

KNOWLEDGE AND CONFIDENCE OF SPEECH-LANGUAGE PATHOLOGISTS
REGARDING AUTISM

Julie M. Ray, B.S., M.A.

Dissertation Prepared for the Degree of
DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

December 2010

APPROVED:

Smita Mehta, Major Professor
Bertina Combes, Committee Member
Darrell Hull, Committee Member
Lloyd Kinnison, Committee Member
Abbas Tashakkori, Chair of the
Department of Educational
Psychology
Jerry R. Thomas, Dean of the College of
Education
James D. Meernik, Acting Dean of the
Robert B. Toulouse School of
Graduate Studies

Ray, Julie M. Knowledge and Confidence of Speech-Language Pathologists Regarding Autism. Doctor of Philosophy (Special Education), December 2010, 78 pp., 11 tables, references, 67 titles.

The increased prevalence rate of autism has immense implications for speech language pathologists (SLPs) who are directly involved in the education and service delivery for students with autism. However, few studies have documented the effectiveness of the knowledge and confidence of SLPs regarding autism. The purpose of this study was to measure the knowledge and confidence of SLPs regarding autism and the extent to which their educational and professional training prepared them to work effectively with this population. An online survey was administered to and returned by 336 SLPs nation-wide. Two multiple linear regressions were conducted to determine the variables that explained overall knowledge and confidence. The number of students with autism on one's caseload explained most of the variance. Independent sample t-test results depicted knowledge and confidence scores of SLPs who were behaviorally trained versus those who were not behaviorally trained. SLPs who were behaviorally trained had higher mean scores on measures of knowledge and confidence when compared to those without formal behavioral training. Finally, a bivariate correlation was conducted to explore the relationship between knowledge and confidence of SLPs, however, results were not statistically significant.

Copyright 2010

by

Julie M. Ray

ACKNOWLEDGEMENTS

It is a pleasure to thank those who made this dissertation possible. First, I would like to thank my professors Drs. Smita Mehta, Bertina Combes, and Kevin Callahan. Their insight into my potential allowed me to become a participant in the Project STARS program. Over the past four years their steadfast encouragement allowed me to develop into a researcher with a strong desire to pursue further research experiences. In addition, I would like to thank the US Department of Education (Grant # H325D060017) for funding this program and giving me the opportunity to provide a positive effect on the numerous lives of families and individuals living with autism. I give special thanks to Dr. Mehta for providing me with guidance, patience, and knowledge, as she has been my mentor throughout this entire process.

I would also like to express my gratitude to many others who aided in making this academic pursuit possible. Without the support and shared understanding of my Project STARS classmates, tough times may not have seemed so manageable. I would also like to thank Debbie Farr, coordinator of the Project STARs program, and Forest Lane, educational research student for his guidance in statistics. In addition, thanks to Drs. Paul Cascella, Lisa Cushing, Juane Heflin, Dorthea Lerman, Brenda Scheuermann, Aubyn Stahmer, and Matt Tincani for their willingness to take time out of their busy schedules to aid in the content validation procedures of my dissertation.

Lastly, I want to thank my friends and family, especially my parents who have always supported and believed in my ability to accomplish every endeavor I have pursued. Special thanks go to Brittany Tillman, a little girl with autism I met in 2002. Without her presence in my life, I cannot be sure any of this ever would have happened.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	v
KNOWLEDGE AND CONFIDENCE OF SPEECH-LANGUAGE PATHOLOGISTS REGARDING AUTISM	1
Methods.....	10
Results	14
Discussion	22
References	40
Appendices	
A. SURVEY INSTRUMENT.....	45
B. EXTENDED LITERATURE REVIEW	51
C. INSTRUMENT DEVELOPMENT PROCESS.....	66
COMPREHENSIVE REFERENCE LIST	73

LIST OF TABLES

	Page
1. Summary of Frequency of Respondents by State	33
2. Professional and Educational Background Summary.....	34
3. SLP Preparedness of Techniques in Universities.....	35
4. Regression Summary of Independent Variables on Knowledge.....	36
5. Summary of Beta Weights and Structure Coefficients for Knowledge	36
6. Regression Summary of Independent Variables on Confidence	36
7. Summary of Beta Weights and Structure Coefficients for Confidence.....	37
8. Frequency of Respondent Scores by % in Knowledge and Confidence.....	37
9. Measures of Central Tendency for Knowledge and Confidence.....	37
10. Results of Knowledge Items [Understanding Regarding Autism], $N = 36$	38
11. Results of Knowledge Items [Understanding Regarding Autism], $N = 36$	39

KNOWLEDGE AND CONFIDENCE OF SPEECH-LANGUAGE PATHOLOGISTS REGARDING AUTISM

The term autism spectrum disorders (ASD) is used to describe “a group of developmental disabilities that are characterized by atypical development in socialization, communication, and behavior. ASD typically are apparent before age 3 years, with associated impairments affecting multiple areas of a person’s life” (Centers for Disease Control [CDC], 2009).

ASD has lost its reputation for being a low-prevalence condition. Recent reports suggest that the prevalence for ASD has changed from 1 in 150 noted in 2007 to 1 in 110 children recorded in 2009 (CDC, 2007; 2009). These prevalence rates indicate a dramatic increase when compared to previous reports from the 1990s that indicated a rate of 4 to 5 in 10,000 children (Hulit & Howard, 1997; Reed, 1994). The increased prevalence rate has immense implications for families and professionals including speech language pathologists (SLPs) that are involved in the education and service delivery for children.

Education and related service interventions for students with ASD are developed to address three primary characteristics associated with the diagnostic criteria, namely deficits in social interaction and communication, and demonstration of restricted, repetitive, and stereotypical patterns of behavior, interests, and activities (American Psychiatric Association [APA], 2000). Two of the three characteristics (i.e., deficits in communication and social interaction) consistently require intervention by SLPs. Therefore, it is critical that SLPs have the knowledge and confidence required to work

with students ASD, specifically autism (AU), because this group of children is more likely to display severe skill deficits in all areas of development.

Although many professionals are involved in the diagnosis, assessment, and intervention of individuals with autism (National Research Council, 2001), deficits in communication and social interaction call for attention from SLPs for an extended period of time starting in early childhood often through adulthood (American Speech Language and Hearing Association [ASHA], 2006c). Specifically in school settings, SLPs are largely responsible for providing direct intervention to children with autism as well as consulting with personnel that work with such students. Recent reports indicate that 83% to 84% of school-based SLPs directly intervene with students with autism in clinical settings (Whitmire & Eger, 2003; ASHA, 2008). Due to the need for establishing professional standards for SLPs, ASHA formulated an ad hoc committee and released a four part series on ASD (2006a; 2006b; 2006c; 2006d). The gist of the report is that “SLPs serve as an integral part of a team, including individuals with ASD and their families, that is responsible for formulating and implementing service delivery plans that meet the unique communication needs of the individuals with ASD” (ASHA, 2006a, p. 2).

The above statement implies that SLPs employed in public schools are expected to possess prerequisite knowledge and a broad range of competencies for serving students with autism effectively (Simpson, 2004). These areas of knowledge and skills should be acquired through formal course work and specialized instruction instead of exclusively through in-service training and self-instruction (Heflin & Alaimo, 2007; Simpson & Myles, 2008). In other words, “instructional and management methods must

be explicitly taught, and these skills must be modeled and practiced in field placements with students with ASD” (Simpson, 2004, p. 140). In essence, if these opportunities are not provided during preservice training, SLPs would be compelled to acquire prerequisite knowledge through continuing education or self-instruction, which may or may not necessarily include empirically-validated practices for students with autism.

Traditional preparation for SLPs includes knowledge and skills necessary for addressing deficits in speech, communication and social interaction skills of individuals with various types of disabilities. However, it is unclear whether they are professionally prepared to address concurrent issues that emerge during social or communication intervention such as managing student problem behavior. Research has shown that deficits in communication skills are correlated with a high rate of occurrence of problem behavior (e.g., tantrums, aggression and self-injury) (Day, Horner, & O’Neill, 1994; Derby et al., 1997; Durand & Carr, 1992; Lalli, Mace, Wohn, & Livezey, 1995; Shukla & Albin, 1995; Sprague & Horner, 1992). In fact, various topographies of problem behavior are used by individuals with disabilities to communicate needs and wants in the absence of functional communication skills (Buschbacher & Fox, 2003; Carr & Durand, 1985; Donnellan et al., 1984; Durand, 1993). In addition, Camarata and colleagues (1988) have also reported that 97% of participants with autism scored one or more standard deviations below the mean for language skills suggesting a high correlation between below average language skills and high rates of problem behavior.

Responding to student problem behaviors during language intervention is facilitated if interventionists are professionally trained in the field of applied behavior analysis (ABA). Increasing amount of evidence, dating back almost 50 years (Ullman & Krastner, 1965;

Willis & Giles, 1976), has demonstrated that the use of ABA has been very effective for children with intellectual disabilities and is *the* most effective treatment methodology for individuals with autism (Eikeseth, Smith, Jahr, & Eldevik, 2002; Lovaas, 1987; Kimball, 2002; McEachin, Smith, & Lovaas, 1993; Sallows & Graupner, 2005; Smith, Eikeseth, Levstrand, & Lovaas, 1997; Smith, Groen, & Wynn, 2000;). ABA techniques are widely utilized to decrease problem behaviors as well as increase skills in speech, language, and communication (Mancil, Conroy, Nakao, & Alter, 2006; Martin, Drasgow, Halle, & Brucker, 2005).

The National Autism Center (NAC), a non-profit organization dedicated to the improvement of the lives of individuals with autism, recently completed a national standards project where it presents a careful analysis of evidence-based practices in the field of autism (2009). In this report, pivotal response treatment, naturalistic teaching strategies, modeling, and comprehensive behavioral treatment have all been recognized as established and evidence-based practices. The common component among the above mentioned practices is that these and several others are rooted in the science of applied behavior analysis (ABA).

