (National Research Council, 2001). The increasing numbers of children with ASD enrolled in school, the deficits and behaviors associated with these disorders, and the variety and complexity of the interventions that are often required to educate these children, present unique challenges to teachers.

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Ensuring children with ASD receive an effective education will depend, in part, on the extent to which educators are supported to implement evidence-based assessment and interventions in classroom settings (Matson, 2008; Odom, et al., 2005). Indeed, the reauthorization of The Individuals with Disabilities Education Act (IDEA, 2004) and The No Child Left Behind Act of 2001 (P.L. 107-110, Section 1001) require that schools implement research-based practices and the responsibility to implement these practices often rests with the classroom teacher. Despite this expectation, teachers often receive little formal instruction regarding the evaluation and implementation of researched-based practices (National Research Council, 2001). Additionally, teachers may be reluctant to change cur-

rent practices within their classrooms and are often skeptical concerning practices deemed "research based" (Ayres, Meyer, Erevelles & Park-Lee, 1994; Boardman et al., 2005).

Boardman and colleagues (2005) conducted focus groups with 49 special education teachers to examine the teachers' perceptions concerning research based interventions. Findings in this study suggested that teachers may not consider whether an intervention is "research based" as an important criteria when selecting an intervention. Instead, teachers chose interventions based on feasibility within their classroom, personally held beliefs concerning education, and perceived appropriateness for their students. For example, teachers are not likely to implement a behavior plan that relies on providing tangible rewards if they believe such a system to be "bribery" or the process to be too time consuming for the classroom schedule. Additionally, if an intervention procedure does not fit well with the current practices and expectations of the classroom, the intervention is often adapted by the teacher without consultation from the researcher (Inerney & Hamilton, 2007). This adaptation may be inappropriate and potentially detracts from the effectiveness of an intervention (Fullan & Miles, 1992). Given the importance of teacher related variables in the successful adoption, implementation, and maintenance of research based interventions, it seems necessary to include teacher related variables in research.

The purpose of this review was to examine how teachers and teaching assistants have been involved in school-based research for children with ASD. This review addresses three questions: (a) how have teachers been involved in research and what is the value of different types of involvement, (b) how were teachers trained to implement interventions, and (c) what were the teachers' perceptions of the interventions (i.e., social validity) and how has that been measured. Considering the legal requirements regarding research-based interventions and the importance of teacher-related variables in the adoption of research-based interventions, a review of this type would seem timely as it may inform future research aimed at facilitating the use of evidence-based practices by teachers of students with ASD.

Method

Selection Criteria and Search Procedures

We completed systematic computerized literature searches on ERIC and PsycINFO to identify research studies that were conducted in school settings and that involved students with ASD and teachers. The search was focused in intervention studies published between 1996 and February 2008. A combination of the following keywords was entered into the keywords field: *autism, Asperger's syndrome, autism spectrum disorder, school, teacher, classroom, treatment,* and *intervention.* This search was further limited to studies published in English and appearing in peer-reviewed journals. The reference lists from the resulting studies were then hand searched for additional relevant studies.

Studies were included in this review if they met the following criteria. (a) Participants were diagnosed with an ASD and were enrolled in grades K-12; (b) the study was conducted in a school setting and, (c) teacher involvement was described. Teachers were considered to be involved if they helped design or implement the intervention, collected data and/or provided data on social validity or treatment fidelity.

Studies in which teachers were involved only in some element of assessment (e.g., Akshoomoff, 2006) were excluded. Additionally, studies in which teacher involvement was unclear were excluded. For example, Sansosti and Smith (2006) referred to "caregivers" and this study was therefore excluded because it was unclear if these caregivers were also teachers. Finally, a study was excluded if the teacher only provided information regarding a student, but was not otherwise involved. The 49 studies meeting these inclusion criteria are listed in Table 1.

Coding and Summary of the Studies

All of the 49 studies were coded using a coding sheet designed specifically for this study (available upon request). Every article was read in its entirety and pertinent information was extracted and recorded onto the data sheet. For each included study, we analyzed teacher involvement into three general stages.

TABLE 1

Teacher Involvement in Research Conducted with Children Diagnosed with ASD ("X" = Involvement in the Corresponding Category)

	Planning Stage				*Intervention Stage*		*Evaluation Stage*	
Citation	*Select Particpants*	*Identify Target Behavior*	*Identify Treatment Goal*	*Input into Intervention*	*Implemented*	*Data Collection*	*Teacher Behavior as Outcome Measure*	*Social Validity*
Adams et al., 2004								X
Agosta et al., 2004	X	X	X	X	X	X		
Agran et al., 2002					X	X		X
Ahearn et al, 2007	X				X			
Banda et al., 2007	X							
Barry & Burlew, 2004					X	X		
Bock, 1999					X			
Bock, 2007				X	X	X		X
Braithwaite & Richdale, 2000		X	X					
Brown & Mirenda, 2006					X			X
Bryan & Gast, 2000					X	X		X
Buggey, 2005		X	X					
Cicero & Pfadt, 2002	X				X			
Coleman-Martin et al., 2005					X			X
Conroy et al., 2005		X			X			
Delano & Snell, 2006		X		X				X
Dib & Sturmey, 2007	X				X		X	
Durand, 1999		X			X			
Dyches, 1998					X	X		
Garrison-Harrell & Kamps, 1997		X						
Grindle & Remington, 2004					X			
Hagiwara & Myles, 1999		X				X		
Heckaman et al., 1998	X							
Hirsch & Myles, 1996		X			X	X		
Johnson et al., 2004					X			X
Kay et al., 2006					X	X		
Laushey & Heflin, 2000		X			X			X
Luiselli, 1996					X			
Malandrak & Okalidou, 2007					X			
Mancina et al., 2000					X			
Mechling, Gast, & Cronin, 2006					X			
O'Reilly et al., 2005					X			X
Peterson et al., 2001		X			X			
Pestursdottir et al., 2007	X				X			X
Polychronis et al., 2004					X	X		X
Reynhout & Carter, 2007	X	X		X	X			X
Ricciardi et al., 2003					X	X		
Riesen et al., 2003		X			X			
Scattone et al., 2002					X			X

TABLE 1—*(Continued)*

Citation	*Planning Stage*				*Intervention Stage*		*Evaluation Stage*	
	Select Particpants	*Identify Target Behavior*	*Identify Treatment Goal*	*Input into Intervention*	*Implemented*	*Data Collection*	*Teacher Behavior as Outcome Measure*	*Social Validity*
Scattone et al., 2006				X	X			X
Schepis et al., 1998				X	X			X
Schmit et al., 2000					X			X
Simpson et al., 2004		X			X			
Smith & Camarata, 1999					X		X	X
Taber et al., 2000					X		X	
Thiemann & Goldstein, 2001	X							X
Thiemann & Goldstein, 2004					X			X
Tincani, 2004								X

The first, Planning Stage, included involvement prior to the implementation of the intervention procedures. The second, Intervention Stage, included involvement with respect to implementation of the intervention procedures. The third, Evaluation Stage, included involvement following the onset of intervention (e.g., providing social validity data).

Studies were also analyzed to identify those that included measures of social validity. Social validity measures were analyzed and classified in terms of (a) assessment method (i.e., how the social validity data were collected, (b) effectiveness (i.e., how well the teachers perceived the intervention to work), (c) intrusiveness (i.e., the teachers' perception of how feasible the intervention was within the context of their classroom), (d) appropriateness (i.e., teachers' perception of the intervention's suitability for the participating students), and (e) ease of implementation (i.e., how difficult or complicated it was for the teachers to implement the intervention procedures). Studies were analyzed to reflect how the authors of the reviewed studies reported their results. For example, if the authors said, "teachers reported the intervention to be effective but complicated to implement" then the results were classified as effective, but not easy to implement. In some of the 49 studies, social validity data were collected using a numerical rating scale. However, because the numerical results of those scales were always interpreted into written descriptions by the study authors, we used their narrative summary in our coding the results. This was necessary because many different scales were used across studies; the table reports the written descriptions instead of the numerical ratings (e.g., Bryan & Gast, 2000).

The 49 studies were also analyzed in terms of the amount and type of teacher training and extent to which treatment fidelity was assessed. The studies that reported how teachers were trained were coded to identify the methods that were used in training the teachers to implement the intervention. In some instances training was said to have occurred, but no description of the training was given (e.g. Bock, 2007). These cases are not coded on the training variable. Treatment Fidelity was coded in reference to to the extent to which the intervention is implemented or carried out as planned (Cooper, Heron & Heward, 1987). As with social validity data, the descriptions used by the study authors were used in coding the results. For some studies, this meant that a percent of correct implementation was available, but in other studies a verbal description was given in place of a percentage (e.g., Laushey & Heflin, 2000).

Reliability of study coding was assess by col-

lecting Inter-coder agreement data on 64% (n = 34) of the studies. For this, a second independent reader extracted data from the study and compared the results to the original coding noting instances of agreement and disagreement. Inter-coder agreement ranged from 80 to 100% with an overall mean of 98% ranging from (80-100%). All disagreements between the two independent coders were settled by a joint recoding the article to reach consensus.

Results

How have Teachers been Involved at Different Stages of Research?

Table 1 indicated the type of teacher involvement for each of the three possible stages. Teachers were involved at the Planning Stage in 25 studies. Their involvement at this stage included selecting participants, identifying target behaviors, identifying treatment goals, and providing input into the selection or design of the intervention. Specifically, in nine studies the teachers provided input into the selection of participants (Agosta, Graetz, Mastropieri, & Scruggs, 2004; Ahearn, Clark, McDonald, & Chung, 2007; Banda, McAfee, Lee, & Richard, 2007; Cicero & Pfadt, 2002; Dib & Sturmey, 2007; Heckaman, Alber, Hooper, Howard, 1998; Pestursdottir, McComas, & McMaster, 2007; Reynhout, & Carter, 2007; Thiemann & Goldstein, 2001). In 15 studies teachers were involved in selecting target behaviors for intervention (e.g. Braithwaite & Richdale, 2000; Buggey, 2005; Conroy et al., 2005; Durand et al., 1999). In three studies teachers helped to decide how much the target behavior should increase or decrease (referred to as "Identify Treatment Goal" within Table 1; Agosta et al., 2004; Braithwaite & Richdale, 2000; Buggey, 2005). Finally, in six studies teachers were involved in the selection or design of the intervention (Agosta et al., 2004; Bock, 2007; Delano & Snell, 2006; Reynhout & Carter, 2007; Scattone, Tingstrom, & Wilczynski, 2006; Schepis, Reid, Behrmann, & Sutton, 1998).

In these 49 studies, as indicated in Table 1, teachers were most commonly involved at the Intervention Stage. Their involvement at this stage included implementing the intervention procedures (n = 38 studies) and/or collecting data on the dependent variables (n = 11 studies).

A variety of interventions were implemented by teachers. The most common interventions implemented by teachers could be described as involving the following techniques: (a) embedded instruction (Johnson et al., 2004; Polychronis et al., 2004; Riesen et al., 2003; Simpson et al., 2004), (b) social stories (Agosta et al., 2004; Barry & Burlew, 2004; Bock, 2007; Reynhout & Carter, 2007; Scattone et al., 2002; Scattone, Tingstrom, & Wilczynski, 2006; Thieman & Goldstein, 2004), and (c) activity or picture schedule interventions (Bryan & Gast, 2000; O'Reilly et al., 2005; Schmit et al., 2000). The majority of studies where the teachers implemented the intervention (n = 34) had positive results with mixed results in the remaining four studies (i.e., in some participants in the study showed improvement, but others did not (Conroy et al., 2005; Scattone et al., 2004; Scattone et al., 2006; Thiemann & Goldstein, 2004).

Teachers were involved at the Evaluation Stage in 23 studies. Specifically, a teacher behavior was selected as a dependent variable in three studies (Dib & Sturmey, 2007; Smith & Camarata; Taber, Seltzer, Heflin, & Alberto, 2000) or as a source of social validity data in 21 studies (e.g., Adams, Gouvousis, VanLue, & Waldron, 2004).

How have Teachers been Trained to Implement Interventions within Research?

Training to implement intervention procedures was described in 17 studies and treatment fidelity reported in 13 studies (Table 2). The following training procedures were reported: (a) review of videotapes, (b) modeling from researcher, (c) role playing of intervention procedures, (d) in vivo feedback or coaching, (e) script training, (f) training manuals, (g) verbal explanations, (h) procedural checklists, and (i) attendance at instructional workshops. Of the 17 studies that listed training procedures the level of detail in the description of the training procedures varied. For example, only five studies reported the duration of training (Agran et al., 2002; Durrand et al., 1999; Johnson et al., 2004; Mancina et al., 2000; Polychronis et al., 2004).

TABLE 2

Teacher Training (NR = Not Reported)

Citation	*Training Method*	*Treatment Fidelity*
Ahearn et al, 2007	video tapes and written instructions	NR
Bock, 2007	NR	98% to 100% of procedural checklist
Bock, 1999	Procedural Checklist	NR
Brown & Mirenda, 2006	Procedural checklist, roleplay with feedback followed by on-going review of video tapes	NR
Bryan & Gast, 2000	Verbal explanation	80% correct of procedural checklist
Cicero & Pfadt, 2002	Training manual, roleplay, and on-going feedback	NR
Heckaman et al., 1998	NR	97% to 100% correct of procedural checklist
Conroy et al., 2005	Observation of researcher and then on-going feedback	NR
Dib & Sturmey, 2007	Verbal instructions, feedback, rehersal, modeling	For 3 teachers 100% correct
Durand, 1999	18 hours of workshops over a 3 day period	For 5 teachers, 88%, 71%, 93%, 100%, 79% correct
Dyches, 1998	researcher delivered instruction and roleplay	NR
Johnson et al., 2004	2 sessions 30 min each with scripts, roleplay, and modeling by researcher	90% to 100% of a proceudral checklist
Kay et al., 2006	NR	98% correct of a procedural checklist
Laushey & Heflin, 2000	On-going feedback	Researcher inspected the intervention materials to determined IV was being correctly implemented
Malandrak & Okalidou, 2007	3 sessions for 30 minutes each of direct instruction, video tape reviews, on-site observation, on-going feedback and supervision	NR
Mancina et al., 2000	Video examples, modeling from researcher and feedback given for 5 days	NR
Pestursdottir et al., 2007	NR	89% to 93% of procedural checklist
Polychronis et al., 2004	30 min session with modeling and roleplay with feedback until 100% correct in roleplay	92% to 100% correct of a procedural checklist
Reynhout & Carter, 2007	Instructional videotapes and workbook	NR
Riesen et al., 2003	Script, modeling from researcher, and roleplay with feedback until 100% correct	99% to 100% correct of a procedural checklist
Scattone et al., 2006	Modeling from researcher and roleplay until 100% correct	86% to 100% correct of a procedural checklist
Scattone et al., 2002	NR	91% to 100% correct of a procedural checklist
Smith & Camarata, 1999	Video tapes and discussion	NR

What are Teachers' Perceptions of Interventions within Research?

Twenty studies collected social validity data in a variety of ways (Table 3). Five studies used anecdotal methods; 10 used some form of a rating scale, and 3 created teacher focus groups to discuss acceptability and effectiveness. However, regardless of the methodology used, all of the studies that reported social validity reported positive results in that the teachers described interventions as easy, effective, favorable, useful, and/or acceptable. The one exception was Tincani (2004), who found that the participating teachers did not indicate a preference between different AAC devices.

Rating scales were the most common methodology to assess social validity. This method was used in 11 studies (Brown & Mirenda, 2000; Bryan & Gast, 2000; Coleman & Martin, 2005; Johnson, 2004; Pestursdottir, McComas, & McMaster, 2007; Polychronis, 2004; Scattone et al., 2006, Scattone et al., 2002, Schepis et al., 1998, Smith & Camarata, 1999, Thieman & Goldstien, 2004). Anecdotal data was collected in eight studies (Adams et al., 2004; Agran et al., 2002; Bock, 2007; Kay et al., 2006; O'Reilly et al., 2005; Pestursdottir, McComas, & McMaster, 2007; Schmit et al., 2000; Tincani, 2004). Anecdotal data was collected both verbally (e.g., Adams et al., 2004) and in written questionnaires (e.g., Tincani, 2004). Focus groups or panel discussions were held in theee studies (Delano & Snell, 2006, Laushey & Heflin, 2000, Thiemann & Goldstein, 2001).

Twelve studies reported maintenance data ranging from 10 days to 1 year from the end of the study (Agran et al., 2002; Bock, 1999; Brown & Mirenda, 2006; Cicero & Pfadt, 2002; Laushey & Heflin, 2000; Luiselli, 1996; O'Reilly et al., 2005; Peterson et al., 2001; Ricciardi et al., 2003; Schmit et al., 2000; Thiemann & Goldstein 2001; Thiemann & Goldstein, 2004). All studies that reported maintenance had positive results demonstrating the continued use and sustained effects of the intervention.

Discussion

The purpose of this review was to examine the ways in which teachers have been involved with the intervention research for children with ASD. While this review examined teacher involvement, the purpose of the studies being reviewed was not necessarily to address issues related to teacher involvement. Instead, the studies reviewed focused on determining the possible effectiveness of certain interventions. However, in some cases, this research also provided preliminary information concerning teachers' ability and willingness to implement certain interventions.

Teacher Involvement in the Planning Stage

A considerable amount of planning occurs before intervention research is conducted. While teacher involvement in some elements of this process may not be feasible or useful (e.g., preparing documents for the Internal Review Board), involvement in decisions that are commonly made by teachers within a normal school environment, outside of a research project, may be valuable (e.g. selecting intervention components & defining target behaviors). Encouraging teachers to participate in research by actively involving them prior to the intervention has several possible benefits.

First, allowing teachers to select participants and/or the behaviors targeted for intervention may increase the likelihood that the research will be addressing a socially significant applied problem by helping to ensure that the intervention is evaluated within the context of the students and behaviors that are actual classroom concerns. Second, incorporating feedback from teachers regarding the specifics of intervention procedures may decrease the likelihood that an intervention will be too cumbersome to fit within the preexisting demands of classroom. Third, interventions designed with these considerations are more likely to be maintained over time (Kennedy, 2002) and are less likely to be adapted by teachers in inappropriate ways (Inerney & Hamilton, 2007).

It is likely the case that some interventions require more planning and preparation prior to implementation than others. For example, many challenging behavior interventions require the completion of functional assessments (e.g. Durand, 1999; O'Reilly et al., 2005). These procedures can be complicated and often require some complex procedural

TABLE 3
***Social Validity* (NR = Not Reported)**

Citation	*Assessment Method*	*Effectiveness*	*Intrusiveness*	*Ease of Implementation*
Adams et al., 2004	Anecodtal Report	Excellent	NR	NR
Agran et al., 2002	Ancedotal reports from 3 teachers	"Considerable Improvements", "Produced Positive Results", "Noted Improvements"	NR	NR
Bock, 2007	Ancedotal reports from 3 teachers	"Highly effective"	NR	"Easy to implement" and "fairly easy to create"
Brown & Mirenda, 2006	6 item Likert scale questionnaire created by the researchers	Strongly agreed that contingency mapping was effective	Stongly agreed that intervention was acceptable for classroom	Strongly agreed that intervention was easy to implement
Bryan & Gast, 2000	7 item Likert scale questionnaire created by the researchers	"Useful management tool" of "benefit to all children"	"Feasible for classroom use"	NR
Coleman-Martin et al., 2005	Teachers completed the Teacher Report Questionaire from the Social Skills Rating System (Gresham & Elliot, 1990)	2 of 5 teachers reported significant improvement for 2 of 5 participants, nonsignifcant findings for other 3 teacher child dyads	NR	NR
Johnson et al., 2004	7 item Likert scale questionnaire created by the researchers	Rated as 6 on a scale of 1-7 with "7" as "excellent, very effective"	Rated 1 on a scale of 1-7 with "7" as "not disruptive to the classroom"	NR
Laushey & Heflin, 2000	Focus group of cumminty members that included teachers gave ancedotal reports	"benefical"	NR	"easy to use"
O'Reilly et al., 2005	Ancedotal report	NR	NR	"easy to implement"
Pestursdottir et al., 2007	14 item Likert Scale created by researchers	"effective"	"acceptable"	"simple"
Polychronis et al., 2004	6 item Likert scale questionnaire created by the researchers and anecdotal reports were requested	Rated 5.50 on a scale of 1 to "6" with 6 as very effective	Rated 5.75 on a scale of 1 to 6 with "6" as not disruptive to the class	Rated 5.75 on a scale of 1 to 6 with "6" as very easy
Reynhout & Carter, 2007	Intervention Rating Profile (IRP-15) Martiens, Witt, Elliot, & Darveaux, 1985)	On a scale from 15 to 90 were scores above 52.5 are considered acceptable the teacher scored a 76	On a scale from 15 to 90 were scores above 52.5 are considered acceptable the teacher scored a 76	On a scale from 15 to 90 were scores above 52.5 are considered acceptable the teacher scored a 76

TABLE 3—*(Continued)*

Continued

Citation	*Assessment Method*	*Effectiveness*	*Intrusiveness*	*Ease of Implementation*
Scattone et al., 2002	Intervention Rating Profile (IRP-15) Martiens, Witt, Elliot, & Darveaux, 1985)	On a scale from 15 to 90 were scores above 52.5 are considered acceptable three teachers scored "68", "70", and "78"	On a scale from 15 to 90 were scores above 52.5 are considered acceptable three teachers scored "68", "70", and "78"	On a scale from 15 to 90 were scores above 52.5 are considered acceptable three teachers scored "68", "70", and "78"
Scattone et al., 2006	Intervention Rating Profile (IRP-15) Martiens, Witt, Elliot, & Darveaux, 1985)	On a scale from 15 to 90 were scores above 52.5 are considered acceptable three teachers scored "55", "68", and "78"	On a scale from 15 to 90 were scores above 52.5 are considered acceptable three teachers scored "55", "68", and "78"	On a scale from 15 to 90 were scores above 52.5 are considered acceptable three teachers scored "55", "68", and "78"
Schepis et al., 1998	7 item Likert scale questionnaire created by the researchers	NR	"contextually appropriate"	NR
Schmit et al., 2000	NR	Meaningful positive change	NR	NR
Smith & Camarata, 1999	Modified Consumer Satisfaction Questionnaire that used 7 item Likert Scale and anecdotal reports	"greatly improved"	"practical" and "unobrtusive"	NR
Thiemann & Goldstein, 2001	5 item Likert Scale created by the researchers given to focus group containing 6 teachers	Teachers ratings of communication skills of participants prior to the stud was "not at all' to "much less than average" after intervention skills were rated as "somewhat less than average" "average"	NR	NR
Thiemann & Goldstein, 2004	5 item Likert scale questionnaire created by researchers	"Somewhat more effective than typical instruction"	"More efficient than typical instruction in the classroom"	"Very easy"
Tincani, 2004	Written questionnaire	"Varied depending on student characteristics"	"Feasible"	NR

adaptations in order to be appropriate for a particular individual and environment (Hanley, Iwata & McCord, 2003). If teachers are not included in this portion of the assessment process, even if adequate implementation of the procedures is demonstrated, it can not be assumed that a classroom teacher, without the support of an additional specialist, would be able to conduct the preparations needed prior to implementing the intervention.