It appears that SLPs who work with students with autism need to be competent and confident not only in providing skills-instruction but also in problem behavior management (Nungesser & Watson, 2005). Given that a vast majority (84%) of SLPs provide services to students with autism (ASHA, 2008), measurement of their knowledge and skills in the interrelated areas of autism and problem behavior management seems to be warranted. Several researchers have investigated the type of

training, knowledge, and perspectives of SLPs regarding autism (Beck & Dennis, 1997; Cascella & Colella, 2004; Schwartz & Drager, 2008; Stone, 1987).

Beck and Dennis (1997) surveyed SLPs and teachers regarding their perceptions of classroom-based interventions, such as speech therapy. One of the sections on the survey pertained to classroom management. Authors wanted to specifically investigate the perceptions of teachers and SLPs regarding student problem behavior in the general education classroom. Forty-three percent of SLPs disagreed that “behavior management was nonproblematic” whereas 38% agreed with the statement. Thirty-five percent disagreed that “attention of targeted children is easily maintained” while 25% agreed with the statement. With both items, the majority of SLP participants disagreed with the statements, suggesting a less than optimal comfort level in managing problem behavior of students receiving speech therapy in the classroom. While this study measured the perceptions of SLPs regarding their behavior management skills, other studies have measured the knowledge of SLPs based on a survey instrument originally developed by Stone (1987).

Stone (1987) had originally assessed the knowledge and beliefs of several groups of professionals including SLPs, clinical psychologists, pediatricians, and school psychologists regarding autism. Survey responses were compared to responses of 18 “autism experts.” The items on the survey were developed to include the social, emotional, and diagnostic domains of autism. In Section I of the instrument, a Likert scale was provided to participants to select the degree to which they agreed with the stated items. In Section II, participants were asked to respond to questions regarding diagnosis and characteristics of autism. Stone noted that responses of the experts were

consistent with perspectives found in the scientific literature of that time period.

However, when compared to the responses of experts, participants representing the four disciplines had varying misconceptions regarding autism. For example, SLPs believed that autism was an emotional disorder and professionals from all other disciplines believed individuals with autism had special talents and skills.

Many in the field consider Stone's research to be seminal for understanding the knowledge of professionals that work with children with autism (Campbell, Reichle, Van Bourgondien, 1996; Heidgerken, Geffken, Modi, & Frakey, 2005; Schwartz & Drager, 2008; Stone & Rosenbaum, 1988). Helps, Newson-Davis, and Callis (1999) modified Stone's (1987) survey instrument and distributed it to participants in London, England. The investigators added nine additional items to the survey and modified the item format in which the content was presented. Three groups of professionals were surveyed including mainstream teachers, specialist teachers (i.e., those working with special education populations), and support staff. Responses of participants were compared with the responses provided by a group of "experts." Findings of the study showed that (1) participants tended not to recognize children with autism as having challenges in learning; (2) respondents recognized autism as an emotional disorder; (3) they did not commonly recognize autism as a developmental disorder.

In 2004, Cascella and Colella investigated the knowledge of SLPs who worked in schools in the state of Connecticut. Information regarding caseloads, university training, continuing education, autism knowledge, and knowledge of communication disorders related to autism was obtained. This study required SLPs to self-report on knowledge regarding autism and educational or intervention strategies including ABA, discrete trial

training, incidental teaching, and naturalistic interventions. Means were computed for each intervention by knowledge rating (i.e., very knowledgeable, knowledgeable, somewhat knowledgeable, or minimally knowledgeable). Most SLPs reported being “somewhat knowledgeable” about intervention strategies noted above. Overall, results indicated that SLPs were less than optimally knowledgeable and trained in autism. Cascella and Colella (2004) suggested that further education was needed for adequate preparation of SLPs that worked with students with autism.

Most recently, Schwartz and Drager (2008) investigated the training, knowledge, and confidence of SLPs in delivering treatment to children with autism. Participant responses were collected through a survey that included items that were either true/false (i.e., mutually exclusive and objective) or on a Likert scale (i.e., ordinal and subjective). Some of the items appeared to have been derived from Stone’s (1987) previous research. The true/false statements were used to obtain responses regarding the diagnostic characteristics of autistic disorder. The Likert scale was used to obtain information on characteristics of autism and related competencies. The authors noted that participant responses were more consistent with the current scientific literature when compared to participants in Stone’s (1987) study; however, authors believed that the results were less than optimal for this group (even though they did not define what they considered to be optimal level of knowledge and confidence).

Schwartz and Drager stated that SLPs appeared to be more knowledgeable about general autism characteristics than its diagnostic criteria. They suggested that further research should focus on accurately evaluating knowledge of SLPs on critical dimensions. They also suggested that undergraduate and graduate programs at

universities consider incorporating more focused information on autism “to develop specialized competencies” among the SLPs (p. 67).

The few studies described above specifically targeted SLPs as participants for assessing the knowledge regarding autism. None of the studies, however, specifically assessed the knowledge in applied behavior analysis or techniques specifically designed to measure confidence on problem behavior management. Research on the measurement of knowledge of other professionals besides SLPs has also identified similar findings.

Nungesser and Watkins (2005) surveyed 45 preschool teachers regarding their perceptions of challenging behavior of students with autism. Teachers responded that they usually used “reactive” responses to challenging behavior, such as time-out, loss of privileges, and use of physical restraint rather than “proactive” methods like function-based interventions or use of language to communicate choices. Findings also showed that not all teachers believed that communication difficulties were related to problem behavior. Although the participants in their study were teachers, the authors discussed the importance and need for SLPs to have a strong understanding of the relationship between challenging behavior and social-communication skills. They urged SLPs to consider four recommendations, all of which were reported to be endorsed in the behavioral and developmental literature.

First, Nungesser and Watkins (2005) encouraged SLPs to be mindful of the functions that maintain student problem behavior. They suggested the use of functional communication training to replace maladaptive behaviors which would likely result in an increase in desirable behavior. The implication of this recommendation is that SLPs

need to possess an understanding of the concept of behavioral functions in order to implement functionally equivalent replacement behaviors. Second, they suggested that SLPs engage in the classroom settings to inform, teach, and model methods for staff and provide shadowing or direct intervention to students in a natural environment to facilitate language development, reducing the probability of occurrence of problem behaviors. Third, the authors recommended SLPs to teach emotional language skills designed to provide students with the opportunity to express feelings verbally rather than through maladaptive behaviors. Finally, Nungesser and Watkins (2005) recommended that SLPs utilize other students in the classroom to model skills, engage in role play of appropriate skills, and create interactions to promote generalization of newly learned skills.

Issues related to the type and content of professional education and training of SLPs and the need for continued assessment of their knowledge and confidence levels in working with students with autism that display problem behavior, compelled the design of this investigation. To that end, the specific research questions were:

1. To what extent are SLPs knowledgeable about autism and applied behavior analytic (ABA) procedures?
2. To what extent do SLPs perceive themselves to be confident in managing the problem behavior of students with autism during intervention?
3. Which predictor variables are related to knowledge or confidence levels of SLPs?
4. Is there a correlation between knowledge of autism/ABA of SLPs or their confidence levels in managing the problem behavior of students with autism?

Method

Survey research methodology was used to collect data regarding the knowledge and confidence of SLPs that worked with students with autism. The electronic-survey solicited responses from SLPs nation-wide regarding their professional and educational background, general and advanced knowledge about autism, and self-perceived level of confidence in managing problem behavior of students with autism.

Participants

The population for this study included 336 SLPs practicing in the United States. Eligibility for participation in the study required that an SLP had completed his or her master's degree and currently provided intervention to at least one student with autism. Those that did not have a master's degree and did not directly work with a student with autism could not participate in the study.

Four methods were used to recruit participants for this study. First, school district SLP coordinators were contacted and asked to forward the link to the e-questionnaire (on Survey Monkey) to the SLP community within their districts. Second, the Survey Monkey link was posted on professional listservs and Internet-based professional and social networking groups (i.e., SLP Facebook groups or the Behavioral Speech Yahoo group) for ease of distribution. Third, SLPs were requested to forward the survey link to other members of their local professional network (i.e., snowball sampling). Multiple methods of recruitment were utilized due to low-response rates that were noted in previous research (Schwartz & Drager, 2008). In this study, a total of 336 SLPs completed and returned the e-questionnaire.

Questionnaire

A survey instrument (questionnaire) was utilized to assess whether SLPs were knowledgeable about autism and applied behavior analysis (ABA) and confident about implementing interventions for problem behavior. The questionnaire was composed of three main sections: educational and professional background, understanding (or knowledge) regarding autism, and confidence (or comfort) in managing challenging behavior.

Section I, Educational and Professional Background, requested information such as participant's degree and year it was conferred, memberships and certifications held, work setting, number of years as a practitioner, and number of students with autism on one's caseload. In addition, participants check-marked the names of intervention methods learned in their speech language pathology university program. Information on the educational and professional background was critical for predicting the variables that were related to the knowledge and confidence of SLPs that worked with students with autism. The items included in this section were derived from items used in previous research (Cascella & Colella, 2004; Schwartz & Drager, 2008; Stone, 1987).

Section II, Understanding Regarding Autism, included statements with (a) mutually exclusive response categories (i.e., true, false, or do not know) and (b) closed-ended questions (i.e., multiple-choice; Johnson & Christensen, 2008). This section included questions related to general and advanced knowledge on autism and ABA. This section was deliberately titled *Understanding* Regarding Autism instead of *Knowledge* Regarding Autism to make it appear less threatening to respondents. Items in this section were either replicated or modified based on previous survey instruments

developed by Stone (1987) and Campbell and colleagues (1996) that had further evaluated Stone's instrument to establish its psychometric properties. In addition, based on the review of the literature, some items that reflected current issues in the field were also included (e.g., childhood immunizations cause autism).

In the third section of the survey, Confidence in Managing Challenging Behavior, participants were required to identify their comfort level when dealing with a variety of problem behaviors displayed by children with autism during intervention. This section deliberately asked for comfort levels in managing challenging behavior on the assumption that comfort level and confidence are correlated. Previous research has reported on SLP confidence in working with students with autism regarding goal writing, overall confidence, and other basic management skills (Casella & Colella, 2004; Schwartz & Drager, 2008). To extend this line of research, this investigation examined comfort levels and presumed confidence of SLPs in managing problem behavior of students with autism (Brinkley et al., 2007; Hastings, Brown, Mount, & Cormack, 2001).

After the questionnaire was developed, seven experts in the field of autism, special education, applied behavior analysis, and speech, language, and pathology were requested to critically analyze the content of each item to determine whether it provided a good measure of knowledge and confidence of SLPs that work with students with autism. They were requested to suggest whether an item should be retained, modified, or discarded in relation to the construct it was supposed to measure. The recommendations of the experts were reviewed and compiled on an item-by-item basis to create the survey instrument.

Following an expert review of the questionnaire, a field test was conducted with a

limited and convenient sample from the target population to evaluate the wording of the items on the questionnaire and the ease of completing it. Paper copies of the questionnaire were distributed through an exhibitor booth at the Texas Speech Language and Hearing Association annual (2010) convention. Volunteers were invited to participate in the survey and receive a free bottle of water and a raffle entry. After volunteering to participate, they were asked to review and sign the informed consent letter prior to commencing the survey. A total of 78 respondents completed the survey. Data obtained from the field test and comments of the respondents allowed for further refinement of the instrument. Following this procedure, the items were uploaded on Survey Monkey for distribution to the participants after receiving official approval from the university's institutional review board.

Procedures for Data Coding

Survey data were entered and coded using the SPSS software for data analyses. For Section I, Professional and Educational Background, the items that had two responses were coded with either a 1 or a 2 (e.g., bachelor's or master's degree), or were coded with a 1 or a 0 (e.g., Do you hold or are you pursuing the BCBA certification?). Some items had four possible responses (e.g., 1-5 years; 6-10 years; 11-20 years; 21+ years). For such items, the choices were coded as 1, 2, 3, and 4 for a, b, c, and d. When the respondents were asked to check the techniques in which they had been trained, if they checked a technique, it was coded as 1. If they did not check the technique, it was coded as a 0.

For Section II, Understanding Regarding Autism, the true and false questions

had three possible responses: true, false, and do not know. A correct response was counted as 1 while the incorrect response and “do not know” were counted as 0. For the multiple choice questions, the correct answer was scored as 1 and all other responses were 0. Finally, the questions based on the Likert scale in Section III (Confidence in Managing Challenging Behavior) were coded as 1 (*strongly disagree*), 2 (*disagree*), 3 (*agree*), and 4 (*strongly agree*).

Results

Characteristics of the Respondents

The purpose of this study was to obtain information regarding the knowledge and confidence of SLPs practicing their craft in the US. SLPs from 42 different states responded to this survey including the District of Columbia, with the largest number of responses from Missouri, Texas, California, New York, and Pennsylvania (see Table 1).

Many variables regarding the educational and professional background of the SLPs were of interest to this study including the highest degree attained, certification, number of years of experience in the field including those with children with autism, number of children with autism on their caseload, setting in which they worked, roles fulfilled, and specific interventions they were trained to implement while working with children with autism. Specifically, reliability analysis, linear regression, correlations, t-tests, and descriptive statistics were conducted. For the purpose of this study, the variables that were examined and included in the linear regression as independent variables are: years working as an SLP, years working in the field of autism, number of students with autism with whom an SLP works, and number of SLPs certified as or

becoming certified as applied behavior analysts. Results obtained for each of these variables are described below.

Percentages of responses regarding characteristics of respondents are presented in Table 2. Of the 336 respondents that returned the completed survey, 330 (98.2%) had received a master's degree while 6 respondents (1.8%) held doctorate degrees in the field of speech-language pathology. In addition, 321 of the 336 respondents (95.5%) were certified through ASHA. When asked if they were certified or taking courses to be certified as an applied behavior analyst, 16 of 336 (4.8%) SLPs reported having completed or being in the process of pursuing BCBA or BCaBA certification.

Data show that 38.7% of SLPs had 1 to 5 years of experience in the field of speech-language pathology, 21.4% of SLPs had 6 to 10 years of experience, 22.0% of SLPs had 11 to 20 years of experience, and 17.9% of SLPs had 20 or more years of experience in the field. Regarding years of experience working with students with autism, 42.9% of SLPs had 1 to 5 years of experience, 27.4% had 6 to 10 years of experience, 23.5% had 11 to 20 years of experience, and 6.3% had 20 or more years of experience working with students with autism.

While respondents were found to work in a variety of settings with students with autism including home health, private practice, and hospital/medical, a majority of SLPs worked in public school settings (i.e., 235 respondents or 69.9%). When asked about the types of professional roles they performed, SLPs reported engaging in multiple roles such as providing one-to-one or group therapy for children with ASD (95.2%), providing communication assessment (76.5%), training parents and teachers (57.7%), working on

an autism teams (26.2%), training other SLPs (18.2%), and finally, consulting with a large number of students with autism, for example, on the use of augmentative and alternative communication devices (12.2.%). When asked how many students with autism they were currently working with, 49.4% SLPs reported working with 1-5 students, 28.9% with 6-10 students, 13.4% with 11-20, and 8.3% with 21 or more students.

To obtain further information regarding professional training, the respondents were asked to select (check) the intervention techniques in which they were “adequately” prepared through their graduate programs. Twenty techniques were available for selection, many of which are considered to exemplify evidence-based practices in the field of autism (NAC, 2009), whereas others are considered to be ineffective in the scientific literature. Both types of interventions were noted because they constitute areas of training in many SLP programs.

From the list of evidence-based interventions, data showed that nine respondents (2.7%%) reported being trained in the use of the Assessment of Basic Language and Learning Skills (ABLLS) or the Verbal Behavior – Milestones Assessment Placement Program (VB-MAPP) for evaluation and target selection. Fifty-five respondents (16.4%) reported being trained in functional behavior assessment. Eighty-three respondents (24.7%) reported being trained in functional communication training. Eighty-two respondents (24.4%) reported being trained in managing problem behavior of children with autism. Ninety-four respondents (28%) reported being trained in milieu or naturalistic teaching. Twelve respondents (3.6%) reported being trained in pivotal response treatment. One hundred three respondents (30.7%) reported being

trained in positive behavior supports. One hundred sixty-eight respondents (50.0%) reported being trained in prompting and prompt fading, and finally, 74 respondents (22.0%) reported being trained in reinforcer assessment. A list of all 20 techniques and related means are provided in Table 3.

Knowledge and Confidence of Respondents

Multiple analyses of the data were conducted including a test of reliability, multiple linear regression, *t*-tests, correlation, frequency, and descriptive statistics to address the research questions. Reliability analyses were performed on two groups of items, knowledge (i.e., Item 1-23) and confidence (i.e., Item 38 a-k). The purpose of computing reliability was to measure the internal consistency of the instrument with this sample, or how well the items on the instrument measured one dimension, for example, knowledge (Cortina, 1993). Common practice in the field suggests that a reliability score of 0.7 or higher is considered acceptable for an instrument (Cortina, 1993).

For the knowledge items, an alpha coefficient of 0.473 was obtained. Results of the reliability analyses indicated that removal of items 13 and 23 improved the coefficient to be above 0.5; therefore, they were discarded from data analysis. After removing Item 23, the reliability improved to 0.488. Following this, the second item was removed in an effort to further improve reliability to 0.501. For the purpose of this investigation, because the goal was not to develop a standardized instrument, a reliability score of 0.501, though not optimal, was accepted. For the confidence items, the alpha coefficient was found to be 0.918, which is more acceptable than the score for the knowledge items.

Two multiple linear regressions were conducted in order to determine which independent variables explained the greatest variance in scores of knowledge and confidence. In the first regression analysis, the dependent variable was the sum of respondent test scores on Section II of the instrument (i.e., knowledge). For the second, the dependent variable was the sum of respondent test scores on Section II of the instrument (i.e., confidence). For both regressions, the predictors (i.e., independent variables) were years working as an SLP, years working in the field of autism, number of students with autism on the caseload, and an applied behavior analyst certification.

In the first regression analysis, it was necessary to establish the linearity of the relationship between the dependent (i.e., knowledge) and the predictor variables (i.e., educational and professional background). The null hypothesis was that the predictors do not explain the dependent variable, knowledge, and that no relationship would exist. For the first regression, R was found to be 0.361 and statistically significant, $F(4,335) = 12.423$, $p < 0.001$; therefore, the null hypothesis was rejected. The degree of linearity was determined to be statistically significant between the independent and dependent variables. In addition, the coefficient of determination, R^2 , was computed to explain 13.1% of the variance of the dependent variable, knowledge (see Table 4).

In the second regression analysis, it was necessary to establish the linearity of the relationship between the dependent (i.e., confidence) and the predictor variables (educational and professional background). The null hypothesis is that the predictors do not explain the dependent variable, confidence, and that no relationship would exist. For the second regression, R was found to be 0.376 and statistically significant, $F(4,335) = 13.660$, $p < 0.001$. As a result, the null hypothesis was rejected. The degree of linearity

was determined to be statistically significant between the independent and dependent variables. Also, the coefficient of determination R^2 was computed to be 0.142 which indicates that the independent, predictor variables explain 14.2% of the variance of the dependent variable, confidence (see Table 5).