Teacher Involvement in the Intervention Stage

The most common way teachers were involved in these studies was in the implementation of the intervention. The hypothesis that teachers will rate interventions as more acceptable if they themselves are involved in the implementation has been tested several times with conflicting results. For example, Algozzine and Ysseldyke (1982) reported survey results that suggested teachers favored interventions involving teacher implementation over those directed by someone else. However, more recent research suggests that the interventionist does not affect teacher ratings of acceptability (Carter, 2007). Regardless, because teachers are the primary intervention agents for the majority of educational and behavioral goals, the ability of teachers to implement a given classroom intervention is an important research question. Some interventions may be so complicated and time consuming that the expectation that a teacher, without extensive and specific training, could implement the intervention may not be reasonable. Therefore, studies that demonstrate a teacher's ability to accurately implement an intervention within the context of the classroom may provide useful precursory information regarding the feasibility of a particular intervention's future widespread adoption.

Despite these positive findings, caution should be exercised before interpreting that teachers were able to accurately and independently implement all of the intervention procedures. Because researchers were often present during the time of implementation, it is often not known how much support and feedback were given during the implementation. Feedback or coaching was specifically mentioned in four studies (Conroy et al., 2005; Brown & Mirenda, 2006; Laushey & Heflin, 2000; Cicero & Pfadt, 2002). Consequently, although teachers implemented the intervention, it is not known whether they would have been able to do so without the continued support of the researcher. Notable exceptions to this are when training is described and treatment fidelity is reported, which occurred in 13 of the 38 studies where teachers implemented the intervention.

Often the behaviors targeted for intervention are also goals on the child's Individualized Education Plan (e.g. Johnson et al., 2004). IDEA requires that teachers take data to demonstrate progress towards educational goals. Therefore, data collection is an integral part of the implementation of many interventions. Because data collection may often be time consuming and distracting for many teachers, it is an important aspect of the intervention to consider. In light of this IDEA requirement it is interesting that in the majority of these studies (n=38) data was collected by the researchers, not by the teacher implementers. This could be due to the desire not to distract teachers during implementation or the need to separate data collection to prevent potential bias. At any rate, additional research could be done to determine the acceptability and accuracy of different data collection procedures for use by teachers in the classroom.

Teacher Involvement in the Evaluation Stage

Teachers can be involved at this stage of research by providing some form of outcome data useful in evaluating the intervention. Using a teacher behavior (e.g., frequency of reprimands) as a dependent variable may contribute to the evaluation of an intervention's effectiveness. For example, Taber and colleagues (2000) measured the number of prompts the teacher needed to keep a student on task. This measure provided additional data suggesting that the intervention decreased student off-task behavior. Measuring teacher behavior may also help to highlight additional benefits or concerns of an intervention that may not be apparent in the behavior off the participating students. For example, if an intervention is found to be successful in decreasing problem behavior in one student, but at the cost of the teacher spending significantly less time with other students then the

intervention may be too time consuming for continued use in the classroom.

Multistage Involvement

The majority of studies (n = 31) involved teachers across more than one stage. This type of multistage involvement may have additional benefits. For example, a teacher who implements the intervention (Intervention Stage) and then provides social validity data (Evaluation Stage) may be providing more thoughtful and generalizable social validity data than a teacher who is not involved in the implementation.

Teacher Training

Of the17 studies that delineated procedures for training teachers to implement the intervention, we noted that details were often lacking as to the specifics of the training (e.g., duration). Because staff training is often an issue when implementing new practices in schools, it is important that researchers report the specifics of their training procedures, so that the logistics and costs of training can be better estimated. This information is also needed to facilitate replication and application of research-based interventions in applied settings. The amount of training required in order for teachers to be able to successful implement a procedure may influence the viability of that procedure in applied settings where training resources may be scarce.

Social Validity

The social validity data reported in these studies was generally very favorable in showing that the teachers generally considered these types of interventions to be easy, effective, favorable, useful, and/or acceptable. This finding suggests that the types of research-based interventions investigated in these studies are acceptable to teachers, which could be an important factor in the maintenance of the use of effective evidence-based procedures in the classroom. Along these lines it was interesting to note that the maintenance data collected in these studies was also generally favorable suggesting that the teachers did in fact continue to implement the procedures with lasting positive effects. Thus maintenance could be seen as another type of social validation (Kennedy, 2002).

However, it is important to note that many studies in this review included subjective measures of social validity and few studies incorporated normative data or utilized experimentally validated measures. Therefore, given the almost entirely positive findings of the reported measures, it is possible that such measures may have reduced meaning. An additional concern is the reliance on only a small number of teachers. Future research could focus on identifying more reliable and valid social validity assessments and on systematically assessing specific intervention components in different contexts (e.g. general education classroom versus special education) implemented by teachers of varying backgrounds and beliefs.

In summary, several conclusions might be made from this review. First, teachers have been included in a variety of meaningful ways in recent research. However, additional research in the areas of teacher training to implement research based interventions and teachers' perception of interventions is needed. Second, the current legal requirement to implement research based interventions suggest the need to further review the involvement of teachers in applied intervention research and the use of research-based practices. One way to help ensure that scientific based interventions are adopted in classroom practice might be to involve teachers in research that aims to develop new and more effective classroom interventions. These results of this review may provide some guidance to that end.

References

Akshoomoff, N. (2006). Use of the Mullen Scales of Early Learning for the assessment of young children with autism spectrum disorders. *Child Neuropsychology, 12*, 269–277.

Adams, L., Gouvousis, A., VanLue, M., & Waldron, C. (2004). Social story intervention: Improving communication skills in a child with an autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities, 19*, 87–94.

Agosta, E., Graetz, J. E., Mastropieri, M. A., & Scruggs, T. E. (2004). Teacher-researcher part-

nerships to improve social behavior through social stories. *Intervention in School and Clinic. 39*, 276–287.

Agran, M., Blanchard, C., Wehmeyer, M., & Hughes, C. (2002). Increasing the problem solving skills of students with developmental disabilities participating in general education. *Remedial and Special Education, 23*, 279–288.

Ahearn, W. H. Clark, K. M. McDonald, P. F., & Chung. B. I. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied behavior Analysis, 40*, 263–275.

Algozzine, B., Ysseldyke, J., Christenson, S., & Thurlow, M. (1982). Teachers' intervention choices for children exhibiting different behaviors in schools, *Institute for Research on Learning Disabilities, 76*, 1052–1093.

Apple, A .L., Billingsley, F., & Schwartz, I. S. (2005). Effects of video modeling alone and with self-management on compliment-giving behaviors of children with high-functioning ASD. *Journal of Positive Behavior Interventions, 7*, 33–46.

Ayres, B., Meyer, L., Erevelles, N., & Park-Lee, S. (1994). Easy for you to say: Teacher perspectives on implementing most promising practices. *Journal of the Association for Persons with Severe Handicaps, 19*, 84–93.

Banda, D. R., McAfee, J. K., Lee, D. L., & Richard, K. M. (2007). Math preference and mastery relationship in middle school students with autism spectrum disorders. *Journal of Behavioral Education, 16*, 207–223.

Barry, L. M., & Burlew, S. B. (2004). Using social stories to teach choice and play skills to children with autism. *Focus on Autism and Other Developmental Disabilities, 19*, 45–51.

Bildt, A., Sytema, S., & Kraijer, D. (2005). Adaptive functioning and behaviour problems in relation to stage of education in children and adolescents with intellectual disability. *Journal of Intellectual Disability, 49*, 572–681.

Boardman, A. G., Arguelles, M. E., Vaughn, S., Hughes, M. T., & Klingner, J. (2005). Special education teachers' views of researched based practices, *The Journal of Special Education, 39*, 168–180.

Bock, M. (2007). The impact of social-behavioral learning strategy training on the social interaction skills of four students with Asperger's Syndrome. *Focus on Autism and Other Developmental Disabilities, 22,* 88–95.

Bock, M. (1999). Sorting laundry: Categorization strategy application to an authentic learning activity by children with autism. *Focus on Autism and Other Developmental Disabilities, 14*, 220–230.

Browder, D., & Cooper-Duffy, K. (2003). Evidence-based practices for students with severe disabilities and the requirement for accountability in "No Child Left Behind". *The Journal of Special Education, 37*, 157–163.

Brown, K. E., & Mirenda, P. (2006). Use of a novel visual support strategy as an adjunct to functional communication training. *Journal of Positive Behavioral Interventions, 8*, 155–164.

Bryan, L. C., & Gast, D. L. (2000). Teaching on-task and on-schedule behaviors to high-functioning children with autism via picture activity schedules. *Journal of Autism and Developmental Disorders, 30*, 553–567.

Braithwaite, K. L., & Richdale, A. L. (2000) Functional communication training to replace challenging behaviors across two behavioral outcomes. *Behavioral Interventions, 15*, 21–36.

Buggey, T. (2005). Video self-modeling applications with students with autism spectrum disorder in a small private school setting. *Focus on Autism and Other Developmental Disabilities, 20*, 52–63.

Carter, S. L. (2007). Review of recent treatment acceptability research, *Education and Training in Developmental Disabilities, 42*, 301–316.

Cicero, F. R., & Pfadt, A. (2002). Investigation of a reinforcement-based toilet training procedure for children with autism. *Research in Developmental Disabilities, 23*, 319–331.

Coleman-Martin, M. B., Heller, K. W., Cihak, D. F., & Irvine, K. L. (2005). Using computer-assisted instruction and the nonverbal reading approach to teach word identification. *Focus on Autism and Other Developmental Disabilities, 20*, 80–90.

Conroy, M. A, Asmus, J. M., Sellers, J. A., & Crystal, L. N. (2005). The use of an antecedent-based intervention to decrease stereotypic behavior in a general education classroom: A case study. *Focus on Autism and other Developmental Disabilities, 20*, 223–230.

Cooper, J. O., Heron, T. E., & Heward, W. L. (1987). *Applied behavior analysis.* Prentice Hall: New Jersey.

Delano, M., & Snell, M. E. (2006). The effects of social stories on the social engagement of children with autism. *Journal of Positive Behavioral Interventions, 8*, 29–42.

Dib, N., & Sturmey, P. (2007). Reducing student stereotypy by improving teachers' implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 40*, 339–343.

Durand, M. V. (1999). Functional communication training using assistive devices: Recruiting natural communities of reinforcement. *Journal of Applied Behavior Analysis, 3,* 247–267.

Dyches, T. T. (1998). Effects of switch training on the communication of children with autism and severe disabilities. *Focus on Autism and Other Developmental Disabilities, 13*, 151–162.

Elliot, S. N., Witt, J. C., Galvin, G., & Peterson, R. (1984). Acceptability of positive and reductive

interventions: Factors that influence teachers' decisions. *Journal of School Psychology, 22*, 353–360.

Elliot, S. N., Witt, J. C., Kratochwill, T. R., & Stoiber, K. C. (2002) Selecting and evaluating interventions. In M. R. Shinn, H.M. Walker, & G. Stoner, *Interventions for academic and behavior problems II* (pp. 315–350). Washington, DC, US: National Association of School Psychologists.

Fox, L., & Hanline, M. F. (1993). A preliminary evaluation of learning within developmentally appropriate early childhood settings. *Topics in Early Childhood Special Education, 22*, 214–222.

Fullan, M. G., & Miles, M. B. (1992). Getting reform right: What works and what doesn't. *Phi Delta Kappan, 73*, 774–752.

Garrison-Harrell, L., & Kamps, D. (1997). The effects of peer networks on social-communicative behaviors for students with autism. *Focus on Autism and Other Developmental Disabilities, 12,* 241–255.

Giangrece, M. F., & Broer, S. M. (2007). School-based screening to determine overreliance on paraprofessionals. *Focus on Autism and Other Developmental Disabilities, 22*, 149–158.

Graff, R. B., & Green, G. (2004). Two methods for teaching simple visual discriminations to learners with severe disabilities. *Research in Developmental Disabilities, 25*, 295–307.

Gray, C. A. (1998). Social stories: Improving responses of students with autism with accurate social information. *Focus on Autistic Behavior, 8*(1), 1–10.

Graziano, A. M., & Raulin, M. L. (2004) Research Methods A Process of Inquiry (5th Ed.) Boston: Pearson Education Group.

Gresham, F., & Elliot, S. (1990). *Social Skills Rating System.* Circle Pines, MN: American Guidance Service.

Grindle, C. F., & Remington, B. R. (2004). Teaching children with autism using conditioned cue-value and response-marking procedures: A socially valid procedure. *Research in Developmental Disabilities, 25*, 413–429.

Hagiwara, T., & Myles, B.S. (1999). A multimedia social story intervention: Teaching skills to children with autism. *Focus on Autism and Other Developmental Disabilities, 14*, 82–95.

Hall, L. J., McClannahan, L. E., & Krantz, P. J. (1995). Promoting independence in integrated classrooms by teaching aides to use activity schedules and decreased prompts. *Education and Training in Mental Retardation, 30,* 208–217.

Hanley, G. P., Iwata, B. A., & McCord, B. E. (2003). Functional analysis of problem behavior: A review. *Journal of Applied Behavior Analysis, 36*, 147–185.

Hawkins, R. P. (1991). Is social validity what we are interested in? Argument for a functional approach. *Journal of Applied Behavior Analysis, 24*, 205–213.

Heckaman, K. A, Alber, S. A., Hooper, S., & Howard, W. L. (1998). A comparison of least-to-most prompts and progressive Time delay on the disruptive behavior of students with autism. *Journal of Behavioral Education, 8*, 171–201.

Hirsch, N., & Myles, B. S. (1996). The use of a pica box in reducing pica behavior in a student with autism. *Focus on Autism and Other Developmental Disabilities, 11*, 222–227.

House, E. (1981). Three perspectives on innovation: Technological, political, and cultural. In R. Lehming & M. Kane (Eds.). *Improving schools: Using what we know.* Beverly Hills, CA: Sage Publications.

Individuals with Disabilities Education Act of 2004, Pub. L. No. 108–446, § 101, 118 Stat. 2647 (2004).

Johnson, J. W, McDonnell, J., Holzwarth, V.N, & Hunter, K. (2004). The efficacy of embedded instruction for students with developmental disabilities enrolled in general education classes. *Journal of Positive Behavior Interventions, 6*, 214–227.

Kanner, L. (1943), Autistic disturbances of affective contact. *Nervous Child 2,* 217–250.

Kazdin, A. E. (1977). Assessing the clinical or applied significance of behavior change through social validation. *Behavior Modification, 1*, 427–452.

Kay, S., Harchik, A. E., & Luiselli, J. K. (2006). Elimination of drooling by an adolescent student with autism attending public high school. *Journal of Positive Behavioral Interventions, 8*, 24–28.

Keen, D., Sigafoos, J., & Woodyatt, G. (2001). Replacing prelinguistic behaviors with functional communication. *Journal of Autism and Developmental Disorders, 31*, 385–398.

Kennedy, C. H. (2002). The maintenance of behavior change as an indicator of social validity. *Behavior Modification, 26*, 594–604.

Kiernan, C., & Kiernan, D. (1994). Challenging behaviour in schools for pupils with severe learning difficulties. *Mental Handicapped Research, 7*, 177–201.

Laushey, K., & Heflin, L. (2000). Enhancing social skills of kindergarten children with autism through the training of multiple peers as tutors. *Journal of Autism and Developmental Disorders, 30*, 183–193.

Lavie, T., & Sturmey, P. (2002) Training staff to conduct a paired-stimulus preference assessment. *Journal of Applied Behavior Analysis*, 35, 209–211.

Lecavalier, L., Leone, S., & Wiltz, J. (2006). The impact of behavior problems on caregiver stress in young people with autism spectrum disorders.

Journal of Intellectual Disability Research, 50, 172–183.

Levin, J. R., & O'Donnell, A. M. (1999). What to do about education's credibility gaps? *Issues in Education: Contributions from Educational Psychology, 5*, 177–229.

Levin, J. R., O'Donnell, A. M., & Kratochwill, T. R. (2003). Educational and psychological research. In W. M. Reynolds (Ed). *Handbook of psychology: Educational psychology*. Hoboken, NJ: John Wiley and Sons Inc.

Luiselli, J. K., & Heflin, J. L. (2000). Enhancing social skills of kindergarten children with autism through the training of multiple peers as tutors. *Journal of Autism and Developmental Disorders, 30*, 183–193.

Luiselli, J. K. (1996). A case-study evaluation of a transfer-of-stimulus control toilet training procedure for a child with pervasive developmental disorder. *Focus on Autism & Other Developmental Disabilities, 11*, 158–163.

Machalicek, W., O'Reilly, M., Beretvas, N., Sigafoos, J., & Lancioni, G. (2007). A review of interventions to reduce challenging behavior in school settings for students with autism spectrum disorders, *Research in Autism Spectrum Disorders. 1,* 229–246.

Machalicek, W., Davis, T. N., O'Reilly, M., Beretvas, N., Sigafoos, J., & Lancioni, G., et al. (in press). Teaching social skills to students with autism in school settings: A review of the recent research. To appear in J. Luiselli (Ed). *Autism Spectrum Disorders*. Baltimore: Paul Brookes.

Malandraki, G. A., & Okalidou, A. (2007). The application of PECS in a deaf child with autism: A case study. *Focus on Autism and Other Developmental Disabilities, 22,* 23–32.

Mancina, C., Tankersley, M., Kamps, D., Kravits, T., & Parrett, J. (2000). Brief report: Reduction of inappropriate vocalizations for a child with autism using a self-management treatment program. *Journal of Autism and Developmental Disabilities, 30,* 599–605.

Martens, B. K., Witt, J. C., Elliot, S. N., & Darveaux, D.X. (1985). Teacher judgments concerning the acceptability of school based interventions. *Professional Psychology: Research and Practice, 16*, 78–88.

McClintick, K., Hall, S., & Oliver, C. (2003). Risk markers associated with challenging behaviors in people with intellectual disabilities: A meta-analytic study. *Journal of Intellectual Disability Research, 47*, 405–416.

McDonald, M. E., & Hemmes, N. S. (2003). Increases in social initiation toward an adolescent with autism: reciprocity effects. *Research in Developmental Disabilities, 24*, 453–465.

McInerney, M., & Hamilton, J. L. (2007). Elementary and middle schools technical assistance center: An approach to support the effective implementation of scientifically based practices in special education. *Exceptional Children, 73*, 242–255.

Mechling, L. C., Gast, D. L., & Cronin, B. A. (2006). The effects of presenting high-preference items, paired with choice, via computer-based video programming on task completion of students with autism. *Focus on Autism and Other Developmental Disabilities, 21*, 7–13.

Mesibov, G. B., Browder, D. M., & Kirkland, C. (2002). Using individualized schedules as a component of positive behavioral support for students with developmental disabilities. *Journal of Positive Behavioral Interventions, 4*, 73–79.

Mosteller, F., & Boruch, R. (Eds.). (2002). *Evidence matters: Randomized trials in education research.* Washington, DC: Brookings Institute.

Myles, B. S., & Simpson, R. L. (1996). Collateral behavioral and social effects of using facilitated communication with individuals with autism. *Focus on Autism and Other Developmental Disabilities, 11*, 163–170.

Myles, B. S., & Simpson, R. L. (1996). Impact of facilitated communication combined with direct instruction on academic performance of individuals with autism. *Focus on Autism and Other Developmental Disabilities, 11*, 37–45.

National Research Council, (2001). *Educating Children with Autism.* Committee on Educational Interventions for Children with Autism. Catherine Lord and James P. McGee, Eds. Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press. pp. 104–105; 221.

No Child Left Behind Act of 2001, P.L.107–110, 115 stat. 1425 (200).

Odom, S. L., Brantlinger, E., Gersten, R., Horner, R. H., Thompson, B., & Harris, K. R. (2005). Research in special education: Scientific Methods and evidence-based practices. *Exceptional Children, 71,* 137–148.

O'Reilly, M., Sigafoos, J., Lancioni, G., Edrisinha, C., & Andrews, A. (2005). An examination of the effects of a classroom activity schedule on stages of self-injury and engagement for a child with severe autism. *Journal of Autism and Developmental Disabilities, 35*, 305–311.

Ozonoff, S., & Miller, J., (1996). An exploration of right-hemisphere contributions to the pragmatic impairments of autism. *Brain and Language, 52*, 411–434.

Peterson, S. M., Caniglia, C., & Royster, A. J. (2001). Application of choice making intervention for a student with multiply maintained problem behavior. *Focus on Autism and Other developmental Disabilities, 16*, 240–246.

Pestursdottir, A., McComas, J., & McMaster, K.

(2007). The effects of scripted peer tutoring and programming common stimuli on social interactions of a student with Autism Spectrum Disorder, *Journal of Applied Behavior Analysis, 40,* 353–357.

Polychronis, S. C., McDonnell, J., Johnson, J.W., Riesen, T., & Jameson, M. (2004). A comparison of two trail distribution schedules in embedded instruction. *Focus on Autism and Other Developmental Disabilities, 19,* 140–151.

Reynhout, G., & Carter, M. (2007). Social story efficacy with a child with autism spectrum disorder and moderate intellectual disability. *Focus on Autism and Developmental Disabilities, 22,* 173–182.

Ricciardi, J. N., Luiselli, J. K, Terrill, S., & Reardon, K. (2003). Alternative response training with contingent practice as intervention for pica in a school setting. *Behavioral Interventions, 18,* 219–226.

Riesen, T., McDonald, J., Johnson, J.W., Polychronis, S., & Jameson, M. (2003). A comparison of constant time delay and simultaneous prompting within embedded instruction in general education classes with students with moderate to severe disabilities. *Journal of Behavioral Education, 12,* 241–259.

Roberts, C., Mazzucchelli, T., & Taylor, K. (2003). Early intervention for behaviour problems in young children with developmental disabilities. *International Journal of Disability, Development and Education, 50,* 275–292.

Sansosti, F. J., & Powell-Smith, K. A. (2006) Using social stories to improve the social behavior of children with Asperger Syndrome. Journal *of Positive Behavior Interventions, 8,* 43–57.

Scattone, D., Tingstrom, D. H., & Wilczynski, S. M. (2006). Increasing appropriate interactions of children with autism spectrum disorders using social stories. *Focus on Autism and Other developmental Disabilities, 21,* 211–222.

Scattone, D., Wilczynski, S. M., Edwards, R. P., & Rabian, B. (2002). Decreasing disruptive behaviors of children with autism using social stories. *Journal of Autism and Developmental Disorders, 32,* 535–543.

Schepis, M. M., Reid, D. H., Behrmann, M. M., & Sutton, K. A. (1998). Increasing communicative interactions of young children with autism using a voice output communication aid and naturalistic teaching. *Journal of Applied Behavior Analysis, 31,* 561–578.

Schmit, J., Alper, S., Raschke, D., & Ryndak, D. (2000). Effects of using a photographic cueing package during routine school transitions with a child who has autism. *Mental Retardation, 38,* 131–137.

Schwartz, I. S., & Baer, D. M. (1991). Social validity assessments: Is current practice state of the art? *Journal of Applied Behavior Analysis, 24,* 189–203.

Sigafoos, J., Arthur, M., & O'Reilly, M. (2003). *Challenging behavior & developmental disability.* Philadelphia: Whurr Publishing.

Simpson, A., Langone, J., & Ayres, K. M. (2004). Embedded video and computer based instruction to improve social skills for students with autism. *Education and Training in Developmental Disabilities, 39,* 240–252.

Smith, A. E., & Camarata, S. (1999). Using teacher-implemented instruction to increase language intelligibility of children with autism. *Journal of Positive Behavior Interventions, 1,* 141–151.

Sugai, G., Horner, R. H., & Gresham, F. M. (2002). Behaviorally effective school environments. In M. R., Shinn, H. M., Walker, & G. Stoner, *Interventions for academic and behavior problems II* (pp. 315–350). Washington, DC, US: National Association of School Psychologists.

Taber, T. A., Seltzer, A., Heflin, J. L., & Alberto, P. A. (2000). Use of self-operated auditory prompts to decrease off-task behavior for a student with autism and moderate mental retardation. *Focus on Autism and Other Developmental Disabilities, 14,* 159–166.

Taylor, B. A., & Harris, S. J. (1995). Teaching children with autism to seek information: Acquisition of novel information and generalization of responding. Journal of *Applied Behavior of Analysis, 28,* 3–14.

Taylor, B., Hoch, H., & Weissman, M. (2005). The analysis and treatment of vocal stereotypy in a child with autism. *Behavioral Interventions, 20,* 239–253.

Thiemann, K. S., & Goldstein, H. (2001). Social stories, written text cues, and video feedback: Effects on social communication of children with autism. *Journal of Applied Behavioral Analysis, 34,* 425–446.

Thiemann, K. S., & Goldstein, H. (2004). Effects of peer training and written text cueing on social communication of school-age children with pervasive developmental disorder. *Journal of Speech, Language, and Hearing Research, 47,* 126–144.

Tincani, M. (2004). Comparing the picture exchange communication system and sign language training for children with autism. *Focus on Autism and Other Developmental Disabilities, 19,* 152–163.

U.S. Department of Education, Office of Special Education Programs. (2003). Annual report to Congress on the implementation of the Individuals' with Disabilities Education Act. Washington, DC: Author.

U.S. Department of Education, Office of Special Education Programs. (2006). Annual report to Congress on the implementation of the Individuals' with Disabilities Education Act. Washington, DC: Author.

VonBrock, M. B., & Elliott, S. N. (1987). The influ-

ence of intervention effectiveness information on the acceptability of classroom interventions. *Journal of School Psychology, 25*, 131–144.

Watson, T., Ray, K., Sterling Turner, H., & Logan, P. (1999) Teacher-implemented functional analysis and treatment: A method for linking assessment to intervention. *School Psychology Review, 28*, 292–302.

Witt, J. C., Elliott, S. N., & Martens, B. K. (1984). Acceptability of behavioral interventions used in classrooms: The influence of teacher time, severity of behavior problem, and type of intervention. *Behavioral Disorders, 10*, 95–104.

Wolf, M. M. (1978). Social Validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11*, 203–214.

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Sexuality Education for Individuals with Autism Spectrum Disorders: Critical Issues and Decision Making Guidelines

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Abstract: Individuals with autism spectrum disorders (ASD) present unique needs regarding sexuality education. While the topic of sexuality has received increased attention in the fields of intellectual and developmental disabilities generally, less consideration has focused on the unique needs of individuals with ASD specifically. This paper presents one position in support of sexuality education for children and adolescents with ASD. The nature of human sexuality is discussed to provide a context for the rights of individuals with ASD to learn about their sexuality. Further justification for providing sexuality education in terms of the unique characteristics of this population is offered in conjunction with potential consequences of failing to provide sexuality education. Lastly, information regarding a decision-making process for sexuality education curriculum is presented, including the responsibilities of families and professionals providing sexuality education.

A large body of research exists regarding specific aspects of intervention and education for individuals with autism spectrum disorders (ASD) (Simpson et al., 2005). Much ASD research focuses on teaching communication (Koegel, Koegel, Frea, & Smith, 1995), as this is a core deficit of ASD (APA, 2000). Despite continual advancements in intervention research, little attention has been given to the issue of sexuality (Konstantareas & Lunsky, 1997; Stokes & Kaur, 2005; Van Bourgondien, Reichle, & Palmer, 1997). Comparisons of available literature on sexuality in people with intellectual disabilities and people with ASD yield significantly more literature in intellectual disabilities and very little in ASD (Bambara & Brantlinger, 2002; Koller, 2000). Nevertheless, the importance of providing quality and individualized sexuality education is substantial because individuals with ASD have unique needs that may not be addressed in sexuality education programs designed for persons with ID (Howlin, 1997).

This paper presents one position regarding sexuality education for individuals with ASD based upon (a) the literature related to human sexuality in general, (b) the available literature related to sexuality education for this population, and (c) relevant literature on sexuality education for individuals with intellectual disabilities. Attempts to address important specific questions related to ASD sexuality education are included, followed by decision making guidelines. It is hoped that a discussion about this critical but sensitive topic will facilitate dialogue and research representing alternative points of view to further the knowledge base on sexuality education for persons with ASD.

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What is Human Sexuality?

Human sexuality is often misperceived as referring only to specific sexual behaviors (NCASH, 1995). Rather, sexuality encompasses a broad variety of physical, emotional, and social interactions, suggesting that a simple and precise definition cannot be written (Bruess & Greenberg, 1994). Thus, many experts and organizations prefer to use general terms to describe human sexuality. The National Commission on Adolescent Sexual Health (NCASH), for example, states:

> Sexuality is a natural and healthy part of life. Sexuality encompasses the sexual knowledge, beliefs, attitudes, values, and behaviors of individuals. It deals with anatomy,

> physiology, and biochemistry of the sexual response system, as well as with roles, identity, and personality. Sexuality encompasses thoughts, feelings, behaviors, and relationships. (p. 2)

The use of general terms helps deter the common stereotypical association of sexuality exclusively with interpersonal sexual behavior in an attempt to remove the taboo of discussing human sexuality of persons with ASD.

The NCASH (1995) recognizes the stages of sexuality in all human beings and the need for sexual expression regardless of ability. While experts recognize the needs of persons with disabilities to understand and explore their own bodies, build and maintain relationships, and engage in sexual behaviors (Aunos & Feldman, 2002), individuals with ASD may frequently be excluded from the application of this principle. The very nature of their disability may be the primary reason for this occurrence.

Sexuality and Individuals with ASD

Autism spectrum disorders are neurological developmental disorders that affect language acquisition, social development, and behavior (APA, 2000). While each of these deficit areas can be linked to poor understanding of sexuality and an inability to appropriately express feelings of sexuality, impairment in social development is perhaps the primary contributor. Realmuto and Ruble (1999) suggest that typical children learn about sexuality via casual social experiences. Social experiences include those within the community, family, and educational settings (Suris, Resnick, Cassuto, & Blum, 1996). Individuals with ASD often lack the ability to effectively learn in unstructured social situations regardless of setting. The inability to learn social skills through informal interaction is often misperceived as the individual's preference for being alone (Stokes & Kaur, 2005). In fact, many individuals with ASD report wanting social relationships (Attwood, 1998; Ousley & Mesibov, 1991). Consequently, people with ASD may be viewed as sexually immature or completely asexual and, as a result, the need for sexuality education may be overlooked or ignored by professionals and family members (Konstantareas & Lunksky, 1997; Ludlow, 1991; Stokes & Kaur, 2005). To the contrary, persons with ASD may be in significant need of sexuality education due to the pervasive nature of their social deficits.

Justification for Providing Sexuality Education to Individuals with ASD

Sexuality education for individuals with ASD is supported by three important factors. First, social deficits common to persons with ASD render them particularly prone to sexual abuse (Mansell, Sobsey, Wilgosh, & Zawallich, 1996). Thus, education to prevent sexual abuse is critical. Second, persons with ASD have the universal right to learn about relationships, marriage, parenthood, and appropriate sexuality. Often, social skills and communication deficits render people with ASD unable to acquire sexuality, relationship, and intimacy skills from the natural environment. Importantly, absence of a clear understanding of appropriate sexuality increases the likelihood of inappropriate sexual behavior among persons with ASD (Stokes & Kaur, 2005). Finally, sexuality education for persons with ASD facilitates good hygiene, promotes health, and prevents unwanted pregnancy. We explore each of these factors below.

Preventing Sexual Abuse

Without individualized education regarding the various facets of sexuality education, individuals with ASD may more likely to be victims of sexual abuse. Individuals with ASD are at an increased risk of sexual abuse for at least two reasons: (a) they are often unable to provide reports to parents, professionals, or law enforcement about sexual abuse due to communication deficits; and (b) they may fail to report sexual abuse because they are unaware it is wrong (Howlin & Clements, 1995; Mansell et al., 1996). In addition to the serious personal and physical distress caused by sexual abuse, an individual subjected to abuse may fail to make educational, academic, behavioral, and communicative progress (Howlin & Clements). Moreover, the sex offender may never be caught, charged, or convicted, maintaining a higher prevalence of sexual abuse among this population. An individual with

ASD therefore has the right to sexuality education in order to prevent and/or report incidences of sexual crimes.

Facilitating Relationships, Marriage and Parenthood

It is the generally recognized right of all individuals, including those with ASD, to participate in consensual romantic relationships, marry, and engage in pre-and post-marital consensual sex with their partner. The right of a person to conceive, deliver, and care for his or her own child in conjunction with needed supports is also universally accepted. It has been reported that individuals with mild intellectual disabilities (including autism) often want to marry and have children (Aunos & Feldman, 2002). Intellectual ability should not preclude a person with ASD from learning about his or her own sexuality, or from engaging in consensual, emotionally meaningful romantic and sexual relationships. Therefore, all people with intellectual disabilities, including autism, should be provided with this type of curriculum.

Importantly, access to sexuality curriculum does not imply that the individual should necessarily have a child or engage in interpersonal sexual behaviors such as intercourse. In many cases, the person with ASD may not be able to give consent to sexual behaviors due to limited cognitive ability. Additionally, many individuals with ASD may not be able to effectively care for a child even with substantial supports. Individuals whose cognitive ability (a) limits them from providing sexual consent or (b) prevents them from providing for an infant should be discouraged from engaging in interpersonal sexual behaviors. In the case where two individuals are able to give consent and are able to care for a child should be provided with the supports necessary.

Thompson (2002) cautions against assuming that persons with developmental disabilities are heterosexual simply because heterosexuality is the dominant mode of sexual expression in our culture. In some cases, individuals with ASD may choose to engage in sexual behaviors with members of the same sex or, more broadly, to identify with a gay, lesbian, or bisexual (GLB) lifestyle. While some may disagree with homosexuality on individual, community, or governmental levels, we should not let personal beliefs interfere with the right of the individual to express his or her sexual identity (Blanchett, 2002). Moreover, we should not dismiss the sexual preferences of an individual on the basis of an intellectual or developmental impairment. Instead, effort should be focused on providing information about safe sex and the potential consequences of engaging in unsafe sex. Similar attention should be given to teaching about romantic relationships and intimacy, affording the GLB person with ASD the same consideration as the heterosexual person with ASD.

Preventing Challenging Behavior

Stokes and Kaur (2005) report that failure to address the social desires of individuals with ASD can increase inappropriate behavior, including apparent obsession with another individual, inappropriate sexual expression such as public undressing, and aggression. In the absence of understanding how to initiate and maintain appropriate romantic and sexual relationships, adolescents and adults with ASD may be especially prone to sexually inappropriate acts towards others (Ray, Marks, & Bray-Garretson, 2004). In all cases, sexuality education to facilitate one's sexual identity and appropriate sexual behavior can prevent potentially negative outcomes.

Promoting Health and Hygiene

Proper sexuality education for individuals with ASD should not be provided just to prevent and report sexual abuse, promote marriages, preserve parenting rights, or to simply satisfy social desires. Sexuality education is also needed to promote proper health and hygiene, disease prevention, and birth control (NCASH, 1995). Poor health and hygiene can result in physical pain, sickness, and death, but proper health and hygiene can promote a sense of physical well-being and increased self-esteem (Fegan, Rauch, & McCarthy, 1993). Therefore, appropriate sexual education is indicated in all cases to enhance physical well being and promote good health throughout the lifespan.

What Should be Taught in Sexuality Education for Individuals with ASD?

Koller (2000) provides a list of potential topics of instruction that include "body parts, reproduction, birth control, sexual health, the sexual life cycle from birth to death, male and female socio/sexual behavior, dating, marriage, parenting, establishing relationships, abuse awareness, boundary issues, self-esteem, and assertiveness skills training" (p. 130). Ideally, sexuality education should begin in early childhood with body awareness and social skills development and progress as the individual matures to include building and maintaining friendships, romantic relationships, dating, sexual behavior, partnership, and long-term relationships. Blanchett and Wolfe (2002) present a comprehensive review of published curricula to teach sexuality to individuals with developmental disabilities. The unique needs of individuals with ASD highlight several specific topics for sexuality education.

Body Awareness

Providing individualized education about caring for the human body is an essential component of sexuality education (Fegan et al., 1993). Due to deficits in language, children with ASD may lack basic awareness of their body parts and their functions. Therefore, young children with ASD should be taught to identify all of their body parts. They should also be taught about the importance of protecting themselves from sexual exploitation by (a) learning about private body parts, (b) learning what kind of touching is okay and not okay, and (c) who, when, and how, to report sexual abuse.

When appropriate, individuals with ASD throughout the lifespan should be taught about their body's functions (e.g. menstruation, ejaculation) and the necessity for regular examinations by themselves and doctors (e.g. Pap and Breast exams, Testes exams). Again, limitations in language ability may preclude adolescents and adults with ASD from attending to health-related sexuality needs. Sexually transmitted disease prevention should also be included in sexuality education. Specific attention should be given to abstinence, safe sex (e.g., condoms), and symptoms indicating a need for medical treatment.

Social Development

Persons with ASD experience difficulty building and maintaining social relationships (APA, 2000). Teaching social and relationship skills is imperative since sexuality has much to do with human relationships. In the case of a minor, selecting relationship skills to be taught is the responsibility of the student's individualized education plan (IEP) team. Social skills are a core deficit of ASD and specific social skills instruction should be provided to every individual with ASD, regardless of age or level of functioning (Koller, 2000). Ideally, social deficits should be addressed as early as possible. The IEP team should make decisions regarding social skills instruction based on the individual's age, cognitive level, skill strengths, and skill deficits. For instance, the IEP team for a younger child may focus on turn-taking, greetings, eye-contact, and play skills. An IEP for an adolescent or adult may focus on the importance of (a) sharing similar interests with others, (b) concepts of love and intimacy, (c) appropriate ways to express emotions and relieve stress, and (d) how to appropriately deal with rejection.

Romantic Relationships and Intimacy

Theory of Mind (ToM) deficits intrinsic to persons with ASD may render individuals unable to understand the actions, feelings, and intentions of others (Baron-Cohen, 1995). Difficulties with ToM become especially problematic as adolescents and young adults with ASD attempt to navigate romantic relationships. For example, a young man with Asperger syndrome interested in dating a young woman might fail to recognize seemingly obvious cues of disinterest (e.g., not returning phone calls, telling him "I've got other plans") and inappropriately persist in romantic or sexual overtures. Therefore, teaching adolescents with ASD the subtle rules of romantic courtship is critical. Specific programmatic content should include how to appropriately initiate romantic relationships, dating, appropriate physical boundaries, listening skills, and the meaning of consensual sexual activity.

Masturbation and Modifying Behavior to Meet Social Norms

Self-stimulatory behaviors are significantly difficult to modify because of their self-reinforcing nature (Scheuermann & Weber, 2002). This is especially true of masturbation. Masturbation is considered to be a normal component of human development (Bruess & Greenberg, 1994; NCASH, 1995). Despite this, stigma and misconceptions regarding masturbation remain common in our society and, as a result, individuals with ASD are often discouraged from masturbating (Walsh, 2000). Masturbation may be more common in individuals with ASD than nondisabled individuals because of the increased tendency to engage in self-stimulating behaviors (Realmuto & Ruble, 1999). Individuals with ASD are frequently reported to masturbate in inappropriate locations (Koller, 2000). It is important to remember that masturbation may be the individual's only way of appropriately relieving normal sexual urges. Attempting to repress an individual's desire to masturbate in an appropriate situation (e.g., in the privacy of the person's bedroom or bathroom) is therefore discouraged. Providing an individualized sexuality education program to promote appropriate masturbation is suggested. Such programming should include explicit instruction on when and where it is and is not appropriate to masturbate. Those looking for assistance in reducing inappropriate masturbation are directed to Walsh (2000).