In an effort to further interpret the relationships expressed in the regression analyses, beta weights were reviewed and structure coefficients were calculated. The beta weights in the knowledge model (see Table 6) indicated a positive relationship between knowledge and years practicing in autism (statistically significant at $p = 0.022$). The beta weights in the knowledge model also indicated a statistically significant ($p < 0.001$) or a positive relationship between knowledge and the number of students with whom an SLP worked. Conversely, a negative relationship was identified between knowledge and BCBA/BCaBA certification; however, this variable was found to be statistically significant ($p < 0.001$). A negative relationship was found between knowledge and years of experience in the field of speech-language pathology and this relationship was not statistically significant ($p = 0.074$). Three of four p values were noted to be statistically significant.

Further, structure coefficients were calculated for variables as they related to knowledge scores. It is important to calculate structure coefficients in addition to beta weights in order to obtain a wholesome understanding of the relationship (Courville & Thompson, 2001). In order from most to least, the number of students with autism on an SLP's caseload was the primary variable that explained 54.0% of the variance of the predicted sum of scores. Although it was negatively related to knowledge scores, BCBA/BCaBA certification explained 49.6% of the variance of the predicted sum of

scores. Thirdly, the number of years practicing in autism was found to have a structure coefficient of 18.0%. Although not significant, the number of years practicing in the field of speech-language pathology explained 4.1% of the variance of the predicted knowledge scores (see Table 6).

The confidence model presented in Table 7 showed that the beta values indicated a statistically significant ($p < 0.001$) positive relationship between confidence and number of students with autism. A statistically significant ($p = 0.017$) positive relationship was also found between confidence and years practicing in autism. Similar to the knowledge model, a negative relationship was found among confidence and BCBA/BCaBA certification; however, this relationship was still found to be statistically significant ($p = 0.018$). Lastly, a negative relationship was found to exist between confidence and years practicing speech-language pathology ($p = 0.425$). Again, the previously noted three variables were found to be statistically significant while years practicing as an SLP were not found to be significantly related (see Table 7).

Structure coefficients were computed for all four variables, BCBA/BCaBA certification, years practicing as an SLP, years practicing with students with autism, and number of students on an SLPs caseload (see Table 7). The number of students with autism most strongly explained the variance in confidence test scores at 68.6%. Secondly, years practicing in autism explained 34.1% of variance in confidence test scores followed by applied behavior analyst certification, which explained 26.4% of the variance. Lastly, years practicing as an SLP were found to explain 16.5% of the variance in the confidence test scores.

For both models, the variable explaining the most variance for knowledge and confidence test scores was current number of students with autism on one's caseload. All variables were found to be statistically significant in both models except for years practicing as an SLP which was not significant.

Descriptive statistics were computed for respondents' test scores in knowledge and confidence (see Tables 8 and 9). Knowledge items had one correct answer whereas confidence items were presented on a one to four point Likert scale and were rated from a self-perceived viewpoint with possible answers being *strongly disagree* (SD), *disagree* (D), *agree* (A), and *strongly agree* (SA).

With a possible score of 21.0 on the knowledge section (i.e., Understanding Regarding Autism), 15.19 was the mean score for all respondents. The median was 15.0, the mode was 15.0, and the standard deviation was 2.29. The range of knowledge scores obtained was between 8 and 21. Percentage scores were computed for all respondents. No respondents scored below 25%, 6 respondents scored between 26-50%, 176 respondents scored between 51-75%, and 154 respondents scored between 76-100%. One of the 336 respondents scored a 21 of 21. Mean percent correct for each item in the knowledge section is presented in Table 10.

The confidence section had a possible score of 44.0. The mean score was 29.75, the median was 30.0, the mode was 30.0, and the standard deviation was 5.85. The range of confidence scores was between 11 and 43. Percentage scores were computed for all respondents. No respondents scored below 25%, 26 scored between 26%-50%, 176 scored between 51%-75%, and 154 scored between 76%-100%. No respondent

scored 44 out of 44 or 100%. Mean percentage correct for each item in the confidence section is presented in Table 11.

Next, an independent samples *t*-test was conducted for knowledge and confidence for two groups: 1) those that were trained in ABA (indicated through a BCBA, BCaBA certification or pursuit of one of these certifications), and 2) those that were not trained in the area. For the first *t*-test, group statistics were computed for applied behavior analysts and non-behavior analysts. The ABA group averaged a 17.8 out of 21 (*SD* 2.66380) in knowledge while the non-behavior analysts averaged a 15.0 out of 21 (*SD* 2.20465) in knowledge. Following this, the *t*-test was computed for confidence scores. The ABA group averaged at 34.8 out of 44 (*SD* 6.33739) while the non-behavior analysts averaged a 29.5 out of 44 (*SD* 5.72022). For the first *t*-test, Cohen's *d* was found to be 1.1221553 and effect-size *r* was 0.4893186. For the second *t*-test, Cohen's *d* was found to be 0.8789905 and effect-size *r* was 0.4023514.

Finally, a bivariate correlation was conducted on two variables to determine if a significant relationship existed between knowledge and confidence. The null hypothesis was that the dependent variables, knowledge and confidence, were not significantly related and that no relationship existed between these variables. For this correlation, *r* was found to be 0.108 and not statistically significant; therefore, the null hypothesis was accepted.

Discussion

The purpose of this study was to (a) investigate the knowledge and confidence of SLPs regarding autism and ABA in relation to the professional preparation; (b)

investigate self-perceived confidence of SLPs in managing problem behavior of students with autism, and (c) determine which independent variables predicted the knowledge and confidence of SLPs. Results of this study may have implications for university SLP training programs, specifically for delineating ASD coursework and establishing standards for competence required to work with students with autism.

The results suggest that in general, knowledge of SLPs regarding autism was higher than scores that were reported for SLPs in previous research; however, SLPs still appear to lack specific knowledge of evidence-based practices for working with students with autism. In 2004, Cascella and Colella reported that SLPs working in schools in Connecticut were “markedly underprepared for the challenges inherent in school service delivery for children with ASD” (p. 249). Although their study was published less than a decade ago, it is possible that the increased attention to autism in recent years may have impacted the curriculum, self-interest, and professional awareness and access regarding autism, which might explain the possible increase in the knowledge of SLPs in this investigation. Similarly, Schwartz and Drager (2008) had noted that the knowledge of SLPs that were assessed in 2008 had shown improvement when compared to SLPs evaluated in Stone’s initial investigation in 1987. They noted that SLPs continued to show a lack of comprehension of autism and its’ diagnostic criteria as well as the confidence required to directly work with this population (Schwartz & Drager, 2008). This study was published recently (i.e., January 2008); therefore, it is possible that SLPs are more knowledgeable about autism due to an increased prevalence rate, extensive media coverage, continuing education opportunities and government-assisted funding for autism.

Every respondent in this investigation worked with at least one student with autism. Previous research showed that 82-84% of SLPs in schools were working with students with autism (ASHA, 2008; Whitmire & Eger, 2003;). This number may have increased as a function of a parallel increase in the prevalence rate for autism (CDC, 2007; 2009). Results of this survey indicated that almost half of the SLPs (166 or 49.4%) worked with 1-5 students with autism, 329.9 (97%) with 6-10 students with autism and 13.4% with 11-20 students with autism. Finally, 8.3% (28) SLPs currently worked with more than 20 students with autism. This means that about half of the SLPs in this sample worked with six or more students with autism, which in theory, could make up a significant portion of their caseload work as compared to other eligibility categories for speech impairment (e.g., minor articulation and language disorders or intellectual disability). It is possible that SLPs educated themselves about characteristics and needs of students with autism because of their case load.

In this study, rather than asking specifically about coursework regarding autism (as done by Schwartz & Drager, 2008), respondents were asked about intervention techniques learned in their university training programs. Some of the techniques available for selection were evidence-based practices for working with students with autism. Although the SLPs demonstrated a well-rounded knowledge of autism, generally, they did not report being trained in the use of these evidence-based practices and also demonstrated less knowledge in this area by scoring incorrectly on questions related to ABA methods.

On the list of intervention techniques available for selection, seven were considered established treatments by the National Autism Society standards report

(NAC, 2009). The percentage of respondents who reported being adequately prepared by their university training programs to use these techniques was nominal. The percentage of respondents for each technique (see Table 3), included reinforcer assessment (22%), functional communication training (24.7%), prompting and prompt fading (50%), functional behavior assessment (16.4%), milieu or naturalistic teaching strategies (28%), pivotal response treatment (3.6%), and positive behavior supports (30.7%). These numbers appear to be relatively low given that they have been listed in as being evidence-based for individuals with autism in the scientific literature.

Previous research (Stone, 1987; Cascella & Colella, 2004; Schwartz & Drager, 2008) that assessed the knowledge of SLPs regarding autism did not provide a range for what appears to be optimal knowledge. In this study, the average score of SLPs on the knowledge portion of the survey was a 71%. Most SLPs appear to be knowledgeable about diagnostic characteristics except for the characteristics regarding stereotypical and repetitive patterns of behavior and special interests and activities. When asked whether stereotypic and repetitive pattern of behavior was a diagnostic characteristic, about half (51.2%) of SLPs did not know or said that it was not a diagnostic characteristic. Most SLPs correctly answered questions regarding characteristics of autism; however, were unsure as to whether autism was a developmental disorder. Overall, SLPs correctly answered questions pertaining to autism knowledge and the score of 71% could have been related to the inaccuracies of responses on the knowledge questions related to management of student problem behavior and ABA techniques.