Ruble and Dalrymble (1993) found that many parents report other inappropriate sexual behavior such as public disrobing, inappropriate touching of members of the opposite sex, and masturbation with unusual objects. These types of behaviors require behavior modification and teaching that are consistent with social norms and may be the primary focus of sexuality education for some individuals. Ward and Bosek (2002) describe a comprehensive program for treating inappropriate sexual behavior in persons with intellectual disabilities by teaching self-awareness of high risk situations and alternatives to inappropriate responses. Changing inappropriate sexual behavior to meet social norms is essential for the individual to access and participate in the community.

Reproductive and Parenting Rights of Individuals with ASD

Individuals with ASD have the right to learn about contraception when pregnancy is not desired. They also have the right to learn about the available types of contraception and to be a part of the decision-making process regarding their contraceptive. In some cases, surgery on reproductive organs may be necessary to preserve health, while decreasing or eliminating the possibility of conception. For instance, uterine or ovarian cancer may require hysterectomy to preserve the life of a woman. In men, similar medical circumstances (e.g., testicular cancer) may require testes removal. Nonconsensual or fraudulent sterilization (i.e., forcing, deceiving, or convincing someone to proceed with sterilization who would otherwise choose not to simply for the purpose of preventing the individual from becoming pregnant) is never appropriate. In fact, each state in the U.S. has laws designed to protect the reproductive rights of individuals with intellectual disabilities (Küpper, 1995). Professionals and families should recognize that sterilizing an individual will not eliminate their sexual needs and desires and that sexuality education must be provided even if the individual cannot conceive a child or engage in sexual behaviors. Readers can find more information about reproductive health at the U.S. Centers for Disease Control website on reproductive health at www.cdc.gov/reproductivehealth.

Selecting Sexuality Skills for Individuals with ASD: Decision Making Guidelines

Research regarding sexuality in individuals with ASD, including what skills to teach, is significantly lacking. Nonetheless, the literature on sexuality education for persons with intellectual disabilities provides the following general guidelines for parents and professionals who must make decisions regarding what information about sexuality will be taught. General guidelines include (a) considering the role of the IEP team, including parents, in the design of sexuality education programs; (b) considering the student's involvement in his or her own sexuality education program;

and (c) anticipating disagreements about sexuality education among team members.

Role of the IEP Team

First, deciding what to teach should be the decision of the child's or adolescent's IEP team. According to the Individuals with Disabilities Education Improvement Act of 2004 (PL 108-446), the members of the IEP team should consist of educational and related services professionals, family members and friends, advocates, the student (when appropriate), and a representative from the local education agency. The team should decide what to teach the individual based on his or her specific needs. Nevertheless, making decisions about what to teach can be challenging for members of the IEP team. Haracopos and Pederson (1995) provide a framework for decision-making when considering sexuality education for individuals with ASD that may help the IEP team:

1. People have the right and possibility of having a sexual life in accordance with their desires and needs and what they can manage.
2. People with autism have the right to receive guidance and support with regard to unresolved sexual problems.
3. The learning of appropriate social behavior with regard to sexuality should occur in agreement with the social rules and norms of the autistic person's [sic] place of residence.
4. The type of guidance should, first of all, be related to and dependent on how demanding and obvious the sexual problem is for the person with ASD and the environment. It is then important to determine and assess if the sexual signs are definite, indefinite, or not present.
5. Sexuality should be viewed in a global context so that sexual instruction and training do not only consist of helping the person learn to masturbate to achieve orgasm. It is equally important to enhance the person's body awareness and to support him or her in understanding their physical and emotional changes in relation to the sexual drive.
6. When a person with ASD directs his or her sexual interest towards another person, one should decide how far to go in supporting such contact. Since experiencing sexuality with another person consists of showing tenderness, care, and empathy, one must recognize that the majority of people with autism have extreme difficulty relating to other people. (p. 21)

In addition to these six guidelines it is equally important to consider the religious, ethnic, and cultural beliefs of the family since many families may feel uncomfortable about openly discussing issues related to sexuality (NCASH, 1995). Educators should anticipate that children's sexuality will be a sensitive topic with parents (Aunos & Feldman, 2002). Therefore, it is important to inform the family prior to the IEP meeting using specific language that sexuality education will be discussed. For instance, a family of a five-year-old boy may become upset upon hearing the special educator's intention to discuss sexuality during the IEP meeting, not realizing that sex education, in this case, pertains only to teaching body parts, motor development, and body awareness. Presenting this information before the IEP meeting (a) allows the family to better prepare for the meeting, (b) reduces the likelihood of defensiveness and confrontation, and (c) increases acceptance and participation in deciding what to teach and who should teach it.

Student Involvement

Second, participation of the student with ASD in the IEP process can result in a sense of empowerment, increased willingness to engage in learning, and an IEP that accurately reflects the individual's goals and dreams (Test et al., 2004). Lesseliers and Van Hove (2002) suggest that because individuals with developmental disabilities are viewed as "perpetual children," their voices in decision making about their own sexuality are often ignored. On the other hand, allowing the person to express his or her sexuality interests in the IEP meeting helps the team to make informed, person-centered decisions about sexuality programs. In some cases, students with ASD may not be able to explain their desires for sexuality education. Similarly, stu-

dents with ASD may not be able to provide informed consent to sexuality education. In these circumstances professionals must evaluate the individual using various assessment tools to determine if the individual exhibits a need for sexuality education (Patti, 1995). In such cases, the choice to provide sexuality education should be made on an individual basis and should be supported by assessment results.

Dealing with Disagreement

Finally, because of the contentious nature of human sexuality, disagreements among team members, including parents, should be anticipated. What should happen if the individual wants and/or needs sex education, but the parents do not agree? The ethical questions regarding disagreement about teaching sexuality education are not easy to answer. In the case where the individual is a minor, professionals must exercise respect for the parent's wishes. Providing sexuality education to a minor, or to an adult whose rights have been assigned to a guardian, that has not been approved by the individual's parent or guardian is not advised and may be considered criminal (Guttmacher Institute, 2007).

In cases where some team members (e.g., parents) are resistant, professionals may choose to focus their energy on providing information about the importance of sexuality education as opposed to simply giving up. Professionals often encounter the most challenging ethical decisions when the individual has reached the age of majority and is legally free to make his or her own choices. Providing sexuality education to a legally independent individual with ASD against the parent's wishes will no doubt be a difficult choice for many professionals. In the case where the individual is attending school beyond his/her 18th birthday, the parent may protest by refusing to send his or her child to school, thereby compromising the efforts and educational progress of the individual with ASD.

Despite obvious need, parents may still object to their child receiving sexuality education. In these cases it is not advisable to proceed with sexuality education against the wishes of the parents because the quality of the program may be compromised (i.e. better results are achieved when families and professionals work together). It may be more efficient to convince the parents about the need for sexuality education than to engage in personal, professional, and legal altercations. If sex education is provided to the individual throughout the school years starting at a young age, and if parents are encouraged and supported throughout their child's education, difficult situations such as these may be avoided and better outcomes can be achieved.

Who Teaches Sexuality Skills to Individuals with ASD? Decision Making Guidelines

Role of Parents and Caregivers

Deciding who will be responsible for teaching sexuality should also be determined during the IEP team meeting. Traditionally, parents and caregivers have been the primary providers of sexuality education (Fegan et al., 1993). Parents and caregivers provide the foundation for sexual development by demonstrating and modeling appropriate relationships within the home (NCASH, 1995), and are responsible for explaining their moral standards to their children (Fegan et al.). Additionally, they are more likely to know their child's needs than professionals and, as a result, are better equipped to teach their child about sexuality. Therefore, where appropriate, parents should be encouraged to participate fully in their children's sexuality education.

Despite these advantages, parents may not be comfortable addressing their child's sexuality (Aunos & Feldman, 2002). Sexuality may be a particularly sore topic for parents of adolescents with autism or other developmental disabilities because they perceive sexuality to be an extra burden for their child, and because they view their child to be asexual or unable to make independent decisions about sexuality (Lesseliers & Van Hove, 2002). Consequently, parents may suggest that it is the school's responsibility to provide sexuality education, or they may ignore the issue of sexuality altogether. Parents' decision not to participate in their child's sexuality education, or any aspect of their educational curriculum, should not lessen the team's willingness to incorporate parents' values and desires into

their child's sexuality education program (Vaughn, White, Johnston, & Dunlap, 2005).

Role of Professionals

The professional who has been designated to be the provider of the individual's sexuality education may feel inadequate or hesitant for several reasons. He or she may feel uncomfortable discussing various aspects of sexuality with students. He or she may have religious, cultural, or personal beliefs that conflict with the situation. Despite such conflicts, professionals must remember their obligation to provide individuals with disabilities, including ASD, appropriate sexuality education. The professional who feels that they are unable to provide quality instruction due to personal beliefs should be replaced in favor of someone who can remain objective.

Objectivity is not the only quality that the professional should exhibit. Fegan et al. (1993) outlines several characteristics of professionals who provide optimal sexuality education. They suggest that the professional:

> (a) feel confident and at ease, (b) be open and direct about the topic, (c) be aware of your own attitudes to reduce bias, (d) learn and understand current information so that it can presented accurately, (e) maintain open relationships and communicate frequently with parents, (f) ask for help from a qualified individual (e.g., sex therapist) when needed, (g) repeat, reinforce, and generalize instruction, and (h) use multisensory tools (e.g., videos, pictures, models, charts, etc.) (pp. 15-16).

A Collaborative Effort

Collaboration is the ideal context to provide sexuality education to individuals with ASD. Parents and professionals may find comfort in working together to provide quality sexuality education. Through collaboration parents can be designated as the responsible party for providing explicit sexuality education that is consistent with their family's culture, religion, and/or other beliefs, while professionals are responsible for teaching skills for social development in the school and community settings. In combining efforts, maintaining communication, and building relationships with the family, positive outcomes are more likely.

Conclusion

This paper presents one position supporting sexuality education for individuals with ASD. The limited amount of available research supports the need for further study of sexuality in the ASD population. Specifically, future research should explore (a) the unique skill needs of children, adolescents, and young adults with ASD regarding their sexuality and (b) the most effective ways to deliver sexuality instruction considering the unique needs of this population.

It is clear that every person with ASD has the right to sexuality education regardless of intellectual functioning (Koller, 2000). However, this entitlement accompanies ethical questions. Some of these questions are discussed here (e.g., How do we provide sexuality education when team members are resistant or disagree?), but considerably more specific questions exist based on circumstances of the individual's societal, cultural, local, and familial conditions. Society is becoming more accepting of individuals with disabilities (Aunos & Feldman, 2002); however, without individualized instruction, individuals with ASD are less likely to participate in meaningful relationships and are more prone to sexual abuse. Additionally, without proper training in sexuality, individuals with ASD may become more socially isolated. These factors support the critical need to provide sexuality education to children and adults with ASD. Effective collaboration in sexuality education can result in better outcomes for the individual with ASD, his or her family, and society.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.

Aunos, M., & Feldman, M. A. (2002). Attitudes towards sexuality, sterilization and parenting rights of persons with intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities, 15,* 285–296.

Attwood, T. (1998). *Asperger's syndrome: A guide for parents and professionals.* London: Jessica Kingsley Publications.

Bambara, L. M., & Brantlinger, E. (2002). Toward a healthy sexual life: An introduction to the special series on issues of sexuality for people with developmental disabilities. *Research & Practice for Persons with Severe Disabilities, 27,* 5–7.

Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind.* Cambridge, MA: MIT Press.

Blanchett, W. J. (2002). Voices from a TASH forum on meeting the needs of gay, lesbian, and bisexual adolescents and adults with severe disabilities. *Research & Practice for Persons with Severe Disabilities, 27,* 82–896.

Blanchett, W. J., & Wolfe, P. (2002). A review of sexuality education curricula: Meeting the sexuality education needs of individuals with moderate and severe intellectual disabilities. *Research and Practice for Persons with Severe Disabilities, 27,* 43–57.

Bruess, C. E., & Greenberg, J. S. (1994). *Sexuality education theory and practice* (3rd ed.). Dubuque: Brown & Benchmark.

Fegan, L., Rauch, A., & McCarthy, W. (1993). *Sexuality and people with disability* (2nd ed.). Baltimore: Brookes.

Guttmacher Institute. (2007). *State policies in brief: Sex and STD/HIV education.* Retrieved January 4, 2007, from http://www.guttmacher.org/statecenter/spibs/spib_SE.pdf

Haracopos, D., & Pederson, L. (1992, May). *Sexuality and autism: Danish report.* Retrieved April 2, 2006, from www.autismuk.com/index9sub.htm

Howlin, P. (1997). *Autism: Preparing for adulthood.* London; New York: Routledge.

Howlin, P., & Clements, J. (1995). Is it possible to assess the impact of abuse on children with pervasive developmental disorders? *Journal of Autism and Developmental Disorders, 25,* 337–354.

Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. § 1400 *et. seq.*(2004).

Koegel, R. L., Koegel, L. K., Frea, W. D., & Smith, A. E. (1995). Emerging interventions for children with autism: Longitudinal and lifestyle implications. In R. L. Koegel. & L. K. Koegel, (Eds.), *Teaching children with autism: Strategies for initiating positive interactions and improving learning opportunities* (pp. 1–15). Baltimore: Brookes.

Koller, R. (2000). Sexuality and adolescents with autism. *Sexuality and Disability, 18,* 125–135.

Konstantareas, M. M., & Lunksy, Y. L. (1997). Sociosexual knowledge, experience, attitudes, and interests of individuals with autistic disorder and developmental delay. *Journal of Autism and Developmental Disorders, 27,* 397–413.

Küpper, L. (1995). Comprehensive sexuality education for children and youth with disabilities. *SIECUS Report, 23*(4), 3–8.

Lesseliers, J., & Van Hove, G. (2002). Barriers to the development of intimate relationships and the expression of sexuality among people with developmental disabilities: Their perceptions. *Research and Practice for Persons with Severe Disabilities, 27,* 69–81.

Ludlow, B. (1991). Contemporary issues in sexuality and mental retardation. *Advances in Mental Retardation and Developmental Disabilities, 36,* 531–539.

Mansell, S., Sobsey, D., Wilgosh, L., & Zawallich, A. (1996). The sexual abuse of young people with disabilities: Treatment considerations. *International Journal for the Advancement of Counseling, 19,* 293–302.

National Commission on Adolescent Sexual Health (1995). Facing facts: Sexual health for America's adolescents. Retrieved April 2, 2007, from www.siecus.org/pubs/Facing_Facts.pdf

Ousley, O., & Mesibov, G. (1991). Sexual attitudes and knowledge of high-functioning adolescents and adults with autism. *Journal of Autism and Developmental Disorders, 21,* 471–481.

Patti, P. J. (1995). Sexuality and sexual expression in persons with mental retardation. *SIECUS Report, 23,* 17–23.

Ray, F., Marks, C., & Bray-Garretson, H. (2004). Challenges to treating adolescents with Asperger's syndrome who are sexually abusive. *Sexual Addiction & Compulsivity, 11,* 265–285.

Realmuto, G. M., & Ruble, L. A. (1999). Sexual behaviors in autism: Problems of definition and management. *Journal of Autism and Developmental Disorders, 29,* 121–127.

Ruble, L. A., & Dalrymple, N. J. (1993). Social/sexual awareness of persons with autism: A parental perspective. *Archives of Sexual Behavior, 22,* 229–240.

Scheuermann, B., & Webber, J. (2002). *Autism: Teaching does make a difference.* Belmont, CA: Wadsworth

Simpson, R., deBoer-Ott, S., Griswold, D., Myles, B., Byrd, S., & Ganz, J., et al. (2005). *Autism spectrum disorders: Interventions and treatments for children and youth.* Thousand Oaks, CA: Corwin Press.

Stokes, M. A., & Kaur, A. (2005). High-functioning autism and sexuality: A parental perspective. *Autism, 9,* 266–289.

Suris, J., Resnick, M. D., Cassuto, N., & Blum, R. W. (1996). Sexual behavior of adolescents with chronic disease and disability. *Journal of Adolescent Health, 19,* 121–134.

Test, D. W., Mason, C., Hughes, C., Konrad, M., Neale, M., & Wood, W. M. (2004). Student involvement in individualized education program meetings. *Exceptional Children, 70,* 391–412.

Thompson, S. A. (2002). The practices in and "out"

of policy. *Research & practice for persons with severe disabilities, 27*, 87–92.

Van Bourgondien, M. E., Reichle, N. C., & Palmer, A. (1997). Sexual behavior in adults with autism. *Journal of Autism and Developmental Disorders, 27,* 113–125.

Vaughn, B. J., White, R., Johnston, S., & Dunlap, G. (2005). Positive behavior support as a family-centered endeavor. *Journal of Positive Behavior Interventions, 7*, 55–58.

Walsh, A. (2000). IMPROVE and CARE: Responding to inappropriate masturbation in people with severe intellectual disabilities. *Sexuality and Disability, 18,* 27–39.

Ward, K., & Bosek, R. (2002). Behavioral risk management: Supporting individuals with developmental disabilities who exhibit inappropriate sexual behaviors. *Research and Practice for Persons with Severe Disabilities, 27*, 27–42.

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Evaluation of the Effects of Sensory Integration-Based Intervention by a Preschool Special Education Teacher

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Abstract: This study addresses the call for increased research on common public school practices and progress monitoring by public school teachers. An alternating treatment design was implemented by a preschool teacher to evaluate the effect of sensory-integration based activities compared with an attention control on the on task behavior of three participants with disabilities. The preschool participants were observed during one-to-one teaching sessions and completing maintenance tasks in an independent workstation during the second half of a school year. The results revealed no differences in the estimated percentages of time on-task when either condition was used for all three participants. More time on task occurred when the participants were working in one-to-one activities. The design used in this study serves as a model that can be used by teachers and occupational therapists working in a public school.

The process of sensory integration is supported by a theoretical construct that describes the relationship between the neurobiology of an individual and the environment (Fisher & Murray, 1991). Theorizing about the interaction between the sensory and motor systems and the environment has been a focus of the field of occupational therapy (Mailloux & Smith-Roley, 2004; Wilbarger & Stackhouse, 2005). Current theories build upon the work of Dr. Jean Ayres who developed a theory of sensory integration and described intervention practice for individuals with disabilities (Ayres, 1972; Ayres & Tickle, 1980). Although theory development regarding the interaction between behavior of the individual, the sensory and motor systems, and environmental stimuli is ongoing (Anzalone & Williamson, 2000; Baranek, Parham, & Bodfish, 2005; Wilbarger & Stackhouse), occupational therapists are actively recommending practices to address atypical behavior by individuals identified with disabilities thought to be a result of problems with sensory integration processing (Mailloux & Smith-Roley).

Reviewers of research on practices based on sensory integration theory have concluded that there is either little or no evidence to support such practices when used for children with learning disabilities (Hoehn & Baumeister, 1994; Kaplan, Polatajko, Wilson, & Faris, 1993), language and learning disorders (Griffer, 1999), mental retardation (Arendt, MacLean, & Baumeister, 1988), and autism spectrum disorders (Goldstein, 2000; Rogers & Ozonoff, 2005). Although most reviewers identify methodological weaknesses in the design as one of the main reasons for their conclusions, there also is a lack of relationship between any changes in behavior with the proposed dysfunctional sensory or motor system (Baranek, 2002; Dawson & Watling, 2000). Many of these authors call for more research on the outcomes of this approach (Dawson & Watling; Griffer; Kaplan et al). In spite of this lack of evidence, sensory integration-based activities continue to be recommended by occupational therapists and used by educators in

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public schools (Rogers & Ozonoff). Parents have reported (Smith & Antolovich, 2000) and authors have speculated (Kaplan et al.) that interventionists perceive that children improve as a result of sensory integration-based therapy or that positive changes in behavior are attributed to the sensory integration strategies.

Several strategies that are put together in order to modulate arousal, attention, affect and action for an individual can be referred to as a "sensory diet" (Anzalone & Williamson, 2000; Baranek, 2002). Some of the strategies included in a typical "sensory diet" may be enjoyable for both the student and the educator. Massaging with lotion is an example. Escalona and her colleagues found that children with autism who received massage from their parents at bedtime exhibited less stereotypic behavior and showed more on-task behavior during play at school compared with those children with autism read a Dr. Seuss story (Escalona, Field, Singer-Strunck, Cullen, & Hartshorn, 2001). The authors state that the underlying mechanism for enhancing attentiveness is not known but they speculate that massage therapy has been noted to enhance parasympathetic activity that is correlated with attentiveness.

Case-Smith and Bryan (1999) used a single-subject AB design to evaluate the effects of sensory integration based therapy on the engagement, play and social behaviors of preschool children with autism or pervasive developmental disorders. Although they found increases in play behavior and engagement for three of the five participants, baseline measures were obtained following the winter break, a time the authors describe as typically resulting in regression of skills. Information on the generalization of play behaviors was lacking.