When asked about specific ABA procedures, for example, positive reinforcement,

89.3% of the SLPs responded incorrectly that “Good job!” and giving a student a high-five always representing positive reinforcement, even when the response decreased (i.e., positive reinforcement requires an increase in frequency, not a decrease). With such a high number of incorrect responses, this could be an indicator that even a basic amount of knowledge regarding ABA is absent. This should be considered of key importance, given that the foundations of ABA constitute the core component of several evidence-based practices for students with autism (NAC, 2009). Other questions regarding negative reinforcement, extinction, and punishment were incorrectly answered by a majority of respondents. To answer these questions correctly, a working knowledge of ABA is necessary. This also has implications on the ability of SLPs to manage problem behavior of students with autism effectively and efficiently. A lack of knowledge regarding ABA procedures increases the likelihood of inability to manage the problem behavior of students during intervention.

Some questions were related to Skinner’s analysis of verbal behavior (Skinner, 1957). This is a behavioral paradigm for how language is learned and is frequently used with students with autism (Barbera, 2007). Many respondents were able to correctly identify key concepts like a mand (i.e., request); however, mixed responses were received regarding the meaning of a tact (i.e., label). Typically, a mand is taught first, according to the verbal behavior paradigm, because it is the first type of communication learned in infancy; however, varied responses were received on what should be taught to a learner with minimal verbal language. In addition to the uncertainty about the meaning of tact, SLP responses indicated a possible introductory working knowledge of the verbal behavior paradigm, but an overall deficit of knowledge in this area.

On the confidence section (Section III) of the instrument, comfort/confidence in managing problem behaviors of students with autism was measured. SLPs noted that they agreed or strongly agreed that they were comfortable with managing the challenging behavior of students with autism in the following order from most to least: those who exhibit behaviors and interests that are repetitive and stereotypical, appear to be restless and unable to sit still, appear to not pay attention to instructions, talk to themselves loudly, refuse to eat foods or drink liquids, frequently cry and scream, are not motivated by objects or activities and are difficult to engage, not potty trained, who run around the room every few minutes unless held by an adult, exhibit aggression toward other children or adults, and exhibit self-injurious behavior. The average amount of comfort reported by SLPs was 29.75 of 40, or 74.3%. Although it is not expected that all SLPs be comfortable in managing all topographies of problem behavior, similar to the findings by Schwartz and Drager (2008), it appears that SLPs may have reported being more confident in managing problem behavior than was expected. Given the inaccurate responses on the knowledge items involving ABA, it was assumed that the respondents would not be confident or comfortable with behavior management, however, results do not support this assumption. For example, it is unknown how a respondent interpreted the phrase “managing problem behavior.” In the event of a problem behavior situation, if SLPs discontinued intervention or utilized behavior management techniques that did not prevent future occurrences or decreases in problem behavior, they may in fact be using ineffective techniques.

Of the 336 respondents, 16 (4.8%) were either board certified behavior analysts (BCBAs)/board certified associate behavior analysts (BCaBAs) or were pursuing one of

these certifications. It is interesting to note that when comparing average scores of respondents with ABA training to those without, there are some differences in mean performance. On the knowledge portion of the test, behaviorally trained SLPs scored an average of 17.81 of 21 while non-behaviorally trained SLPs scored an average of 15.0 of 21. On the confidence portion of the survey, behavioral SLPs scored 34.81 of 44.0 while non-behavioral SLPs scored an average of 29.50 of 44.0. Given that problem behavior is commonly associated with students with autism, this may be an important finding to note when planning for training of SLPs. Overall, SLPs who were pursuing or held the BCBA or BCaBA certifications were more knowledgeable and confident. It should be noted that although some of the respondents considered “non-behavioral” may have had some exposure to ABA, for the purpose of this investigation, engagement in formal coursework leading to the BCBA/BCaBA certification was the factor used to separate the two groups of participants.

In their study, Schwartz and Drager (2008) had noted that “questions could be raised regarding how SLPs perceive themselves as providing adequate services when they appear to not have a firm grasp of the core deficits demonstrated by students with autism” (p. 73). The same could be stated with respect to findings of this study as well. SLPs felt that they were confident in managing problem behaviors when it was apparent that they were not adequately trained in the use of evidence-based practices for problem behavior management. Based on prior research, it is evident that specialized training is required for an individual working with students with autism for them to be effective (Schwartz & Drager, 2008; Scheuermann et al., 2003; Simpson, 2004). Students in graduate training programs are not necessarily being exposed to students

with autism or to training regarding autism (Schwartz & Drager, 2008); therefore, it seems unlikely that they could be well prepared to work effectively with students with autism.

Given the results of the two groups, the knowledge scores, confidence scores, and preparation in behavioral techniques, it seems warranted that SLPs that work with students with autism should be trained to use ABA methods during therapy to improve speech, language, communication and social behavior of students with autism. This suggestion has implications for SLP professional preparation, standards of practice and curriculum and practicum requirements.

To summarize the findings of the study, three variables were established as most influential in predicting knowledge and confidence of SLPs (a) number of years working with students with autism, (b) number of students with autism on the caseload, and (c) presence of ABA training. For both knowledge and confidence, these variables were found to be statistically significant. The most predictive variable for both was the number of students with autism on an SLP's caseload. The second predictor for knowledge was ABA training while the second predictor for confidence was years practicing in autism. Of the variables used in the regression analysis, the one variable that was not important in these two models was years working in speech-language pathology. This may indicate that no matter how long one has been practicing in the profession, practical experience with students with autism is what will make one more likely to be effective. It appears that having in depth training in ABA may also be a key variable in knowledge and confidence of SLPs in working with students with autism. Future research might focus on assessing the impact of this variable with more precision. Finally, to encourage

SLPs to use evidence-based practices for students with autism, additional regulations may be needed to ensure that they receive the training and resources for effective outcomes.

Limitations

Due to the nature of e-survey research methodology, only those SLPs that received the e-questionnaire participated in the study; therefore, it appears that those SLPs that are more inclined to use modern technological tools for communication were more likely to participate. Also, not every member of the SLP population could be contacted, so the SLP population's knowledge and confidence as a whole was not assessed. In addition, participation was voluntary so there may be an overrepresentation of knowledge as it is possible that only those who were relatively knowledgeable about autism and/or ABA completed the survey and were eager to participate because of their interest in autism. Therefore the results of this study cannot be generalized to the entire population of SLPs.

The instrument used to gather data was not a standardized tool. As a result, it is possible that data could be less reliable when compared to studies that may have used a standardized instrument. The confidence section was deemed reliable; however, the knowledge section needs further refinement to improve reliability scores. An alpha coefficient less than 0.7 was noted therefore, results should be interpreted with caution. The purpose of this investigation was to obtain information related to SLP knowledge and confidence, not to develop a standardized assessment instrument. Therefore, further refinement is recommended for those who may be interested in using this tool for

future research. Even though the confidence section was reliable, with any self-report section on a survey, findings could be biased because respondents were answering a subjective question. Respondents were asked to select the techniques in which they were “adequately prepared” by their university training programs. “Adequately prepared” was viewed subjectively, so the results must be interpreted with caution. It is not possible to know to what extent a respondent viewed him or herself to be “adequately prepared.”

Finally, because a convenient instead of a randomized sample was employed, caution should be exercised when generalizing these results to the larger population of SLPs. Should investigators pursue this line of this research in the future, these limitations should be considered while designing the methodological parameters.

Implications and Future Directions

This study provides a perspective on the professional and educational background of SLPs, their knowledge regarding autism and ABA and confidence in problem behavior management. Standards for those working in autism are becoming more prevalent (NAC, 2009; ASHA, 2006a, b, c, d). In 2006, ASHA provided the field with guidelines for standards for SLPs that work with students with autism. Given the prevalence of autism and the need for specialized skills when working with this population, it is clear that policy-level changes may be needed in the development of standards and regulations to aid SLPs for becoming effective clinicians.

Further research may focus on what SLPs consider to be evidence-based practice for students with autism. Results of this study indicated that SLPs had minimal

knowledge concerning the use of evidence-based practices for students with autism. ASHA provides descriptions of evidence-based practices for all of the association's members at their website (www.asha.org); however, non-member SLPs may not have access to this information. In addition to speech/language journals, there are other journals dedicated to autism, ABA, and developmental disorders that can be recommended to SLPs to increase their knowledge. At local levels, schools, private practices, home health agencies, medical/hospital settings, and others who provide intervention to students with autism should consider establishing research or service coordinators for disseminating information related to evidence-based practices for professionals. As recommended by Cascella and Colella (2004), SLPs should be trained in ABA, discrete trial training, incidental teaching, and naturalistic intervention, all of which are considered to be exemplify evidence-based practices in the field.

Another area of interest is the curriculum at SLP university training programs. While it is not recommended that all instructors have expertise in autism and ABA, given the increased prevalence and the number of clinicians that work in schools, it is imperative that students in all universities be provided the information needed to work effectively with students with this disorder. Future research might focus on investigating professional knowledge and training of SLP university professors regarding autism. Additionally, it would be beneficial for university training programs to survey their students to determine their area of specialized interest (e.g., autism). For students interested in the field of autism, additional or alternative course of study might be permitted.