Reilly, Nelson, and Bundy (1983) used an alternating treatment design to evaluate a 30-minute sensory integration-based intervention compared with a fine motor activity on the vocalizations of 18 children with autism. Contrary to predictions they found that the fine motor activity resulted in more vocalization by participants, however, there was a history of positive reinforcement for vocalizations during fine motor activities. Schilling and Schwartz (2004) used a withdrawal design to evaluate the use of therapy ball for children with autism spectrum disorders and found that children were more engaged when using the therapy ball than when using alternative forms of seating (chair, bench, carpet square on floor). These single-subject designs could be used by public school personnel to evaluate intervention outcomes if the proper controls are incorporated.

Educators and therapists who work in public schools are currently expected to use "evidence-based" practices (Odom et al., 2004). The importance of measuring outcomes and using data to guide treatment decisions has been emphasized by leaders in the field of occupational therapy (Anzalone & Williamson, 2000; Baranek et al., 2005; Ottenbacher, Tickle-Degnen, & Hasselkus, 2002). Betty Hasselkus, previous editor of the *American Journal of Occupational Therapy*, wrote that best evidence can be determined by quasi-experimental designs including single-subject designs (Ottenbacher et al.). The Council for Exceptional Children Task Force on Quality Indicators for Special Education Research also agrees that the use of single-subject designs with a set of criteria can be used to determine effectiveness of a practice (Odom et al.). In the following study, a single-subject alternating treatment design was used to evaluate the effects of sensory integration-based activities on the on-task behaviors of three students with developmental disabilities. This study was implemented by a preschool teacher with a credential in early childhood special education.

Method

Participants

Two boys with developmental delay (Jose and Marco) and one boy with autism (Dante) were participants in this study. *Jose* was a four-year old boy of Mexican decent who began early intervention services eight months prior to the study. He received an assessment from an occupational therapist that concluded he displayed some signs of "tactile defensiveness" and inconsistently reacted to teacher directions by screaming and crying especially when asked to work one-on-one in a structured setting. Jose was an active boy, who used three to

four word sentences at the time of the study. He showed signs of appropriate play skills (turn-taking, sharing, and eye contact with verbal reminders), however, the majority of the time he played along side his peers (parallel play) and did not seem to attend to any activity during play or recess for more than five to ten minutes.

Marco was a four-year eleven-month old boy of Mexican decent who began early intervention services at an early age. He transitioned into this preschool classroom at the age of three years. Some of the behaviors Marco exhibited in the classroom were: resistance to being touched by the staff, crying and screaming if anyone left the classroom, hitting his head when angry, frustrated, and/or sad, and closing his eyes or covering his eyes with his arm to avoid task demands. Marco's occupational therapy assessment also concluded signs of "tactile defensiveness". Unlike Jose, Marco had Individualized Educational Plan (IEP) goals and objectives written to address this issue. Marco also displayed oral motor difficulties, such as low tone around his mouth and drooling, and it was at the suggestion of the occupational therapist that oral swipes and oral massage be performed on Marco as part of his "sensory diet".

In addition, Marco had difficulties in the areas of fine motor, self-help, and strength/coordination. Marco was nonverbal and demonstrated his liking of Jose by walking hand-in-hand with him, sitting next to him during table activities, and helping him with classroom chores such as pulling the wagon and cleaning up toys. Marco also approached two or three of the typical peers in his after school program and would follow their verbal and physical directions to play and/or sit with them. Marco spent the majority of his time engaged in parallel play and did not demonstrate age appropriate play skills.

Dante was a four-year old boy of African-American decent who transitioned from a less structured class one-and-a-half months prior to the beginning of this study because of his lack of progress and his display of challenging behaviors (hitting and pushing others). Dante's occupational therapy assessment identified his greatest areas of need to increase his ability to: attend to tasks and people, complete transitions smoothly, and perform fine motor tasks. Dante displayed parallel play skills during free play, and at the time of the study showed limited age-appropriate play and/or social skills, except for greetings and saying "sorry" when he was told he had hurt someone. Dante enjoyed wrestling and movement activities.

Preschool Teacher

The classroom teacher, and first author of this research, held a B.A. in psychology and her teaching credential in Early Childhood Special Education. She was enrolled in an advanced degree program and this study fulfilled one of the requirements for the degree. She had worked as a classroom aide for a year and as a home program tutor for ten years. She was trained to use discrete trial teaching methods, structured TEACCH activities (Mesibov & Howley, 2003) including independent work stations, Pivotal Response Training, a child lead approach based on the principles of applied behavior analysis (Koegel, Koegel, & Carter, 1999), and sensory integration-based activities. The sensory activities were demonstrated by an occupational therapist who worked for the district. The teacher had arranged a class-wide data collection system prior to commencement of the study.

Observers

Two observers were trained for this study. The primary observer was the Special Education Technician (SET or aide) currently working in the classroom and the secondary observer was the second author and the university advisor for the teacher's degree program.

Setting

This Special Education Early Childhood classroom is located on the campus of an urban elementary school in San Diego. Located in a low-income neighborhood, the majority of the school's population is traditionally underrepresented and the majority of students are on free and reduced lunch programs. Students with Individualized Educational Plans who typically have a diagnosis of autism, mental retardation, and/or have sensory deficits and/or behavior problems are placed in spe-

cialized preschool classrooms in this district. Because of the unique needs of the students, the student to staff member ratio is approximately one or two students to one adult. School sessions for the preschool classrooms are three hours and forty-five minutes long with the morning session taking place from 9:00 am to 12:45 pm and the afternoon session taking place from 11:50 to 3:35 pm.

As the children arrive at school they are greeted at the bus and walked to the classroom where each student checks their schedule and proceeds to put their backpack away, go to the bathroom and participate in their individualized "sensory diets" (usually consisting of some or all of the following activities: brushing, joint compressions, oral swipes, and exercises, therapy ball activities, the hammock, and scooter board). Once each student is finished, the students begin their work rotations. These activities include but are not limited to: discrete trial teaching of pre-academic skills, structured teaching independent work stations for maintenance tasks, fine motor rotations (writing, cutting, puzzles, beads), structured play, circle time, art, and specialist services.

Two Special Education Technicians (SET's) support these classrooms. Typically these SET's are not trained by the district or by the special education department in the various techniques and strategies used in these classrooms. The SET in this classroom, however, was informally trained by the classroom teacher in discrete trial teaching, sensory integration-based occupational therapy, overseeing the structured teaching independent work stations, and was consistent with the classroom teacher in how to teach fine motor skills such as prewriting and cutting. The SET was also trained by the teacher on how to take data throughout all teaching strategies and activities.

Materials and Measures

For the sensory diets that all participants received, a surgical brush was used as well as a specialized brush designed for oral swipes for Marco who was given oral swipes after joint compressions. Vestibular equipment was also used and included: a hammock, swing, and scooter board. Proprioceptive input was given via joint compressions, a therapy ball, weighted vests, weighted pillows, and a blanket. The following materials were used during attention control activities: puzzles, puppets, interactive (music/lights) toys, bubbles, books, blocks, and play dough.

The dependent measures for this study were: attention to task and disruptive behaviors. Attention to task was selected because it was a reported benefit of sensory integration-based activities according to the occupational therapist and the classroom teacher. For the purposes of this study, attention to task was defined as the ability to demonstrate eye contact with the teacher and appropriate participation in an activity. Disruptive behaviors were defined as: screaming (S) or any vocalization above conversational noise level that demonstrated the participant's rejection of a command and/or task and lead to their inability to attend to, and/or perform a task for more than two seconds; crying (C) or crying for more than two seconds that lead to the participants' inability to attend to, and/or perform a task; turning away (T) or any physical movement which was demonstrated by the participant turning their body and/or head away from the task or averting their eye gaze from the task leading to a lack of attending to, and/or perform a task for more than two seconds; running away (R) or any physical attempt made by the participant to escape, avoid, and/or reject the task by removing their body from the immediate work environment; eyes closed (E) or an action made by the participant to escape, avoid, and/or reject the task by closing their eyes for a duration of more than two seconds; and other (O) or any other behavior not previously mentioned which demonstrated an attempt to escape, avoid, and/or reject the task for a duration of more than two seconds (playing with materials, staring without movement).

Recording sheets were created to score the occurrence of dependent variables. Dependent measures were scored using whole interval time sampling (5 minutes of each 15-minute activity) with 10 seconds observation and 5 seconds recording. If off task and disruptive behavior occurred, any part of the interval, the type of behavior was recorded by circling the letter coded for that behavior.

Design and Analysis

An alternating treatments design (Barlow & Hersen, 1984; Cooper, Heron, & Heward, 2007) was used to evaluate the effects of sensory integration-based occupational therapy and an attention control on activity engagement and disruptive behaviors. The two treatments or conditions of sensory integration activities and attention control activities were implemented for one to two weeks in a counterbalanced order within each single subject (Cooper et al.).

Procedure

Training of the observers took place prior to beginning the observations. The observers scored videotapes of the participants in various activities (the same activities that they would be observed in during the treatment phase) until the criterion of an inter-observer agreement rating with the classroom teacher of a minimum of 80% over three consecutive observations was obtained for each observer.

During intervention, participants were randomly assigned to a sensory integration or attention control schedule that alternated every one or two weeks. Sensory diets or attention control activities were implemented upon the participants' arrival at school and lasted for about ten minutes. The observers were not in the classroom at the time of intervention to ensure that they were blind to the intervention or condition the participants had received. The SET took the non-participating students to the restroom and the second observer did not arrive on the school grounds until after the intervention had been provided.

The sensory integration intervention consisted of the participant being brushed via the Wilbarger deep pressure and proprioceptive technique (DPPT) – brushing each arm, back, and each leg using long, firm strokes for a count of ten per body part, given joint compressions – applying firm pressure to the shoulders, elbow, wrists, fingers, hips, knees, and ankles for a count of ten per joint, use of a therapy ball (rolled on front of entire body for a count of ten – except on face and on top stomach down, pushing and pulling legs for a count of ten) (Wilbarger & Wilbarger, 1991), and swung in the hammock (stretched out, stomach down). If Marco received the sensory integration intervention, his sensory diet would also include oral swipes after joint compressions and wheelbarrow walking for a distance of ten feet.

When participants received the attention control, they were exposed to a variety of interactive activities with a staff member (not related to the sensory integration activities in their "sensory diets") for the same amount of time that they would have spent receiving their "sensory diets". An example 10-minute period might include the participant choosing an interactive story to read then, completing a series of puzzles or turn-taking games with bubbles or a ball.

Dante and Marco also received additional sensory integrative-based occupational therapy for half-an-hour three and four times a month respectively with a trained occupational therapist who worked specially on occupational therapy goals (from the student's IEP). Sessions were typically held every Friday at 9:00 am and 9:30 am, however, for the purposes of this study, occupational therapy services were rescheduled to occur after data had been collected during two targeted activities following intervention. Occupational therapy sessions were designed to develop fine motor skills, attending, and transitions for Dante, and fine motor skills, toileting, feeding, and dressing for Marco.

Observations were made during the two educational activities (independent workstations and one-on-one activity) that were scheduled directly following the intervention sessions. Independent workstations were modeled from the structured teaching approach from the TEACCH program (Mesibov & Howley, 2003) where students independently worked on a series of mastered tasks until they had completed all the tasks arranged for that session. Activities in a one-to one format with the classroom staff included pre-academic tasks taught with a discrete trial format, fine motor activities such as cutting and drawing and imitation of simple play sequences. Participants rotated through these activities for two 15-minute sessions following the initial sensory or attention activity. Each participant was recorded one child at a time for five-minute samples with the order of observation ran-

domly conducted. All observations were made within the 30-minute period following the intervention activity. During intervention, 43 observations were recorded for Jose, 40 for Marco, and 46 for Dante.

Inter-Observer Agreement

Two observers scored 63% of all observations including both conditions (sensory and attention) throughout the study. Interobserver agreement scores were calculated using the formula: the number of agreements divided by the number of agreements plus the number of disagreements divided by 100 (Sulzer-Azaroff & Mayer, 1991). The overall mean inter-rater agreement was 91% with a range from 69% to 100%. The lowest agreement score occurred during a day with a fire drill (day 6). The mean inter-rater agreement score for Jose was 93% (range = 69% to 100%), for Marco 92% (range = 70% to 100%), and for Dante 89% (range = 75% to 100%).

Results

The percentage of on-task behaviors during two separate activities (independent vs. one-on-one) and across two conditions (sensory vs. attention) for each of the three participants appear in Figure 1. The diamond represents the percentage of attention to task following the sensory integration-based condition and the square represents the percentage of on task behavior when the attention control was used.

The data indicated that there were no differences in the trend as a result of treatment intervention or by condition across all three participants (see Figure 1). The only differences observed were for the type of activity, with the participants maintaining a higher level of on task behavior when working in a one-on-one activity than when in an independent activity (see Figure 1 – lower graph). This difference could be a result of the skilled staff that were familiar with the participants and thus, were able to prevent off task behaviors during the one-to-one sessions.

Dante and Marco's highest percentage of on task behavior during the independent work activity occurred under the sensory condition, however, this high percentage occurred only once for Dante (session 9) with the second highest session scored during the attention control condition (session 23). Marco scored both the highest and lowest percentages under the sensory condition during the independent work activity. Marco had greater variability of on task performance when the sensory condition was implemented. Jose and Marco were on-task between 80% and 100% of the one-to-one sessions regardless of condition except for two observations following the sensory intervention for Marco and one during each condition for Jose when lower percentages were scored (see Figure 1). Dante's data was more variable during one-to-one activities in both conditions.

There was more variety in the type of off task behaviors scored during in the independent work stations compared with the one-to-one activities for all participants. "Turning away" was scored for each of the boys with estimated ranges of between 5 and 65% for Marco, 10 and 55% for Dante and 5 and 40% for Jose. Jose was scored as "crying" during two sessions (with 10% & 45%). "Running" from the station was observed for Dante for 5 to 10% during nine sessions and by Marco for 5% of two sessions. "Other" types of off task behaviors were recorded in thirteen (Jose) to twenty (Marco) of the observations and between 5 and 65% (Jose & Marco) of the session when the participants were in the independent work stations.

The highest category of off task behaviors scored during one-on-one sessions were for "turning away" for all participants with estimated percentages scored for Jose and Marco as between 5 and 25% and for Dante as between 5 and 50% of a session. Dante was also scored as "crying" for 5% of one session. "Other behaviors", were recorded in low percentages during one-to-one sessions for all participants and following both conditions with the exception of Jose who scored between 0% and 15% in this category during five sessions.

Discussion

This study investigated the effects of therapist recommended sensory integration-based activities on the on-task behavior in preschool children with disabilities. Results indicated

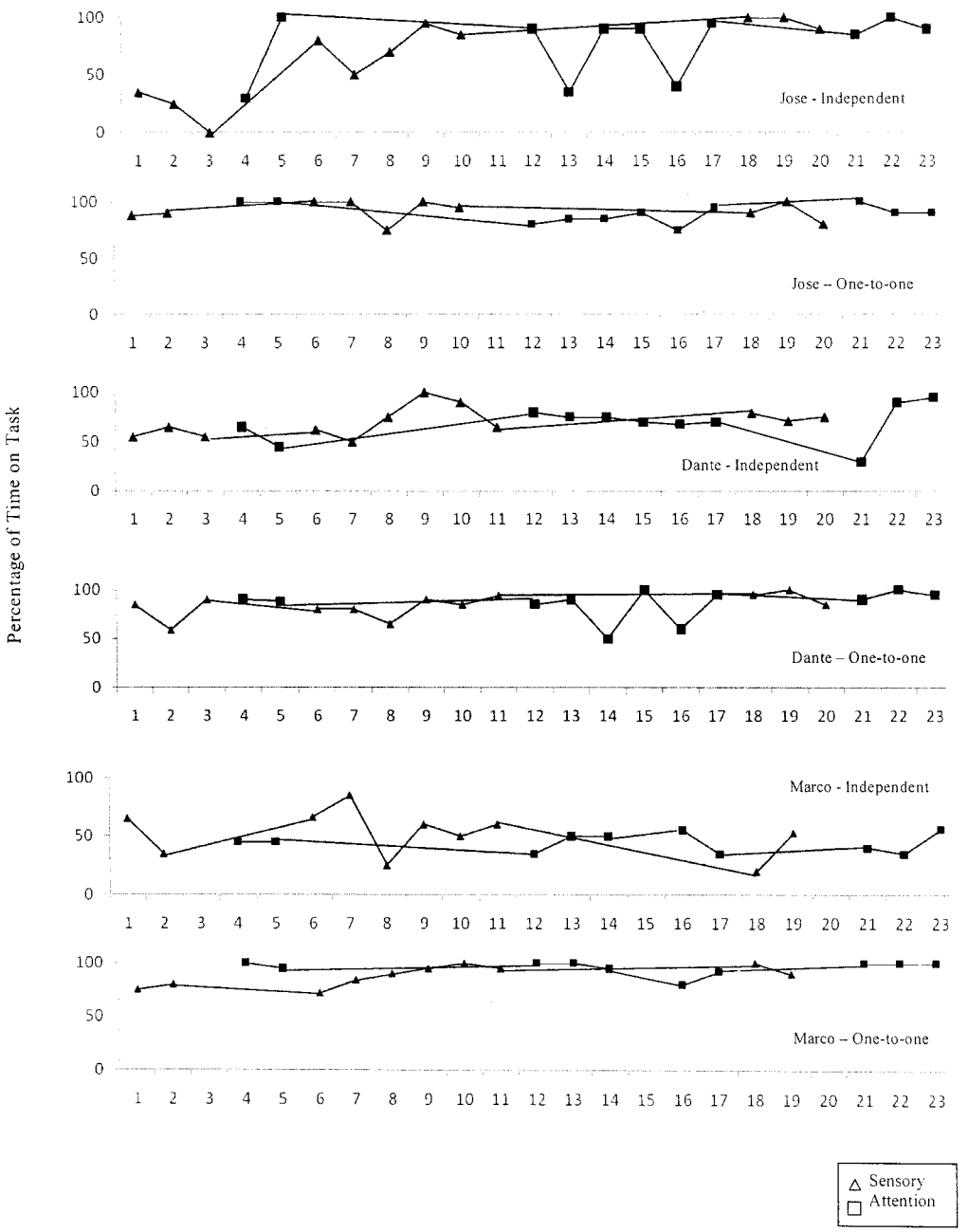

Figure 1. The estimated percentage of time on task for the three participants during independent and one-to-one activities following the two conditions of sensory integration based activities (triangle) and attention control activities (square).

that sensory integration activities had no better effect on the participants' ability to remain on task and reduce the number of disruptive behaviors than attention control activities. All three participants chosen for this study had been prescribed "sensory diets" by an occupa-

tion therapist for sensory defensiveness, and difficulty with attention, yet there was no obvious benefit to starting their day with a "sensory diet" compared with an attention control activity. Similar to results from the alternating treatments design used by Reilly and colleagues (1983), the sensory integration-based condition did not have a greater effect on targeted outcomes.

What seemed to make the most significant difference in the participants' on task behaviors was the individualized attention they received in a one-on-one educational activity versus an independent activity setting. The high percentage of on task behavior for all participants during the one-to-one activities demonstrated the effectiveness of using sound teaching strategies along with motivating materials to maintain on task behavior.

This study was organized and implemented by a preschool teacher working in a public school with the assistance of her classroom aide. Collecting the data on the student's behavior provided important information. The preschool teacher became aware that she had incorrectly attributed some positive changes in student behavior to the sensory integration-based activities, an occurrence speculated by Kaplan and colleagues (1993) to be common.

Review of the data by the occupational therapist and the Individualized Education Plan (IEP) team resulted in the decision to remove the "sensory diet" for Jose and to place him in a less restrictive environment for the following academic year. If data on the efficacy of the "sensory diet" had been collected on a consistent basis for Jose, perhaps the sensory activities would have been discontinued sooner.

Interobserver agreement was obtained, in part, by a professor who does not work in the public school. Arranging for scoring with the assigned occupational therapist would serve multiple purposes including assessing the outcomes of proposed intervention strategies and avoiding requiring teachers to spend valuable time implementing ineffective or no longer needed interventions. Baranek (2002) recommends that professionals provide sensory or motor treatments in shorter-term durations such as between 6 and 12 weeks, and that progress is well documented in a systematic manner. Public school personnel could facilitate this process by requiring ongoing progress monitoring by their occupational therapy staff.

Limitations to this study include the limited time frame in which data was collected. This study was conducted at the later half of the school year when participants were accustom to the staff, routine, and classroom environment and the data may have looked different if the study was conducted at the beginning of the school year. Follow-up data for Jose once sensory-based occupational therapy sessions were discontinued would have yielded interesting information on the maintenance of his on-task behavior.