Table 1

Summary of Frequency and Percentage of Respondents by State

State	Frequency	State
AK	2	0.6%
AL	4	1.2%
AR	6	1.8%
AZ	2	0.6%
CA	24	7.1%
CO	4	1.2%
CT	4	1.2%
DC	1	0.3%
FL	10	3.0%
GA	8	2.4%
HI	1	0.3%
IL	6	1.8%
IN	11	3.3%
KS	3	0.9%
KY	3	0.9%
LA	2	0.6%
MA	5	1.5%
MD	5	1.5%
ME	2	0.6%
MI	5	1.5%
MN	6	1.8%
MO	57	16.9%
MT	3	0.9%
NC	4	1.2%
ND	1	0.3%
NH	1	0.3%
NJ	5	1.5%
NM	1	0.3%
NY	19	5.6%
OH	6	1.8%
OK	3	0.9%
OR	5	1.5%
PA	15	4.5%
RI	1	0.3%
SC	5	1.5%
SD	1	0.3%
TN	6	1.8%
TX	51	15.1%
UT	2	0.6%
VA	9	2.7%
WA	6	1.8%
WI	3	0.9%
WV	1	0.3%
Two states	5	1.5%
No response	13	3.9%

Table 2

Professional and Educational Background

	<i>Characteristic</i>	<i>n</i>	<i>%</i>
Degree	Master's	330	98.2%
	Doctorate	6	1.8%
Setting	Private practice	18	5.4
	Home health	53	15.8
	Hospital/medical	27	8
	Public Schools	235	69.9
Total Years in SLP	1-5	130	38.7%
	6-10	72	21.4%
	11-20	74	22.0%
	21+	60	17.9%
Total Years in Autism	1-5	144	42.9%
	6-10	92	27.4%
	11-20	79	23.5%
	21+	21	6.3%
Roles of SLPs	Trainer to other SLPs	61	18.2%
	Trainer to parents/teachers	194	57.7%
	Provide 1:1 or group therapy	320	95.2%
	Provide communication assessment	257	76.5%
	Consultation to larger numbers of students	41	12.2%
Number of students with autism on caseload	SLP on autism team	88	26.2%
	1-5	166	49.4%
	6-10	97	28.9%
	11-20	45	13.4%
	21+	28	8.3%

Table 3

SLP Preparation of Techniques in Universities

Technique	Frequency	Percent
American Sign Language	111	33%
Auditory Integration Training	15	4.5%
Augmentative and Alternative Communication	198	58.9%
Evaluation and target selection with ABLLS or VB-MAPP	9	2.7%
Evaluation use Mean Length of Utterance (MLU)	264	78.6%
Facilitated Communication Training	35	10.4%
Functional Behavior Assessment	55	16.4%
Functional Communication Training	83	24.7%
Managing problem behavior of individuals with autism	82	24.4%
Manually Coded English sign systems	11	3.3%
Milieu or naturalistic teaching	94	28.0%
Picture Exchange Communication System	128	38.1%
Pivotal Response Treatments	12	3.6%
Positive Behavioral Supports	103	30.7%
Prompting and prompt fading	168	50%
Reinforcer assessment	74	22.0%
Self and parallel talk	162	48.2%
Evaluation using standardized speech/language assessments	246	73.2%
Total Communication	141	42%
Traditional articulation therapy	281	83.6%

Table 4

Regression Summary of Independent Variables on Knowledge

Source	SS	df	MS	F	p	R ²
Regression	231.256	4	57.814	12.423	<0.001	.131
Residual	1540.384	331	4.654			
Total	1771.640	335				

Table 5

Regression Summary of Independent Variables on Confidence

Source	SS	df	MS	F	p	R ²
Regression	1625.025	4	406.256	13.660	<0.001	.142
Residual	9844.449	331	29.742			
Total	11469.473	335				

Table 6

Summary of Beta Weights & Structure Coefficients for Knowledge

Predictor	B	β	r _s	r _s ²	p
BCBA Certification	-2.281	-.212	-0.704	0.496	<0.001
Years Practicing SLP	-0.314	-0.155	0.203	0.041	0.074
Years Practicing in Autism	0.485	0.201	0.424	0.180	0.022
Number of Students with Autism	0.515	0.216	0.735	0.540	<0.001

Table 7

Summary of Beta Weights & Structure Coefficients for Confidence

Predictor	B	β	r_s	r_s^2	p
BCBA Certification	-3.415	-0.124	-0.514	0.264	0.018
Years Practicing SLP	-0.355	-0.069	0.406	0.165	0.425
Years Practicing in Autism	1.268	0.207	0.584	0.341	0.017
Number of Students with Autism	1.611	0.265	0.828	0.686	<0.001

Table 8

Frequency of Respondent Scores by % in Knowledge and Confidence

	Knowledge	Confidence
0-25%	0	0
26-50%	6	26
51-75%	176	220
76-100%	154	90

Table 9

Measures of Central Tendency for Knowledge and Confidence

	Knowledge	Confidence
Mean	15.19	29.75
Median	15.0	30.0
Mode	15.0	30.0
Range	8.0-21.0	11.0-43.0
SD	2.29967	5.85126

Table 10

Results of Knowledge Items [Understanding Regarding Autism], N = 336

<i>Survey Item</i>	<i>Correct</i>	<i>Incorrect</i>
Children must exhibit impaired social interaction to receive a diagnosis of autism. (True)	83.9%	16.1%
To receive a diagnosis of autism, children must exhibit self-injurious behaviors. (False)	98.8%	1.2%
To receive a diagnosis of autism, children must exhibit behaviors and interests that are repetitive and stereotypical. (True)	51.2%	48.8%
To receive a diagnosis of autism, children must exhibit impaired communication skills. (True)	85.4%	14.6%
Some children with autism do not seem to experience pain in the same way as children without autism. (True)	86.9%	13.1%
More boys than girls are diagnosed with autism. (True)	96.7%	3.3%
Some children with autism demonstrate uncoordinated gross and fine motor skills.(True)	96.7%	3.3%
The bulk of scientific evidence supports a causal relation between childhood vaccinations and autism. (False)	89.9%	10.1%
Children with autism primarily tend to be auditory learners. (False)	89.3%	10.7%
Autism is caused by a non-nurturing style of parenting. (False)	98.8%	1.2%
Autism is a developmental disorder. (True)	55.7%	44.3%
During speech therapy, Anna produced a /s/ without lisping so you gave her a high-five and said "Awesome work!" Even though Anna lisped many times since then when making the /s/ sound, the fact that you said "great job" and gave her a high-five represented the use of positive reinforcement. (False)	10.7%	89.3%
A SLP should use an aversive consequence (e.g., seclusion time-out, restraint) to make a child with autism realize s/he has done something wrong. (False)	14.3%	85.7%
Candy, bubbles, tickles, and praise always work as positive reinforce. (False)	86.0%	14.0%
Jennie often repeats your words and phrases during therapy. One day you were working on nouns and you said "It is your turn, Jennie" to which Jennie said "your turn, Jennie". This is because Jennie: (Echolalia)	86.9%	13.1%
Daniel asks for "green skittle" from a number of items including candy, crayons, and bubbles that are within his visual range. This request is an example of a _____. (Mand)	65.2%	34.8%
Your young client Andrew looks at you, points to a picture of a rabbit and says "bunny!" This is an example of a _____. (Tact)	42.3%	57.7%
When working with a student who has only a few words in his/her vocabulary, it is generally best to start language/communication training by teaching: (Requesting)	49.7%	50.3%
Every time Dylan screams and cries, his mother returns to the therapy room. You had a discussion with his mother and explained that you would like for her to wait outside, even if Dylan cries, and she agreed. Now when Dylan cries, his mother does not enter the room. She is most likely demonstrating the use of: (Extinction)	67.6%	32.4%
If you see decreases in a student's acting-out behavior during therapy, it is possible that knowingly or unknowingly, you must have used _____.: (Punishment or Extinction for problem behavior)	9.2%	90.8%
Recent reports of ASD prevalence nation-wide have indicated it to be: (1:110 children)	83.3%	16.7%

Table 11

Results of Likert scale items regarding confidence in managing problem behavior in students with autism, N = 336

I feel comfortable in managing the challenging behavior of my students with autism who...	% SD	% D	% A	% SA
a) exhibit self-injurious behaviors	14.3%	39.6%	40.5%	5.7%
b) exhibit behaviors and interests that are repetitive and stereotypical	2.1%	9.8%	71.7%	16.4%
c) exhibit aggression toward other children or adults	14.0%	39.6%	39.6%	6.8%
d) appear to be restless and unable to sit still	1.8%	11.0%	70.5%	16.7%
e) appear to not pay attention to my instructions	1.8%	11.0%	69.9%	17.3%
f) frequently cry and scream	7.7%	33.6%	49.7%	8.9%
g) run around the room every few minutes unless held by an adult	8.6%	34.8%	46.7%	9.8%
h) talk to themselves loudly	1.5%	16.4%	72.0%	10.1%
i) are not potty trained	10.4%	32.4%	46.1%	11.0%
j) who refuse to eat foods or drink liquids	6.8%	31.3%	52.4%	9.5%
k) are not motivated for objects or activities and are difficult to engage	6.5%	36.0%	47.0%	10.4%

References

- American Speech-Language-Hearing Association. (2006a). *Guidelines for speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Guidelines]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2006b). *Knowledge and skills needed by speech-language pathologists for diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Knowledge and Skills]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2006c). *Principles for speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Technical Report]. Available from www.asha.org/policy.
- American-Speech-Language-Hearing Association. (2006d). *Roles and responsibilities of speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Position Statement]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2008). *2008 Schools Survey report: Caseload characteristics trends*. Rockville, MD: Author.
- Barbera, M.L. & Rasmussen, T. (2007). *The verbal behavior approach: How to teach children with autism and related disorders*. London: Jessica Kingsley Publishers.
- Beck, A. R., & Dennis, M. (1997). Speech-language pathologists' and teachers' perceptions of classroom-based interventions. *Language, Speech, and Hearing Services in Schools, 28*, 146-153.
- Brinkley, J., Nations, L., Abramson, R. K., Hall, A., Wright, H. H., Gabriels., Gilbert, J. R., Pericak-Vance, M. A. O., & Cuccaro, M. L. (2007). Factor analysis of the Aberrant Behavior Checklist in individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorder, 37*, 1949-1959.
- Buschbacher, P., & Fox, L. (2003). Understanding and intervening with the challenging behavior of young children with autism spectrum disorder. *Language Speech and Hearing Services in Schools, 34*, 217-227.
- Camarata, S. M., Hughes, C. A., & Ruhl, K. L. (1988). Mild/moderate behaviorally disordered students: A population at risk for language disorders. *Language, Speech, and Hearing Services in Schools, 19*, 182-190.
- Campbell, D. G., Reichle, N. C., & Van Bourgondien, M. E. (1996). The autism survey: An evaluation of reliability and validity. *Journal of Autism and Developmental Disorders, 26*(6), 621-634.