This study serves as a model for collecting outcome data on interventions used in a public school classroom. Teachers are urged to develop a data collection system and to document student progress. Clearly, it is also important for occupational therapists to become accountable for the strategies they recommend and to provide research indicating that those strategies are evidence-based. Classroom teachers are expected to know the purpose for implementing any strategy and be able to identify the intended outcome. Teachers using ongoing progress monitoring systems can make data-based decisions regarding modifications or discontinuation of interventions in a timely manner in order to provide maximum benefit for their students with disabilities.

References

Anzalone, M. E., & Williamson, G. G. (2000). Sensory processing and motor performance in autism spectrum disorders. In A. M. Wetherby & B. M. Prizant (Eds.), *Autism spectrum disorders: A transactional developmental perspective* (pp. 143–166). Baltimore: Brookes.

Ayres, A. J. (1972). *Sensory integration and learning disabilities*. Los Angeles, CA: Western Psychological Services.

Ayres, A. J., & Tickle, L. S., (1980). Hyper-responsibility to touch and vestibular stimuli as a predictor of positive response to sensory integration procedures by autistic children. *The American Journal of Occupational Therapy, 34*, 375–381.

Arendt, R. E., MacLean, W. E., & Baumeister, A. A. (1988). Critique of sensory integration therapy and its application in mental retardation. *American Journal on Mental Retardation, 92*, 401–411.

Baranek, G. T. (2002). Efficacy of sensory and mo-

tor interventions for children with autism. *Journal of Autism and Developmental Disorders, 32*, 397–422.

Baranek, G. T., Parham, D., & Bodfish, J. W. (2005). Sensory and motor features in autism: Assessment and intervention. In F. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders* (pp. 831–857). NJ: John Wiley & Sons.

Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs: Strategies for studying behavior change* (2nd ed.). New York: Pergamon Press Inc.

Case-Smith, J. & Bryan, T. (1999). The effects of occupational therapy with sensory integration emphasis on preschool-age children with autism. *The American Journal of Occupational Therapy, 53*, 489–497.

Cooper, J., Heron, T., & Heward, W. (2007). *Applied behavior analysis (2nd ed.).* Columbus, OH: Pearson, Merrill, Prentice Hall.

Dawson, G., & Watling, R. (2000). Interventions to facilitate autditory, visual, and motor integration in autism: A review of the evidence. *Journal of Autism and Developmental Disorders, 30*, 415–421.

Escalona, A., Field, T., Singer-Strunck, R., Cullen, C., & Hartshorn, K. (2001). Improvements in the behavior of children with autism following massage therapy. *Journal of Autism and Developmental Disorders, 31*, 513–516.

Fisher, A. G., & Murray, E. A. (1991). Introduction to sensory integration theory. In A. G. Fisher, E. A. Murray, & A. C. Bundy (Eds.), *Sensory integration: Theory and practice* (pp. 3–26). Philadelphia: F. A. Davis.

Goldstein, H. (2000). Commentary: Interventions to facilitate auditory, visual, and motor integration: "Show me the data." *Journal of Autism and Developmental Disorders, 30*, 423–425.

Griffer, M. R. (1999). Is sensory integration effective for children with language-learning disorders?: A critical review of the evidence. *Language, Speech and Hearing Services in Schools, 30*, 393–400.

Hoehn, T. P., & Baumeister, A. A. (1994). A critique of the application of sensory integration therapy to children with learning disabilities. *Journal of Learning Disabilities, 27*, 338–347.

Kaplan, B. J., Polatajko, B., Wilson, N., & Faris, P. D. (1993). Reexamination of sensory integration treatment: A combination of two efficacy studies. *Journal of Learning Disabilities, 26,* 342–347.

Koegel, R. L., Koegel, L. K., & Carter, C. M. (1999). Pivotal teaching interactions for children with autism. *School Psychology Review, 28,* 576–594.

Mailloux, Z., & Smith-Roley, S. (2004). Sensory integration. In H. Miller-Kuhaneck (Ed.), *Autism: A comprehensive occupational therapy approach (2nd ed.)* (pp. 215–244). Bethesda, MD: American Occupational Therapy Association, Inc.

Mesibov, G., & Howley, M. (2003). *Accessing the curriculum for pupils with autistic spectrum disorders.* London: David Fulton Publishers.

Odom, S. L., Brantlinger, E., Gersten, R., Horner, R. D., Thompson, B., & Harris, K. (Fall, 2004). *Quality indicators for research in special education and guidelines for evidence-based practices: Executive summary.* Division for Research, Council for Exceptional Children.

Ottenbacher, K. J., Tickle-Degnen, L., & Hasselkus, B. R. (2002). Therapists awake! The challenge of evidence-based occupational therapy, *The American Journal of Occupational Therapy, 56,* 247–249.

Reilly, C., Nelson, D. I., & Bundy, A. C. (1983). Sensorimotor versus fine motor activities in eliciting vocalizations in autistic children. *Occupational Therapy Journal of Research, 3,* 199–212.

Rogers, S. J., & Ozonoff, S. (2005). Annotation: What do we know about sensory dysfunction in autism? A critical review of the empirical evidence. *Journal of Child Psychology and Psychiatry, 46,* 1255–1268.

Schilling, D. L., & Schwartz, I. S. (2004). Alternative seating for young children with autism spectrum disorder: Effects on classroom behavior. *Journal of Autism and Developmental Disorders, 34*, 423–432.

Smith, T., & Anotolovich, M. (2000). Parental perceptions of supplemental interventions received by young children with autism in intensive behavior analytic treatment. *Behavioral Interventions, 15*, 83–97.

Sulzer-Azaroff, B., & Mayer, R. G. (1991). *Behavior analysis for lasting change.* Houston, Texas: Holt, Rinehart & Winston.

Wilbarger, J., & Stackhouse, T. M. (2005). Sensory modulation: A review of the literature. *Occupational Therapy Innovations.* Retrieved November 7, 2005, from http://www.ot-innovations.com/sensory_modulation.html

Wilbarger, P., & Wilbarger, J. (1991). *Sensory defensiveness in children aged 2–12: An intervention guide for parents and other caretakers.* Avanti Educational Programs: Santa Barbara, CA.

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A Preliminary Investigation of Parents' Opinions about Safety Skills Instruction: An Apparent Discrepancy between Importance and Expectation

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Abstract: The available data suggest that both students and adults with disabilities sustain injuries and are victims of crimes at high levels. Despite these alarming data, several researchers have suggested that safety skills instruction has largely been ignored as a curricular domain. Further, although parents can serve a critical function in educational and transition planning, there is virtually no research that has examined parent perceptions regarding the importance of safety skills instruction in educational programs. The present survey obtained opinions of a sample of parents on selected issues relating to safety skills instruction. The findings suggested that the majority of respondents thought that safety skills were critically important and should be taught both at home and in school. Nevertheless, the respondents reported that few safety skills were included in their child's IEP; they had not discussed safety skills as potential educational programs with their children; and few discussed safety with their children's teacher. A Pearson Chi Square analysis revealed a negative relationship between classroom settings and discussion of safety skills by teachers. Implications of these findings to promote safety competence are discussed.

The available accident, victimization, and injury epidemiology data for persons with disabilities remain limited, but suggest that individuals with disabilities sustain injuries at relatively high levels. Xiang, Stallones, Chen, Hostetler, and Kelleher (2005) suggested that students with disabilities have a higher risk for nonfatal injuries, with the risk even higher for children with multiple, physical, or sensory disabilities (Ramirez, Peek-Asa, & Kraus, 2004). Chotiner and Lehr (1976) indicated that 70% of abused children had disabilities, and Muccigrosso (1991) reported that at least 90% of children with developmental disabilities have been sexually exploited. Further, injury or victimization data involving adults with disabilities also suggest high levels. Agran and Madison (1995) indicated that in a sample of 11,000 individuals served by 800 vocational rehabilitation facilities, over 4,000 work-related injuries were reported. Jaskulski and Mason (1992) reported that in a sample of 108 rehabilitation facilities, approximately 30% of their consumers were HIV-positive. Last, Stimpson and Best (1991) suggested that 73% of women with disabilities have been victims of violence. In all, the data suggest that individuals with disabilities are injured or victimized at high levels.

Because of cognitive, physical, or sensory limitations, several researchers have suggested that persons with disabilities may be predisposed to sustaining injuries (Agran, Spooner, & Zakas, 2008). Even with accessible school facilities, such limitations may present challenges for students with disabilities in school and community settings (Ramirez et al., 2004). Such characteristics as "poor judgment; lack of awareness of danger; impulsiveness and restlessness; inability or difficulties in communicating; low pain threshold; abnormal muscle functioning causing difficulties in chewing, swallowing, standing, walking; and impaired vision and/or hearing" (Bryan, Warden, Berg, & Hauck, 1978, p. 8) may predis-

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pose individuals with disabilities to injury and physical harm.

There is no question that virtually any school, community, work, or home setting has inherent risks and can be dangerous for individuals who do not know or have difficulty in identifying and responding appropriately to risk stimuli. Indeed, to underscore this point, accidents remain the leading cause of death for children without disabilities (Peterson, 1984). Despite alarming information that many students with disabilities have limited knowledge on how to respond to potentially risky or dangerous situations and, as a result, are injured or victimized at levels that appear to exceed the general population, several researchers have suggested that safety skills instruction has largely been ignored as a curricular domain (Agran, 2004; Agran et al., 2008). Unfortunately, many teachers and parents have assumed that students with disabilities either have these skills or are incapable of learning them if they do not. Most importantly, failure to provide systematic safety instruction will leave individuals vulnerable to injury and danger, limit their competence and full participation in school and life experiences, and perpetuate their dependence on caregivers or service providers (Agran, 2004).

The seriousness of the situation regarding the need for direct safety skill instruction cannot be overstated. National data on injury and victimization prevalence for people with disabilities are sobering. For example, children with disabilities are 1.8 times more likely to be neglected, 1.6 times more likely to be physically abused, and 2.2 times more likely to be sexually abused than children without disabilities (Hibbard & Desch, 2007). A report on child maltreatment by the U.S. Department of Health and Human Services (2006) reported that over 52,000 children with disabilities were victims of maltreatment. Of those, over 3,000 children with cognitive disabilities were victims of maltreatment. Even more compelling is the fact that child victims with a disability reportedly were 52% more likely to be victimized again than children without a disability. Considering the implications of these data, the need for safety skills instruction for students with disabilities seems self-evident, but safety instruction continues to be a critically neglected area of instruction. This is particularly distressing in light of the fact that there is ample research about teaching safety skills to individuals with disabilities (Mechling, 2008).

It is ironical that, although teachers think safety skills are important (Collins, Wolery, & Gast, 1992), little has been reported in the literature regarding the opinions of parents about this issue. Parents serve a critical function in educational and transition planning and "shared decision making" with school teams (Turnbull, Turnbull, Erwin, & Soodak, 2006). Parent participation and support for the development of skills that lead to independence is critical. That said, the extent to which parents are actively involved in identifying safety skills in their children's IEPs remains uncertain.

Although several studies have addressed safety instruction from the perspective of teachers (Collins et al., 1992) or service providers (Madison & Agran, 1995), only one examined parent perceptions about safety skills instruction, specifically, which skills parents thought were most important (Collins, Wolery, & Gast, 1991). Such skills as appliance use, bathtub safety, responding to strangers, and responding to fires were uniformly recommended. However, although this study delineated the full range of school-, home-, and community-based safety skills that can be incorporated into instructional programs, it did not examine the nature or quality of safety instruction provided, or the extent to which safety skills were included in IEPs. Given the critical importance of safety skills for students with disabilities and the potentially important role parents can play in educational planning, research on parent perceptions of safety skill instruction is clearly warranted. Such research would be of value in designing safety skills instructional programs most responsive to students' and parents' needs and values. The purpose of the present investigation was to provide a preliminary report on parents' perceptions regarding the importance of safety skills instruction, which skills they thought were most important, the extent to which they had discussed this skills area with their child and their child's teacher, the extent to which safety skills were included in their child's IEPs, and which skills they thought were most beneficial to their children.

Method

Participants

Participants included a convenience sample of 121 parents, who had children with varying types of disabilities and ages. These parents were members of a parent support and advocacy group funded in part by the target state's Department of Education, who were attending a conference designed for parents of children with disabilities.

Instrument Development and Dissemination

A survey instrument was developed based on a review of literature in safety skills instruction for students with disabilities (Agran, 2004; Collins et al., 1991). A draft instrument was field-tested for clarity, comprehensiveness, and relevance of questionnaire items among three graduate students in special education and two state agency personnel staff members who work with parents of children with disabilities, and revisions were made as needed. The resulting instrument was comprised of 14 forced-choice questions and one open-ended question. The questions related to three categories: demographic instruction about their children; parent-teacher communication about safety skills instruction; the extent to which such instruction was provided to their children; and relative importance of selected safety skills areas.

The survey was disseminated to parents attending a parent conference sponsored by the target state's Department of Education. No instructional materials were presented to the parents, and no feedback was provided either during or after completion of the survey questionnaires.

Data Analysis

Descriptive. Frequency tallies were taken for each checked each item of each question, then converted to percentages for all questions except the one open-ended question. The frequency of responses was calculated and reported in terms of number and percentages of responses out of the total number of completed questionnaires returned.

Chi square analysis. To determine if a significant relationship existed between variables a Pearson Chi Square contingency analysis was conducted. Specifically, a crosstab analysis was conducted for the Chi Square statistic (α = .05) to determine the significance of the relationship between specific groupings and respondents' answers to specific questions. Following this analysis, Cramer's phi was calculated to determine effect size.

Interrater Agreement

To ensure the believability of recorded survey findings, agreement data were calculated across survey questionnaire items. Specifically, two types of agreement were calculated: agreement regarding the frequency of responses to each response option and agreement regarding the responses to the open-ended questions. The second author and an independent reader independently transcribed the responses of approximately 10% of the surveys. The percentage of agreement was calculated by dividing the total number of responses recorded by each recorder by the smaller total, and multiplying by 100.

Results

Eighty-eight (n = 88) out of 121 respondents completed the safety questionnaire, resulting in a 72% response rate. Demographic characteristics of respondents' children are displayed in Table 1. The majority of children (53%) was in the 6 to 12-year-old range. The primary instructional settings were the general education setting (42%), resource room (24%), and early childhood (19%), respectively. The majority of students was served in elementary grade levels (44%), followed by high school (21%) and early childhood (19%).

Parents were asked to identify the primary disability of their children (Note: In many cases, more than one disability was identified by a single respondent). *Autism* was the most frequently noted disability (31%), followed by *Other Health Impaired* (23%), and *Speech Language Disability* (22%). (Note: The category of *Other Health Impaired* also included students identified with *ADD/ADHD.*)

Frequencies of responses to safety ques-

TABLE 1

Demographic Characteristics of Respondents' Children

	n	%
Age Ranges in Years		
0–5	9	(10)
6–12	47	(53)
13–15	15	(17)
16–21	13	(15)
21+	3	(3)
Primary Ed Setting[a]		
General Education	37	(42)
Resource Classroom	21	(24)
Self-Contained Classroom	10	(11)
Post HS/Work Training	2	(2)
Kindergarten or Below	17	(19)
Type of Disability[b]		
Autism	27	(31)
Deaf/Blind	0	(0)
Deaf/Hard of Hearing	4	(5)
Emotional	14	(16)
Cognitive	12	(14)
Multiple	16	(18)
Orthopedic	1	(1)
Learning Disability	7	(8)
Speech Language	19	(22)
Other Health Impaired[c]	20	(23)
Visual Impairment	3	(3)
Traumatic Brain Injury	2	(2)
Other	15	(17)
Grade Levels		
PreK-Kindergarten	17	(19)
Elementary	39	(44)
Middle/Jr. High	9	(10)
High School	18	(21)
Post High School	4	(4)

Notes: [a] Percentages were rounded up.

[b] Several respondents indicated more than one disability.

[c] This category included ADD/ADHD.

tions, which required a Yes/No response, are displayed in Table 2. Over 80% of the respondents indicated that safety skills were not part of their children's IEPs and they had never requested that safety skills be included in their child's IEP. Further, 75% indicated that teachers had never discussed safety skills with them, and 84% reported that they never asked their children if they wanted to learn safety skills.

TABLE 2

Frequencies of Parent Responses About Safety Skills

	Yes	*No*
Questions About Safety Skills	*n (%)*	*n (%)*
Has there ever been a safety skills listed as an instructional goal on your child's IEP?	17 (19)	71 (81)
Have you ever requested to your child that safety skills be included in his/her IEP?	18 (20)	70 (80)
Has your child's teacher ever discussed the issue of safety skills with you?	22 (25)	66 (75)
There are more important things to teach in school than safety.	27 (31)	59 (69)
Have you asked your child if he or she would like to learn safety skills at school?	13 (15)	74 (85)
Safety skills are important but should be taught at home and not in school.	3 (3)	12 (14[a])

[a] As an additional choice, parents could choose home and school as *Both Important* (*Both* = 73(83)).

Ironically, when asked if safety skills was an important area to teach, 93% indicated they were *critically* or *very important* and 67% indicated there were no more important things to teach than safety. When asked if safety skills should be taught at home and not at school, 83% of the parents thought it should be taught both at home and at school.

As indicated in Table 3, parents were asked to identify the three most important safety skill areas their children should be taught. Respondents indicated home safety most often (16%). Home safety could include skills such as "recognizing dangerous materials" (e.g., poisonous fluids, items stacked improperly) and "proper use of tools" (e.g., using cutting tools, items that heat up). Crime prevention (11%) represented the next item selected most often. This item could include skills such as "recognizing/responding appro-

TABLE 3

Most and Least Important Safety Skills Areas

Most Important Skill Areas	*n (%)*
All are Important Areas	73 (83)
Home Safety	14 (16)
Crime Prevention	10 (11)
Drug Prevention	9 (10)
Work Safety	4 (5)
HIV/AIDS Prevention	4 (5)
Least Important Skill Areas	*n (%)*
None are Least Important	43 (49)
Work Safety	18 (21)
HIV/AIDS Prevention	14 (16)
Crime Prevention	7 (8)
Home Safety	3 (3)
Drug Prevention	3 (3)

priately to strangers". The next frequently indicated item was drug prevention (10%). This could include recognizing inappropriate or illegal drugs or paraphernalia, responding to peer pressure to engage in inappropriate drug use, and the ability to discriminate between "good" and "bad" drugs. Finally, work safety and HIV/AIDS safety were indicated 7% and 5%, respectively. Most noteworthy, 83% of parents indicated they thought *all areas* were important by checking the appropriate space.

When asked which safety area was the least important, parents indicated that work safety (21%) and HIV/AIDS safety (16%) were least important. Interestingly, many parents (49%) chose not to pick a *least* important safety area, and indicated that "all of these are important".

As noted earlier, parents were asked if a safety skill had ever been listed as an instructional goal on their child's IEP. Those who indicated *Yes* were further asked to identify the goal or goals. Interrater agreement across survey items was 90%, meaning the categories identified by each rater for descriptive purposes showed a strong concurrence for this question, as well as the open-ended question discussed below. Of the 17 who indicated *Yes,* 35% noted that the goal pertained to traffic safety. Other safety skills parents identified were personal safety (e.g., knowing phone number and address), public safety/getting help, and encountering strangers or animals.

A final open-ended question asked parents to indicate if there were any specific safety skills they thought were beneficial for their children. Seventeen ($n = 17$) different skills were noted, with several mentioned multiple times. Avoiding or encountering strangers was mentioned the most often ($n = 9$), followed by all safety skills are "good to teach" ($n = 7$), bully prevention areas ($n = 6$), traffic/street safety ($n = 5$), and personal safety ($n = 4$). Other safety skills identified were related to outdoor/recreational safety, victimization in general, and recognizing emergency personnel and situations.

The Pearson Chi Square analysis suggested there was a statistically significant relationship ($\chi^2(4, n = 87) = 18.1, p < .001$) between the setting where students were primarily served and responses related to the question "if safety skills were ever listed on the child's IEP as goals". Effect size was calculated using Cramer's phi ($\varphi = .48$), showing a large effect. These results indicated a negative relationship between students who were primarily served in the general education setting and the degree to which safety skills were included as part of their IEPs.

Additionally, there was a statistically significant negative relationship between the setting and responses related to the question "if their child's teacher had ever discussed safety skills with him or her" ($\chi^2(4, n = 87) = 10.1, p = .038$). Effect size was calculated using Cramer's phi ($\varphi = .35$), showing a moderate effect.

Discussion

The purpose of this survey was to examine parents' opinions about safety skills relative to their child's public education. The findings suggest that 93% of the parents considered safety skills to be a very important part of their children's educational experience. Further, when asked to rank order the relative importance of selected safety skills areas (e.g., home safety, crime safety), the vast majority indicated that all safety skills are important. Additionally, the majority of parents indicated that these skills should be taught both at home and in school. Last, 67% of the parents said that there were no more important skills to teach

than safety. In all, the data suggest that parents consider safety skills instruction to be an important component of their child's education. However, other responses the parents made suggest several major discrepancies. First, the majority of parents also reported that there were no safety skills listed as instructional goals in their child's IEP. Second, the majority of parents had never asked their children if they wanted a safety skill included in their IEPs. Third, the majority of parents never discussed safety with their child's teacher. Clearly, these findings suggest a discrepancy between importance (how parents rated a safety skill area) and expectation (the extent to which these skill areas were included in their child's IEP).

The findings suggest that parents held strong opinions about the importance of safety skills with regards to their children. They indicated that safety is both a home and school responsibility. That said, one would assume that specific safety skills instruction would comprise at least some of their children's formal public education, however, the results suggest otherwise. Further, the fact that the parents neither discussed safety with their children or their respective teachers supports this finding. It is possible, if not likely, that the parents did discuss safety with their children but it was not within an educational context (not represented in their child's IEP). The situation is further compounded by the fact that approximately one-third of the target students are of transition age, and many key safety skills areas have particular relevance for this age group (e.g., crime safety, work safety). The study did not examine the reasons why safety skills were either not included in the IEPs, or why they do not receive more attention in terms of parent-teacher communication. Consequently, suggesting reasons for this absence may be at best speculative. Nevertheless, the findings do provide preliminary information that may be helpful in understanding this discrepancy between how parents rated safety skills and their apparent absence on IEPs.

The majority of students in the sample, as reported by their parents, were served in either general education or resource rooms, and 10% were served in self-contained classrooms. The fact that most of the students were served in general education settings is of course positive. Although we did not ask the parents to describe the nature of their child's educational program, it would seem logical to assume that these students were receiving academic instruction. The Chi Square analysis suggested that there was a statistically significant negative relationship between class setting and extent to which safety skills were discussed between the teacher and students. That is, safety skills were discussed less in the less restrictive setting (i.e., general education). Consequently, a reason why the students were apparently not receiving safety instruction may be that the emphasis in their classrooms was on academic instruction, and not functional skill development in safety. Lynch and Beare (1990) reported that in a sample of students with intellectual and emotional disabilities their educational programs were exclusively academic. Also, findings presented in the National Longitudinal Study (Wagner, Newman, Cameto, Levine, & Garza, 2006) suggest that close to half of transition-age youth with disabilities do not receive life skills instruction, and Grigal, Test, Beattie, and Wood (1997) reported that only a little more than half of the students with IEPs in their sample received life skills instruction. If this is the case (i.e., education for students in the mild to moderate disabilities is predominantly academic in focus), it may explain why students did not receive safety instruction and why their parents did not communicate with teachers about safety. This finding is of course distressing for at least two reasons. First, it reveals of course that students are not receiving critical instruction that may greatly enhance their safety, well-being, and health status. Second, as suggested by Spooner, Di Biase, and Courtade-Little (2006), several functional skills—particularly, health and safety—can be potentially linked to the general education science content. For example, avoiding injury can be taught under the *Content Standard: Science in Personal and Social Perspectives.* Consequently, academic instruction and safety do not need to be mutually exclusive.

It is surprising that the majority of parents said that they did not have any communication with teachers about safety, given the fact that they valued safety so highly. We did not

ask the parents the reasons for this, so this question remains unanswered. It could be that parents thought that this was a home matter, but the fact that most of them indicated that safety is both a school and home responsibility would contradict this. Whatever the reason, we suggest that it is incumbent upon teachers to inform parents of the vulnerability of their children in having an accident or sustaining an injury and to inform parents about the importance of academic and functional skills.

Parents were also asked to rank the importance of specific safety skills areas. Interestingly, most of the respondents indicated that all of the listed safety skills areas were important. In response to an open-ended question, several respondents also indicated that all safety skills are important to teach. Following this response, home safety and crime prevention were identified as being "most important." When asked which of the skills areas were least important, close to half of the respondents indicated "none were least important."

Interestingly, approximately 10% of the parents indicated that their children should be taught how to avoid or encounter strangers. No doubt this was a real concern for many of these parents and not surprising given the popular attention to this issue. Ironically, although strangers may commit an appreciable number of crimes, most crimes are committed by family members, service providers, or acquaintances or persons the victim knows (Sobsey, 1994). This is information that needs be shared in a safety skills program.

Findings from the present investigation provide insight on the perceptions of parents of students with varied disabilities regarding the nature and extent to which their children were receiving safety skills instruction. However, interpretation of these findings should be viewed with some caution as there are several limitations. First, although the return rate was relatively high and the respondents represented different geographic areas in the target state, the fact that the parents were members of a specific parent advocacy organization limit the generality of the findings and warrant replication with a larger sample size. The fact that the respondents were members of this organization may suggest that they had a certain value set that was not representative of other parents in this state, and that this may have predisposed them to differentially respond to survey questions. Also, demographic information about the parents (e.g., education level, economic status) was not acquired. Such information may have provided insight about the nature of the responses. There is no question that additional replications are needed involving larger and diverse samples of parents from varying states and geographic areas, economic conditions, and educational backgrounds. Second, to maximize the return of completed surveys, the survey was relatively brief and designed to require relatively little time from respondents. That said, the survey may have omitted several key items that would have provided useful information. In particular, the survey did not focus on specific skills. A survey including specific skills may have yielded different findings. Third, the focus of the investigation was to obtain data directly from the sample of parents via the survey, but no effort was made to collect any corroborating evidence to support or refute their perceptions. Thus, no information was obtained on the nature or type of safety skill instruction their children received or how mastery was assessed, and such information may have been of value in best understanding the parents' responses. It was possible that the students received safety instruction that was not reflected in their IEPs. It is recommended that in future research descriptive information about instruction delivered should be included. Fourth, although the survey yielded information about the nature of the students' primary placement, it did not ask parents to provide any information about their child's educational program. Given the range of disabilities of the target students, we have made the assumption that these children were receiving academic instruction but this remains uncertain. It is also possible that the students were receiving functional skill development in other areas than safety (e.g., community living, mobility). Last, although the input provided by parents was of value, it represents their interpretation and opinion of the quality of their child's education. As such, it may not have accurately represented the events that occurred. It would have been helpful if the survey was also disseminated to the students who could provide input on the education

they received. Future research should ensure that this occurs.

Despite the limitations of this study, this investigation represents the first study to examine the perceptions of parents regarding the importance of safety skills instruction and the extent to which their children were receiving such instruction. The data set presented is admittedly limited, nevertheless, the data reported are compelling as they suggest that safety skills instruction is virtually neglected despite the high frequency of accidents and harm sustained by people with disabilities. The present study did not examine the reason why safety skills instruction was not discussed more often by teachers and parents, but the fact remains that the failure to discuss this topic and include these skills in the students' IEPs may have resulted in the lack of appropriate instruction for these students. There is no question that parents and teachers may find certain safety skills areas difficult to discuss (e.g., crime prevention, HIV/AIDs prevention), and this may have contributed to their failure to discuss safety as a curricular domain. Additionally, parents may never have discussed safety with their child's teacher because they believed that their child had a repertoire of safety skills, even though they may never have asked their child to perform them, or there never has been a situation in which the child needed to perform them. Also, as mentioned previously, parents may not think their child could benefit from such instruction and may be reluctant to discuss this with the teacher. Last, parents may have the conviction that their responsibility and that of service providers should be more geared to avoiding risk and protecting the student from potential injury rather than putting them in a situation where an accident or injury may occur. Whatever the reasons, it is imperative that parents and teachers (and, ultimately, students) engage in a meaningful discussion about safety and, hopefully, implement systematic instruction in this area; specifically, how to identify the risks that may be present in the student's school and community, how to respond when these risks are present, and who to contact to get necessary support or to correct the situation. Failure to do so represents a grave omission and potentially compromises both the independence and the well being of individuals we support.

References

Agran, M. (2004). Health and safety. In P. Wehman & J. Kregel (Eds.), *Functional curriculum* (pp. 357–383). Austin, TX: Pro-Ed.

Agran, M., & Madison, D. (1995). Prevalence of injuries among supported employees. *Journal of Vocational Rehabilitation, 5,* 5–13.

Agran, M., Spooner, F., & Zakas, T. L. (2008). Health and safety skills. In T. Oakland & P. Harrison (Eds.), *Adaptive behavior assessment system-II: Clinical use and interpretation.* Atlanta: Elsevier.

Bryan, E., Warden, M. G., Berg, B., & Hauck, G. R. (1978). Medical consideration for multiple handicapped children in the public schools. *Journal of School Health, 48,* 84–89.

Chotiner, N., & Lehr, W. (1976). *Child abuse and developmental disabilities: A report from the New England regional conference.* Boston: New England Developmental Disabilities Communication Center.

Collins, B., Wolery, M., & Gast, D. L. (1991). A national survey of safety concerns for students with special needs. *Education and Training in Mental Retardation, 26,* 305–318.

Collins, B, Wolery, M., & Gast, D. L. (1992). A national survey of safety concerns for students with special needs. *Journal of Developmental and Physical Disabilities, 4*(3), 263–277.

Grigal, M., Test, D. W., Beattlie, J., & Wood, W. (1997). An evaluation of transition components of individualized education programs, *Exceptional Children, 63,* 357–372.

Hibbard, R. A., & Desch, L. W., Committee on Child Abuse and Neglect, & Council on Children with Disabilities. (2007). Maltreatment of children with disabilities. *Pediatrics, 119,* 1018–1025.

Jaskulski, T., & Mason, C. (1992). AIDS policies and education: What are vocational and residential rehabilitation providers doing? *American Rehabilitation, 19*(3), 12–19.

Lynch, E., & Beare, P. L. (1990). The quality of IEP objectives and their relevance to instruction of students with mental retardation and behavioral disorders. *Remedial and Special Education, 11,* 48–55.

Madison, D., & Agran, M. (1995). Safety skills training in supported employment: A survey of current practices. *Journal of Vocational Rehabilitation, 5,* 15–23.

Mechling, L. (2008). Thirty year review of safety skill instruction for persons with intellectual disabilities. *Education and Training in Developmental Disabilities, 43,* 311–323.

Peterson, L. (1984). Teaching home safety and sur-

vival skills to latch-key children: A comparison of two manuals and methods. *Journal of Applied Behavior Analysis, 17,* 279–293.

Muccigrosso, L. (1991). Sexual abuse prevention strategies and programs for persons with developmental disabilities. *Journal of Sexuality and Disability, 9,* 261–272.

Ramirez, M., Peek-Asa, C., & Kraus, J. F. (2004). Disability and risk of school related injury. *Injury Prevention, 10,* 21–26.

Sobsey, D. (1994). Crime prevention and personal safety. In M. Agran, N. Marchand-Martella, & R. Martella (Eds.), *Promoting health and safety: Skills for independent living* (pp. 193–213). Baltimore: Paul H. Brookes.

Spooner, F., Di Biase, W., & Courtade-Little, G. (2006). Science standards and functional skills: Finding the links (pp. 229–243). In D. M. Browder & F. Spooner (Eds.), *Teaching language arts, math, & science.* Baltimore: Paul H. Brookes

Stimpson, L., & Best, M. C. (1991). *Courage above all: Sexual assault against people with disabilities.* Toronto, Ontario, Canada: DisAbled Women's Network.

Turnbull, A. P., Turnbull, R., Erwin, E., & Soodak, L. (2006). *Families, professionals, and exceptionality: Positive outcomes through partnerships and trust* (5th ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.

U. S. Department of Health and Human Services (2006). *Child Maltreatment 2006.* Retrieved June 16, 2008, from http://www.acf.hhs.gov/programs/cb/pubs/cm06/.

Wagner, M., Newman, L., Cameto, R., Levine, P., & Garza, N. (2006). *An Overview of Findings from Wave 2 of the National Longitudinal Transition Study-2 (NLTS2).* Menlo Park, CA: SRI International. Available at www.nlts2.org/reports/2006_08/nlts2_report_2006_08_complete.pdf.

Xiang, H., Stallones, L., Chen, G., Hostetler, S. G., & Kelleher, K. (2005). Nonfatal injuries among U.S. children with disabling conditions. *American Journal of Public Health, 95,* 1970–1975.

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Personal Safety Programs for Children with Intellectual Disabilities

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Abstract: As the severity and extent of child abuse among children with intellectual disabilities is widely recognized, increased attention is now being directed toward personal safety programs. There is, however, relatively little research on teaching personal safety skills to these children. The purpose of this study was to review studies on personal safety programs for children as well as adults with intellectual and developmental disabilities and to present future directions for research on such programs for children with intellectual disabilities.

Child abuse is a serious problem. In 2005, an estimated 12.1 per 1,000 children were found to be victims of child abuse, including sexual, physical, and emotional abuse as well as neglect (U.S. Department of Health and Human Services, 2007).

Unfortunately, children with intellectual disabilities are at even greater risk for child abuse. A large body of research has consistently demonstrated a relationship between intellectual disability and child abuse. For example, Sullivan and Knutson (2000) investigated the incidence of child abuse among an entire school-based population that included all 50,278 children during the 1994/95 school year in Omaha, Nebraska. They collected child abuse registry records, foster care records, law enforcement records, and school records to obtain evidence of child abuse and information about disability status. The results showed that children with intellectual disabilities were about 4.0 times more likely to be the victims of child abuse than their peers without disabilities. In particular, these children were 4.0 times as likely to be sexually abused, 3.8 times as likely to be physically abused, 3.8 times as likely to be emotionally abused, and 3.7 times as likely to be neglected as children without disabilities.

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In another study, Verdugo, Bermejo, and Fuertes (1995) assessed child abuse among children with intellectual disabilities who were living in institutions in Spain. Through a questionnaire completed by professionals (doctors, social workers, psychologists), the researchers found that 11.5% of children with intellectual disabilities had been abused or neglected, while only 1.5 % of children without intellectual disabilities had experienced child abuse. It was estimated that the rate of child abuse was about eight times higher among those with intellectual disabilities than among those without intellectual disabilities. Similarly, many other studies have confirmed the strong relationship between intellectual disability and child abuse with findings indicative of either a high occurrence of child abuse among children with intellectual disabilities (e.g., Ammerman, Van Hasselt, Hersen, McGonigle, & Lubetsky, 1989; Benedict, White, Wulff, & Hall, 1990) or an overrepresentation of children with intellectual disabilities within abused or neglected samples (e.g., Bonnier, Nassogne, & Evrad, 1995; Kvam, 2000; Sandgrund, Gaines, & Green, 1974).

Numerous researchers suggest that specific characteristics of children with intellectual disabilities may be associated with an increased risk of child abuse (e.g., Sobsey, 1994b; Tharinger, Horton, & Millea, 1990; Watson, 1984). First, these children often depend on others for activities of daily living and

personal care. This dependency creates the necessity for intensive interactions with caregivers. When the caregivers have the potential to be abusive, their interactions with caregivers are readily exploited.

Second, children with disabilities often do not have proper personal safety vocabulary necessary to report instances of child abuse (Alyott, 1995; Petersilia, 2000). When they do not have the vocabulary, they are unlikely to tell adults about the incidents in a comprehensible way. Hershkowitz, Lam, and Horowitz (2007) found that children with disabilities were more likely to fail to report child abuse than their peers without disabilities. Without children's disclosures, child abuse may remain unrecognized and uninterrupted.

Third, special education programs tend to teach children to comply with others' requests. As a result of compliance training, they may think that they have no right to refuse adults' inappropriate demands, and may comply with the requests (Watson, 1984). Moreover, since compliance is often viewed as consent, the chance of prosecution of a perpetrator would be reduced (Sobsey, 1994a). In turn, the lack of consequences for perpetration almost ensures repeated victimization.

Poor social skills may also be an important factor. Children who lack social skills are less able to discriminate between appropriate and inappropriate interactions in relationships with different people. Consequently, they may be at a high risk for being manipulated into child abuse. In addition, because poor social skills may interfere with the establishment of close relationships, the children are more likely to be socially isolated. Perpetrators tend to seek out those children who are unable to get protection from friends or community.

Finally, children with intellectual disabilities are frequently excluded from sex education programs (Blum, Resnick, Nelson, & Germaine, 1991; Strommsness, 1993). The children who have insufficient sexuality knowledge may regard abusive or inappropriate behaviors as acceptable. Furthermore, child abuse is sometimes rationalized by perpetrators as being educative. According to Sobsey (1994a), individuals with intellectual disabilities who were abused were sometimes told by the perpetrators that they had to undergo this as part of their sexuality education when they were being abused.

In addition to these child characteristics, other factors such as cultural attitudes and beliefs, as well as segregation in institutions help to account for a greater risk of child abuse among children with intellectual disabilities (Sobsey, 1994b).

As professional awareness of the problem of child abuse expands, there appears a need for personal safety programs as one of multiple approaches to reduce the risk of child abuse. There is, however, relatively little research on personal safety programs for children with intellectual disabilities. The purpose of this study was to examine personal safety programs for children as well as adults with intellectual and developmental disabilities and to present implications for future research in the area of personal safety programs for children with intellectual disabilities.

Personal Safety Programs

Personal safety programs aim to reduce the risk of child abuse by teaching safety skills and knowledge to children with intellectual disabilities. Such programs have been developed for teaching self-protection skills, decision-making skills, social-sexual skills, and sexuality knowledge to individuals with intellectual and developmental disabilities.

Self-Protection Skills Programs

The goal of self-protection skills programs is to teach children with intellectual disabilities to identify a potentially dangerous situation, to respond safely to the situation by verbally refusing and/or leaving the situation, and to report the situation. There have been a small number of studies on teaching self-protection skills to children with intellectual and developmental disabilities. Lee and Tang (1998) used the Behavioral Skills Training Program designed for children without disabilities to teach Chinese children with intellectual disabilities self-protection skills. In the program, the children were taught about body ownership (i.e., we are the bosses of our bodies), the locations of private body parts, how to discriminate between appropriate and inappropriate touches, and who is responsible for child

abuse (i.e., other people's inappropriate touching is never the child's fault). They were also taught to say 'no' in response to an abusive lure, escape from the situation, and report the incident. Instruction, modeling, role plays, shaping, reinforcement, and feedback were employed to teach the skills. The children's knowledge and skills were assessed using the Personal Safety Questionnaire (PSQ) and the What If Situation Test (WIST). The PSQ indicated that children who participated in the program demonstrated better understandings of abuse concepts (e.g., being boss of one's own body, touching an adult's private parts is wrong) than a control group at posttraining and at a 2-month follow-up. The WIST, in which vignettes describing appropriate and inappropriate touching behaviors were verbally presented and questions were asked (i.e., what would you do if you were in the situation?), indicated that the training group evidenced a significant increase in the recognition of appropriate and inappropriate touches, compared with the control group. Furthermore, upon identifying the inappropriate touches, the training group was more likely to verbally describe appropriate responses to the situation (i.e., saying 'no,' leaving the situation, and reporting the incident) as compared to those in the control group. The improvements in the training group were also apparent at a 2-month follow-up. On a closer examination of the specific skills, however, the results indicate that children in the training group received relatively low scores on reporting skills (i.e., telling about incidents).

In a similar study, Warzak and Page (1990) taught children with developmental disabilities to say 'no' to an abusive lure and leave the situation using instruction, modeling, role plays, feedback, and reinforcement. The participants' skills were assessed using role plays, in which potentially abusive behaviors were simulated and the participants' responses to the situations were recorded. The results showed that training was effective in teaching refusal skills to the children.

In comparison, more research attention has been directed toward self-protection skills programs for adults with intellectual disabilities. Lumley, Miltenberger, Long, Rapp, & Robert (1998) developed a self-protection program to prevent abuse by caregivers. The program taught adults with intellectual disabilities the locations and names of private body parts, knowledge of appropriate and inappropriate types of sexual activities and relationships (e.g., it is not okay to have a sexual relationship with service providers), characteristics of abuse situations (e.g., perpetrators often use bribes or threats to lure individuals or keep the incident a secret), and how to verbally and physically refuse abusive lures and report the incident. Instruction, modeling, role plays, reinforcement, and feedback were used to teach these skills. A knowledge measure (a questionnaire) showed that the participants improved their knowledge of sexual abuse concepts following training. Assessment, consisting of verbal reports (i.e., participants' verbal descriptions of what they would do in abusive situations) and role plays, also indicated that the participants demonstrated an increase in their self-protection skills following training and at a 1-month follow-up. However, in-vivo assessment showed that they could not fully generalize their skills to real-life settings and that none of the participants were able to report the incidents.

In a similar study, Miltenberger et al. (1999) taught self-protection skills to adults with intellectual disabilities. The content of this program included concepts of sexual abuse, discriminating sexual abuse from appropriate behaviors, verbal and physical refusal skills, and reporting skills. Instruction, modeling, role plays, reinforcement, and feedback were utilized to teach the skills. Role play assessment showed that the program was successful in teaching self-protection skills, while in-vivo assessment indicated that generalization of the skills occurred after additional training was conducted in natural settings, but that the participants often had difficulty with reporting skills.