- Carr, E., & Durand, V. M., (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis*, 18, 111-126.
- Casella, P. W., & Colella, C. S. (2004). Knowledge of autism spectrum disorders among Connecticut school speech-language pathologists. *Focus on Autism and Other Developmental Disabilities*, 19, 245-252.
- Centers for Disease Control and Prevention. Morbidity and mortality weekly report. Surveillance summaries, February 9, 2007. MMWR 2007; 56 (No. SS-1).
- Centers for Disease Control and Prevention. Morbidity and mortality weekly report. Surveillance summaries, December 18, 2009. MMWR 2009; 58 (No. SS-10; 1-20).
- Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78, 98-104.
- Courville, T., & Thompson, B. (2001). Use of structure coefficients in published multiple regression articles: β is not enough. *Educational and Psychological Measurement*, 61, 229-248.
- Day, H. M., Horner, R. H., & O'Neill, R. E. (1994). Multiple functions of problem behaviors: Assessment and intervention. *Journal of Applied Behavior Analysis*, 27, 279-289.
- Derby, K. M., Wacker, D. P., Berg, W., DeRaad, A., Ulrich, S., Asmus, J., Harding, J., Pruty, A., Laffey, P., & Stoner, E. A. (1997). The long-term effects of functional communication training in home settings. *Journal of Applied Behavior Analysis*, 30, 507-531.
- Donnellan, A., Mirenda, P. L., Mesaros, R. A., & Fassbender, L. L. (1984). Analysing the communicative functions of aberrant behavior. *Journal of the Association for Persons with Severe Handicaps* 9(3), 201-212.
- Durand, V. M., & Carr, E. G. (1992). An analysis of maintenance following functional communication training. *Journal of Applied Behavior Analysis*, 25, 777-794.
- Durand, V. M. (1993). Functional communication training using assistive devices: Effects on challenging behavior and affect. *Augmentative and Alternative Communication*, 9, 168-176.
- Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2002). Intensive behavioral treatment at school for 4 to 7 year old children with autism: A 1-year comparison controlled study. *Behavior Modification*, 26, 49-69.
- Hastings, R. P., Brown, T., Mount, R. H., & Cormack, K. F. M. (2001). Exploration of psychometric properties of the Developmental Behavior Checklist. *Journal of Autism and Developmental Disorders*, 31, 423-431.

- Heflin, L. J., & Alaimo, D. F. (2007). *Students with autism spectrum disorders: Effective instructional practices*. Upper Saddle River, NJ: Pearson Education.
- Heidgerken, A., Geffken, G., Modi, A., & Frakey, L. (2005). A survey of autism knowledge in a health care setting. *Journal of Autism and Developmental Disorders*, 35(3), 323-330.
- Helps, S., Newsom-David, I.C., & Callias, M. (1999). Autism: The teacher's view. *Autism*, 3, 287-298.
- Hulit, L. M., & Howard, M. R. (1997). *Born to talk: An introduction to speech and language development* (2nd ed.). Boston: Allyn & Bacon.
- Johnson, R. B., & Christensen, L. B. (2004). *Educational research: Quantitative, qualitative, and mixed approaches* (2nd ed.). Boston, MA: Allyn and Bacon.
- Johnson, R. B., & Christensen, L. B. (2008). *Educational research: Quantitative, qualitative, and mixed approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Johnson, T. L. (2000). Pilot study of dental hygienists' comfort and confidence levels and care planning for patients with disabilities. *Journal of Dental Education*, 64(12), 839-846.
- Kimball, J.W. (2002). Behavior-analytic instruction for children with autism: Philosophy matters. *Focus on Autism and Other Developmental Disabilities*, 17, 66-75.
- Lalli, J. S., Casey, S., & Kates, K. (1995). Reducing escape behavior and increasing task completion with functional communication training, extinction, and response chaining. *Journal of Applied Behavior Analysis*, 28, 261-268.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, 55, 3-9.
- Mancil, G. R., Conroy, M. A., Nakao, T., & Alter, P. (2006). Functional communication training in the natural environment: A pilot investigation with a young child with autism spectrum disorder. *Education and Treatment of Children*, 29, 615-633.
- Martin, C. A., Drasgow, E., Halle, J. W., & Brucker, J. M. (2005). Teaching a child with autism and severe language delays to reject: Direct and indirect effects of functional communication training. *Educational Psychology*, 25, 287-304.
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation*, 97(4), 359-372.

- National Autism Center. (2009). *National standards report*. Randolph, MA: Author.
Retrieved from:
http://www.nationalautismcenter.org/pdf/NAC%20NSP%20Report_FIN.pdf
- 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.
- Nungesser, N. R., & Watson, R. V. (2005). Preschool teachers' perceptions and reactions to challenging classroom behavior: Implications for speech-language pathologists. *Language, Speech, and Hearing Services in Schools, 36*, 139-151.
- Reed, V.A. (1994). *An introduction to children with language disorders* (2nd ed.) New York: Macmillan College Publishing Company, Inc.
- Sallows, G. O., & Graupner, T. D. (2005). Intensive behavioral treatment for children with autism: Four-year outcome predictors. *American Journal on Mental Retardation, 110*, 417-438.
- Scheuermann, B., Webber, J., Goodwin, M., & Boutot, A. (2003). Issues in teacher education in autism. *Focus on Autism and Developmental Disabilities, 18*(3), 197-206.
- Schwartz, H., & Drager, K. D. R. (2008). Training and knowledge in autism among speech-language pathologists: A survey. *Language Speech and Hearing Services in Schools, 39*, 66-77.
- Shukla, S., & Albin, R. W. (1995). Effects of extinction alone and extinction plus functional communication training on covariation of problem behaviors. *Journal of Applied Behavior Analysis, 29*, 565-568.
- Skinner, B. F. *Verbal behavior*. New York: Appleton-Century-Crofts; 1957.
- Simpson, R. L. (2004). Finding effective intervention and personnel preparation practices for students with autism spectrum disorders. *Exceptional Children, 70*(2), 135-144.
- Simpson, R. L., & Myles, B. S. (2008). *Educating children and youth with autism: Strategies for effective practice* (2nd ed.). Austin, TX: PRO-ED.
- Smith, T., Eikeseth, S., Levstrand, M., & Lovaas, O. I. (1997). Intensive behavioral treatment for preschoolers with severe mental retardation and pervasive developmental disorder. *American Journal on Mental Retardation, 102*, 238-249.
- Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation, 105*, 269-285.

- Sprague, J. R., & Horner, R. H. (1992). Covariation within functional response classes: Implications for treatment of severe problem behavior. *Journal of Applied Behavior Analysis, 25*, 735-745.
- Stone, W. L. (1987). Cross-disciplinary perspectives on autism. *Journal of Pediatric Psychology, 20*(2), 615-630.
- Stone, W. L., & Rosenbaum, J. L. (1988). A comparison of teacher and parent views of autism. *Journal of Autism and Developmental Disorders, 18*(3), 403-414.
- Ullman, L. P., & Krasner, L. (1965). *Case studies in behavior modification*. New York: Holt, Rinehart and Winston.
- Whitmire, K. A., & Eger, D. L. (2003). *Issue brief on personnel preparation and credentialing in speech-language pathology*. (COPSSE Document No. IB-5E). Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education.
- Willis, J., & Giles, D. (1976). *Great experiments in behavior modification*. Indianapolis: Hackett.

APPENDIX A
SURVEY INSTRUMENT

Knowledge of Speech-Language Pathologists Regarding Autism

This e-questionnaire consists of three sections including educational and professional background, your understanding of autism, and comfort level with managing challenging behavior. **The term “autism” is used to include students with both low and high functioning autism.** The questionnaire should take approximately 15-20 minutes to complete.

Section I – Educational and Professional Background

Select the most appropriate response from the options provided and type the information in the blank spaces.

1. In which state do you practice speech-language pathology? _____
2. Do you work with at least one student with autism?
 - a) Yes
 - b) No
3. What is your highest degree?
 - a) I do not have a degree in SLP
 - b) Bachelor’s
 - c) Master’s
 - d) Doctorate
4. Do you hold the Certificate of Clinical Competency (CCC) or are you in your Clinical Fellowship Year (CFY)?
 - a) Yes
 - b) No
5. Are you a BCBA or BCABA?
 - a) Yes/I am currently pursuing certification
 - b) No
6. In what kind of setting do you work the most with students with autism?
 - a) Private Practice
 - b) Home Health
 - c) Hospital/Medical
 - d) Public School
7. How many total years have you been practicing as an SLP?
 - a) 1-5
 - b) 6-10
 - c) 11-20
 - d) 21+

8. How many total years have you worked specifically with students with autism?
- a) 1-5
 - b) 6-10
 - c) 11-20
 - d) 21+
9. Which roles do you fulfill when working with students with autism? Please select all that apply.
- a) Trainer to other SLPs
 - b) Trainer to parents/teachers
 - c) Provide 1:1 or group therapy
 - d) Provide communication assessment
 - e) Consultation to larger numbers of students (e.g., AAC specialist)
 - f) SLP on autism team
10. How many students with autism do you regularly provide speech/language intervention?
- a) 1-5
 - b) 6-10
 - c) 11-20
 - d) 21+
11. Please check (✓) the techniques from the list that your SLP university training program adequately prepared you to use with clients after graduation.