Haseltine and Miltenberger (1990) employed a commercially available self-protection program to teach adults with intellectual disabilities identification of body parts, the names of private body parts, discrimination between appropriate and inappropriate behaviors, verbal refusal, physical escape, and reporting skills. Instruction, modeling, role plays, reinforcement, and feedback were employed to teach the skills. A film, "Child Mo-

lestations: When to say NO" was also presented. In-vivo assessment, in which an abduction lure (e.g., offering a ride) was presented, showed that the skills were generalized into real settings at posttraining and at a one- and six-month follow-up, although some of the participants needed additional feedback to perform reporting skills.

In conclusion, self-protection skills programs discussed here were found to be effective in improving the skills of individuals with intellectual disabilities, although some doubt remains as to whether these skills are generalized to natural settings. Future studies should be conducted in order to develop and systematically evaluate such programs for children with intellectual disabilities. In addition, the existing research indicated that children and adults with intellectual disabilities experienced difficulties with reporting skills. Thus, more research should be devoted to developing personal safety programs specifically with an aim to enhancing accurate reporting skills.

Decision-Making Skills Programs

Children with intellectual disabilities have often been taught to obey others in order to meet their needs. This is likely to make them much more vulnerable to child abuse (Sobsey, 1994b; Watson, 1984). Recently, decision-making skills programs have been developed to teach individuals with intellectual disabilities to identify harm in abusive situations and make an independent decision to minimize the risk.

A program designed by Khemka, Hickson, and Reynolds (2005) taught adults with intellectual disabilities about different types of abuse (i.e., sexual, physical, emotional abuse), how to discriminate between healthy and abusive relationships, how to identify feelings or emotions associated with these relationships, how to implement strategies for stopping and reporting abuse, positive stress management, and coping strategies. A four-step decision-making process (i.e., problem identification, generation of alternative choices, consequence evaluation, and selection of the best course of action) was also addressed in the program. Instruction, modeling, role plays, and discussion were employed to teach the skills. Participants' skills were assessed using the Knowledge of Abuse Concept Scale (KACS) and the Self-Decision Making Scale (SDMS). The KACS indicated that the adults who participated in the program demonstrated significantly greater knowledge of abuse issues than did those of a control group. Moreover, the SDMS, in which vignettes describing sexual, physical, and emotional abuse were verbally presented and questions were asked, showed that the training group significantly improved in their ability to identify problems in abusive situations and to make decisions to handle the situations, compared with the control group.

In a similar study, Khemka (2000) conducted two decision-making skills programs, including a traditional decision-making program and an integrated cognitive and motivational program. The traditional decision-making program taught a cognitive decision-making strategy (i.e., problem identification, definition of problem, alternative choice generation, consequence evaluation) to adults with intellectual disabilities. The integrated cognitive and motivational program taught the cognitive strategy with an added emphasis on motivation. The participants' skills were assessed using verbal reports, in which verbal vignettes and video clips portraying sexual, physical, and emotional abuse were presented. Results indicated that the participants in both programs increased their decision-making skills relative to a control group.

In summary, several researchers have developed and evaluated decision-making skills programs for adults with intellectual disabilities. Their studies demonstrated that the programs were successful in teaching decision-making skills, although there were no measures to assess whether the participants transferred the skills into natural settings. Future research should be conducted on teaching decision-making skills to children with intellectual disabilities. Moreover, given that the studies discussed here failed to demonstrate generalization of the skills, decision-making skills programs need to be evaluated using in-vivo assessments.

Social-Sexual Skills Programs

Social-sexual skills programs have been developed to teach individuals with intellectual dis-

abilities what to say and how to behave in social and sexual relationships (Whitehouse & McCabe, 1997). Children with intellectual disabilities may benefit from improved social-sexual skills in that the skills help them to avoid being manipulated into inappropriate relationships and to develop meaningful social and sexual relationships in an acceptable manner.

Foxx, McMorrow, Storey, and Rogers (1984) taught adults with intellectual disabilities six social-sexual skills, including delivering and accepting compliments, engaging in social interactions, being polite, giving and accepting criticism, dealing with social confrontation, and asking questions and giving answers. A board game, *Sorry*, and a specially designed card deck were used to teach the skills. Each time participants moved a game piece, the game cards describing male-female interactions or referents to sexual behaviors were verbally presented. The participants were then asked what they should do in the situations. Feedback and reinforcement were provided as needed. The participants' skills were assessed using response scores to the game questions. The results indicated that the adults with intellectual disabilities demonstrated an increase in social-sexual skills following training. An important feature of this program was that the social-sexual skills in the program were identified through observations of social interaction, interviews with service providers who worked with individuals with disabilities, and literature reviews. This helped to ensure that the program included relevant and functional skills that the participants needed in their everyday lives.

Valenti-Hein, Yarnold, and Mueser (1994) developed a dating-skills program. In the program, adults with intellectual disabilities were taught skills for initiating, maintaining and ending conversations, listening, recognizing and expressing emotions, identifying similarities between oneself and others, giving and receiving compliments, asking for a date, dealing with rejection, compromising, resisting persuasion, sexual functioning, and birth control. Discussion, modeling, role plays, and feedback were employed to teach the skills. Assessments, consisting of the series of game questions used in Foxx et al.'s study (1984) and role plays, demonstrated that the participants in the training group significantly improved their dating skills at posttraining and at a 2-month follow-up, compared to a control group. Similarly, other researchers taught dating skills to adults with intellectual disabilities (Lindsay, Bellshaw, Culross, Staines, & Michie, 1992; Mueser, Valeti-Hein, & Yanold, 1987) and developmental disabilities (Green, 1983). However, aside from Mueser et al.'s study demonstrating the effectiveness of a dating-skills program, the other studies did not provide evaluation data.

To date, researchers' efforts have been directed toward the development of social-sexual skills programs for adults with intellectual disabilities. The studies in this area indicated that the adults demonstrated an increase in social-sexual skills following the programs. However, no attempt was made to assess generalization of the skills in the existent studies. Again, it appears that there is a need for the development and evaluation of such programs for children with intellectual disabilities.

Sexuality Education Programs

Several researchers indicate that sexuality education has a role to play in decreasing the risk of being abused or neglected (Sobsey, 1994a; Sobsey & Mansell, 1990; Wilgosh, 1990). Since the 1980s, a number of sex education programs have been developed and evaluated.

Penny and Chataway (1982) employed a sexuality education program developed by the Family Planning Association to teach sexuality information to children and adults with intellectual disabilities. In the program, the participants were taught about body parts, reproduction, relationships, male and female roles, parenting, contraception, and sexually transmitted diseases (STDs). Instruction and discussion were utilized to teach the information. The participants' sexual knowledge was assessed using the Sexual Vocabulary Test, in which the participants were asked to explain words related to the body and sexual expression. The results indicated that the participants' knowledge increased following training and was maintained at a 2-month follow-up.

Garwood and McCabe (2000) used the Co-Care program and the Family Planning Victoria (FPV) program to teach sexuality knowl-

edge to children and adults with intellectual disabilities. The Co-Care program covered feelings, body language, social skills, the human life cycle, puberty, body awareness, private and public behavior, sexual relationships, conception, pregnancy and childbirth, contraception, menstruation, and protective behaviors. The FPV program addressed self-awareness, feelings, body awareness, non-private and private body parts, public and private behaviors, relationships, protective behaviors, sexual relationships, contraception, and AIDS. The participants' knowledge was assessed using the Sexuality Knowledge, Experience, Feelings and Needs Scale for People with Intellectual Disability (Sex Ken-ID). The results showed that the participants in the programs increased their sexual knowledge at posttraining. The results from these studies were consistent with the results from other studies demonstrating the effectiveness of sexuality education on adults with intellectual and developmental disabilities (Caspar & Glidden, 2001; Lindsay et al., 1992; McDermott, Martin, Weinrich, & Kelly, 1999; Robinson, 1984).

Recently, a more comprehensive sex education program was developed for adults with intellectual disabilities, their parents, and their service providers (Plaute, Westling, & Cizek, 2002). Interestingly, the program placed a great emphasis on the needs of individuals with disabilities and significant people who were directly involved in the individuals' lives. That is, the researchers interviewed a group of individuals with disabilities, the residential staff who worked with them, and their parents. During the interview, the participants identified and organized relevant and valuable sexual knowledge they believed should be addressed in the program. The content of the program included the names of body parts and their functions, hygiene, relationships (e.g., love, marriage), sexual behavior (e.g., masturbation), childbirth, contraception, pregnancy, STDs, and sexual abuse. Group activities (e.g., a visit to hospitals to observe newborn babies, having a "singles" party) were also included to increase an understanding of sexuality. Although the researchers did not report evaluation data, they provided a good example of how to develop relevant personal safety programs to address the needs of individuals with intellectual disabilities.

In summary, numerous researchers have developed sex education programs for both children and adults with intellectual and developmental disabilities, although there are fewer such programs for children with intellectual disabilities. The programs were found to be successful in increasing a broad range of sexual knowledge. However, it still remains unclear whether or not children with intellectual disabilities would be able to apply the knowledge to their daily lives.

Conclusions

Over the past few decades, it has become increasingly clear that child abuse is a serious problem for children with intellectual disabilities. Research on the incidence of child abuse leaves no doubt that these children are at increased risk for abuse or neglect. In order to reduce the risk of child abuse, it is absolutely critical to teach personal safety skills and knowledge to these children. While the majority of personal safety programs were found to be effective in teaching adults with intellectual and developmental disabilities self-protection skills, decision-making skills, social-sexual skills, and sexuality information, such programs for children with intellectual disabilities are rarely addressed in the existing research. There appears an immense need for an increase in studies on developing and evaluating the programs for these children.

In the development of personal safety programs, one of the most important tasks is to identify skills and knowledge relevant and important to children with intellectual disabilities. Significant people who closely live and work with children, because of their expertise or familiarity with these children, know what type of information the children need to learn. Thus, their ideas and concerns are critical in developing educational programs. To date, however, only two studies have reported attempts to include such significant people in identifying the content of personal safety programs (Foxx et al., 1984; Plaute et al., 2002). Future program development needs to focus on seeking the input of significant people who are directly involved in the children's lives.

Most studies included in this review evalu-

ated personal safety programs using a knowledge measure, a verbal report assessment, and a role play assessment. A few studies employed in-vivo assessments to examine generalization of personal safety skills and knowledge (Haseltine & Miltenberger, 1990; Lumley et al., 1998; Miltenberger et al., 1999). However, these studies found that participants' knowledge and their performance in role plays were not necessarily consistent with their behaviors in natural settings. Those findings do not ensure that those skills acquired by participants are able to be applied to real-life settings. Thus, more naturalistic measures (e.g., in-vivo assessments) will need to be utilized, when the effectiveness of the programs is evaluated.

Several researchers have demonstrated that individuals with intellectual disabilities often have difficulties making a factual report (Haseltine & Miltenberger, 1990; Lee & Tang, 1998; Lumley et al., 1998; Miltenberger et al., 1999). This may be in part due to a lack of personal safety vocabulary necessary to describe the experiences of being abused or neglected. Several personal safety programs have attempted to teach about labeling body parts and feelings (e.g., Haseltine & Miltenberger; Khemka et al., 2005; Lumley et al.), yet there are no programs to teach the personal safety vocabulary necessary in order for children with intellectual disabilities to develop accurate reporting skills. More research attention should be paid to the development and evaluation of such programs for this population.

References

Alyott, J. (1995). Identifying people with learning disabilities who have been sexually abused. *British Journal of Nursing, 4,* 1110–1111.

Ammerman, R. T., Van Hasselt, V. B., Hersen, M., McGonigle, J. J., & Lubetsky, M. J. (1989). Abuse and neglect in psychiatrically hospitalized multihandicapped children. *Child Abuse and Neglect, 13,* 335–343.

Benedict, M. I., White, R. B., Wulff, L. M., & Hall, B. J. (1990). Reported maltreatment in children with multiple disabilities. *Child Abuse and Neglect, 14,* 207–217.

Blum, R. W., Resnick, M. D., Nelson, R., & Germaine, A. (1991). Family and peer issues among adolescents with spina bifida and cerebral palsy. *Pediatrics, 88,* 280–285.

Bonnier, C., Nassogne, M. C., & Evrad, P. (1995). Outcome and prognosis of whiplash shaken infant syndrome: Late consequences after a symptom-free interval. *Developmental Medicine and Child Neurology, 37,* 943–956.

Caspar, L. A., & Gildden, L. M. (2001). Sexuality education for adults with developmental disabilities. *Education and Training in Mental Retardation and Developmental Disabilities, 36,* 172–177.

Foxx, R. M., McMorrow, M. J., Storey, K., & Rogers, B. M. (1984). Teaching social/sexual skills to mentally retarded adults. *American Journal of Mental Deficiency, 89,* 9–15.

Garwood, M., & McCabe, M. P. (2000). Impact of sex education programs on sexual knowledge and feelings of men with mild intellectual disability. *Education and Training in Mental Retardation and Developmental Disabilities, 35,* 269–283.

Green, D. T. (1983). A human sexuality program for developmentally disabled women in a sheltered workshop setting. *Sexuality and Disability, 6,* 20–24.

Hershkowitz, I., Lam, M. E., & Horowitz, D. (2007). Victimization of children with disabilities. *American Journal of Orthopsychiatry, 77,* 629–635.

Haseltine, B., & Miltenberger, R. G. (1990). Teaching self-protection skills to person with mental retardation. *American Journal on Mental Retardation, 95,* 188–197.

Khemka, I. (2000). Increasing independent decision-making skills of women with mental retardation in simulated interpersonal situations of abuse. *American Journal on Mental Retardation, 105,* 387–401

Khemka, I., Hickson, L., & Reynolds, G. (2005). Evaluation of a decision-making curriculum designed to empower women with mental retardation to resist abuse. *American Journal on Mental Retardation, 110,* 193–204.

Kvam, M. H. (2000). Is sexual abuse of children with disabilities disclosed? *Child Abuse and Neglect, 24,* 1073–1084.

Lee, Y. K., & Tang, C. S. (1998). Evaluation of a sexual abuse prevention program for female Chinese adolescents with mild mental retardation. *American Journal on Mental Retardation, 103,* 105–116.

Lindsay, W. R., Bellshaw, E., Culross, G., Staines, C., & Michie, A. (1992). Increases in knowledge following a course of sex education for people with intellectual disabilities. *Journal of Intellectual Disability Research, 36,* 531–539.

Lumley, V. A., Miltenberger, R. G., Long, E. S., Rapp, J. T., & Robert, J. A. (1998). Evaluation of a sexual abuse prevention program for adults with mental retardation. *Journal of Applied Behavior Analysis, 31,* 91–101.

McDermott, S., Martin, M., Weinrich, M., & Kelly, M. (1999). Program evaluation of a sex education

curriculum for women with mental retardation. *Research in Developmental Disabilities, 20,* 93–106.

Miltenberger, R. G., Roberts, J. A., Ellingson, S., Galensky, T., Rapp, J. T., & Long, E. S., et al. (1999). Training and generalization of sexual abuse prevention skills for women with mental retardation. *Journal of Applied Behavior Analysis, 32,* 385–388.

Mueser, K. T., Valenti-Hein, D., & Yarnold, P. R. (1987). Dating skills groups for the developmentally disabled. *Behavior Modification, 11,* 200–228.

Penny, R. E. C., & Chataway, J. E. (1982). Sex education for mentally retarded persons. *Australia and New Zealand Journal of Developmental Disabilities, 8,* 204–212.

Petersilia, J. (2000). Invisible victims: Violence against persons with developmental disabilities. *Human Right, 27,* 9–12.

Plaute, W., Westling, D. L., & Cizek, B. (2002). Sexuality education for adults with cognitive disabilities in Austria: Survey of attitudes and the development of a model program. *Research and Practice of Persons with Severe Disabilities, 27,* 58–68.

Robinson, S. (1984). Effects of sex education program on intellectually handicapped adults. *Australia and New Zealand Journal of Developmental Disabilities, 10,* 21–26.

Sandgrund, A., Graines, R., & Green A. H. (1974). Child abuse and mental retardation: A problem of cause and effect. *American Journal of Mental Deficiency, 79,* 327–330.

Sobsey, D. (1994a). Sexual abuse of individuals with intellectual disability. In A. Craft (Ed.). *Practice issues in sexual and learning disabilities* (pp. 93–115). London: Rutledge.

Sobsey, D. (1994b). *Violence and abuse in the lives of people with disabilities: The end of silent acceptance.* Baltimore, MD: Paul H. Brookes.

Sobsey, D., & Mansell, S. (1990). The prevention of sexual abuse of people with developmental disabilities. *Developmental Disabilities Bulletin, 18,* 51–66.

Strommsness, M. M. (1993). Sexually abused women with mental retardation: Hidden victims, absent resources. *Women and Therapy, 14,* 139–152.

Sullivan, P. M., & Knutson, J. F. (2000). Maltreatment and disabilities: A population based epidemiological study. *Child Abuse and Neglect, 24,* 1257–1273.

Tharinger, D., Horton, C. B., & Millea, S. (1990). Sexual abuse and exploitation of children and adults with mental retardation and other handicaps. *Child Abuse and Neglect, 14,* 301–312.

U.S. Department of Health and Human Services. (2007). *Child maltreatment 2006.* Retrieved April 18, 2008, from http://www.acf.hhs.gov/programs/cb/stats_research/index.htm#can

Valenti-Hein, D., Yarnold, P. R., & Mueser, K. T. (1994). Evaluation of the dating skills program for improving heterosocial interactions in people with mental retardation. *Behavior Modification, 18,* 32–46.

Verdugo, M. A., Bermejo, B. G., & Fuertes, J. (1995). The maltreatment of intellectually handicapped children and adolescents. *Child Abuse and Neglect, 19,* 205–215.

Watson, J. D. (1984). Talking about the best kept secret: Sexual abuse and children with disabilities. *The Exceptional Parent, 14,* 15–20.

Warzak, W., & Page, T. J. (1990). Teaching refusal skills to sexually active adolescents. *Journal of Behavior Therapy and Experimental Psychiatry, 21,* 133–139.

Whitehouse, M. A., & McCabe, M. P. (1997). Sex education for people with intellectual disability. *Education and Training in Mental Retardation and Developmental Disabilities, 32,* 229–240.

Wilgosh, L. (1990). Sexual assault and abuse of people with disabilities: Parent's concerns. *Developmental Disabilities Bulletin, 18,* 44–50.

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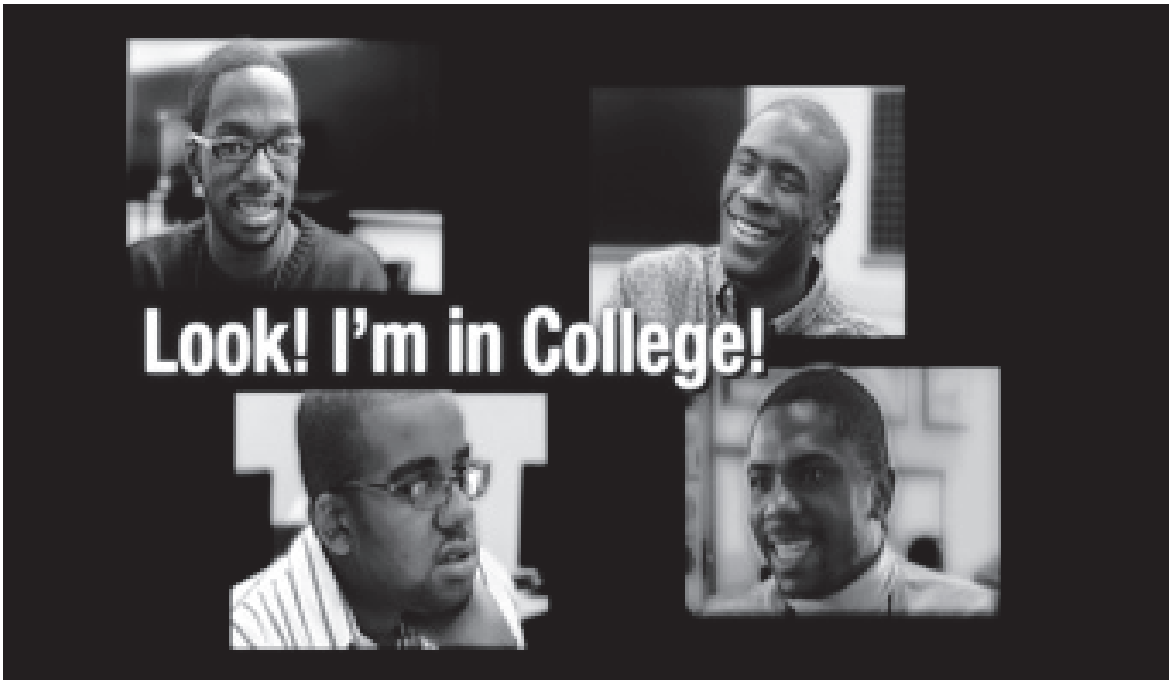
Look! I'm in College! DVD



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