- American Sign Language
- Auditory Integration Training
- Augmentative and Alternative Communication
- Evaluation and target selection with ABLLS or VB-MAPP
- Evaluation using Mean Length of Utterance (MLU)
- Facilitated Communication Training
- Functional Behavior Assessment
- Functional Communication Training
- Managing problem behavior of individuals with autism
- Manually Coded English Sign Systems
- Milieu or Naturalistic teaching
- Picture Exchange Communication System (PECS)
- Pivotal Response Training

- Positive Behavior Support
- Prompting and prompt fading
- Reinforcer Assessment
- Self and Parallel talk
- Speech and language evaluation of students with autism using standardized assessments (e.g., PPVT, PLS-4, CELF-4)
- Total Communication
- Traditional Articulation Therapy

Section II – Understanding Regarding autism

Note whether the following statements are True, False or Do Not Know

2. Children must exhibit impaired social interaction to receive a diagnosis of autism.	True	False	Do Not Know
3. To receive a diagnosis of autism, children must exhibit self-injurious behaviors.	True	False	Do Not Know
4. To receive a diagnosis of autism, children must exhibit behaviors and interests that are repetitive and stereotypical.	True	False	Do Not Know
5. To receive a diagnosis of autism, children must exhibit impaired communication skills.	True	False	Do Not Know
6. Some children with autism do not seem to experience pain in the same way as children without autism.	True	False	Do Not Know
7. More boys than girls are diagnosed with autism.	True	False	Do Not Know
8. Some children with autism demonstrate uncoordinated gross and fine motor skills.	True	False	Do Not Know
9. The bulk of scientific evidence supports a causal relation between childhood vaccinations and autism.	True	False	Do Not Know
10. Children with autism primarily tend to be auditory learners.	True	False	Do Not Know
11. Autism is caused by a non-nurturing style of parenting.	True	False	Do Not Know
12. Autism is a developmental disorder.	True	False	Do Not Know
13. During speech therapy, Anna produced a /s/ without lisping so you gave her a high-five and said “Awesome work!” Even though Anna lisped many times since then when making the /s/ sound, the fact that you said “great job” and gave her a high-five represented the use of positive reinforcement.	True	False	Do Not Know
14. Undesirable behavior like screaming or biting can be decreased with the use of a negative reinforcer.**	True	False	Do Not Know

15. A SLP should use an aversive consequence (e.g., seclusion time-out, restraint) to make a child with autism realize s/he has done something wrong.	True	False	Do Not Know
16. Candy, bubbles, tickles, and praise always work as positive reinforcers.	True	False	Do Not Know

Select the most appropriate response from the multiple options provided.

17. Jennie often repeats your words and phrases during therapy. One day you were working on nouns and you said “It is your turn, Jennie” to which Jennie said “your turn, Jennie”. This is because Jennie:

- a) Appears to be practicing language
- b) Appears to be showing Priority Phrase Repetition (PPR)
- c) Appears to have echolalia
- d) Appears to have imitation skills

18. Daniel asks for “green skittle” from a number of items including candy, crayons, and bubbles that are within his visual range. This request is an example of a _____.

- a) Intraverbal
- b) Tact
- c) Echoic
- d) Mand

19. Your young client Andrew looks at you, points to a picture of a rabbit and says “bunny!” This is an example of a _____.

- a) Intraverbal
- b) Tact
- c) Echoic
- d) Mand

20. When working with a student who has only a few words in his/her vocabulary, it is generally best to start language/communication training by teaching:

- a) Greetings
- b) Requesting
- c) Labeling
- d) Answering social questions (e.g., What’s your name?)

21. Every time Dylan screams and cries, his mother returns to the therapy room. You had a discussion with his mother and explained that you would like for her to wait outside, even if Dylan cries, and she agreed. Now when Dylan cries, his mother does not enter the room. She is most likely demonstrating the use of:

- a) Extinction
- b) Punishment
- c) Negative reinforcement
- d) Following your direction

22. If you see decreases in a student’s acting-out behavior during therapy, it is possible that knowingly or unknowingly, you must have used _____:

- a) Extinction with Positive reinforcement for problem behavior

- b) Negative Reinforcement with Extinction for problem behavior
- c) Punishment or Extinction for problem behavior
- d) Negative Reinforcement and Punishment for problem behavior

23. Recent reports of ASD prevalence nation-wide have indicated it to be:

- a) 1:110 children
- b) 1:5000 children
- c) 5:10,000 children
- d) None of the above

24. For children with autism, priming is suggested as a strategy to address:**

- a) Disorganization
- b) The need for predictability
- c) Demonstration of knowledge
- d) All of the above

Section III – Confidence in Managing Challenging Behavior

For the items noted below, please indicate whether you Strongly Disagree (SD), Disagree (D), Agree (A), or Strongly Agree (SA)

25. I feel comfortable when managing the challenging behavior of my students with autism who...

a) exhibit self-injurious behaviors	SD	D	A	SA
b) exhibit behaviors and interests that are repetitive and stereotypical	SD	D	A	SA
c) exhibit aggression toward other children or adults	SD	D	A	SA
d) appear to be restless and unable to sit still	SD	D	A	SA
e) appear to not pay attention to my instructions	SD	D	A	SA
f) frequently cry and scream	SD	D	A	SA
g) run around the room every few minutes unless held by an adult	SD	D	A	SA
h) talk to themselves loudly	SD	D	A	SA
i) are not potty trained	SD	D	A	SA
j) who refuse to eat foods or drink liquids	SD	D	A	SA
k) are not motivated for objects or activities and are difficult to engage	SD	D	A	SA

26. Please leave any questions or comments regarding this survey in the space below.

****These questions were removed from the data analysis to increase the reliability of the instrument.**

APPENDIX B
EXTENDED LITERATURE REVIEW

The term autism spectrum disorders (ASD) is used to describe “a group of developmental disabilities that are characterized by atypical development in socialization, communication, and behavior. ASD typically are apparent before age 3 years, with associated impairments affecting multiple areas of a person’s life” (Centers for Disease Control [CDC], 2009).

ASD has lost its reputation for being a low-prevalence condition. Recent reports suggest that the prevalence for ASD has changed from 1 in 150 noted in 2007 to 1 in 110 children recorded in 2009 (CDC, 2007; 2009). These prevalence rates indicate a dramatic increase when compared to previous reports from the 1990s that indicated a rate of 4 to 5 in 10,000 children (Hulit & Howard, 1997; Reed, 1994). The increased prevalence rate has immense implications for families and professionals including Speech Language Pathologists (SLPs) that are involved in the education and service delivery for children.

Education and related service interventions for students with ASD are developed to address three primary characteristics associated with the diagnostic criteria, namely deficits in social interaction and communication, and demonstration of restricted, repetitive, and stereotypical patterns of behavior, interests, and activities (American Psychiatric Association, [DSM-IV-TR], 2000). Two of the three characteristics (i.e., deficits in communication and social interaction) consistently require intervention by SLPs. Therefore, it is critical that SLPs have the knowledge and confidence required for working with students with ASD, specifically autism, because this group of children is more likely to display severe skill deficits in all areas of development.

Although many professionals are involved in the diagnosis, assessment, and intervention of individuals with autism (National Research Council, 2001), deficits in communication and social interaction call for attention from SLPs for an extended period of time starting in early childhood often through adulthood (American Speech Language and Hearing Association [ASHA], 2006c). Specifically in school settings, SLPs are largely responsible for providing direct intervention to children with autism as well as consulting with personnel that work with such students. Recent reports indicate that 82.8% and 84% of school-based SLPs directly intervene with students with autism (Whitmire & Eger, 2003; ASHA, 2008). Due to the need for establishing professional standards for SLPs, ASHA formulated an ad hoc committee and released a four part series on ASD (2006a; 2006b; 2006c; 2006d). It stated that, “SLPs serve as an integral part of a team, including individuals with ASD and their families, that is responsible for formulating and implementing service delivery plans that meet the unique communication needs of the individuals with ASD” (ASHA, 2006a, p. 2).

The above statement implies that SLPs employed in public schools are expected to possess prerequisite knowledge and a broad range of competencies for serving students with autism effectively (Simpson, 2004). These areas of knowledge and skills should be acquired through formal course work and specialized instruction instead of exclusively through in-service training and self-instruction (Heflin & Alaimo, 2007; Simpson & Myles, 2008). In other words, “instructional and management methods must be explicitly taught, and these skills must be modeled and practiced in field placements with students with ASD” (Simpson, 2004, p. 140). In essence, if these opportunities are not provided during preservice training, SLPs would be compelled to acquire

prerequisite knowledge through continuing education or self-instruction, which may not necessarily include empirically-validated practices for students with autism.

Traditional preparation for SLPs includes knowledge and skills necessary for addressing deficits in speech, communication and social interaction skills of individuals with various types of disabilities. However, it is unclear whether they are professionally prepared to address concurrent issues that emerge during social or communication intervention such as managing student problem behavior. Research has shown that deficits in communication skills are correlated with a high rate of occurrence of problem behavior (e.g., tantrums, aggression, self-injurious behavior) (Day, Horner, & O'Neill, 1994; Derby et al., 1997; Durand & Carr, 1992; Lalli, Mace, Wohn, & Livezey, 1995; Shukla & Albin, 1995; Sprague & Horner, 1992). In fact, various topographies of problem behavior are used by individuals with disabilities to communicate needs and wants in the absence of functional communication skills (Buschbacher & Fox, 2003; Donnellan et al., 1984; Durand, 1993; Carr & Durand, 1985). In addition, Camarata and colleagues (1988) have also reported that 97% of students who demonstrated challenging behavior scored one or more standard deviations below the mean for language skills suggesting a high correlation between below average language skills and higher rates of challenging behavior.

It appears that SLPs who work with students with autism need to be competent not only in skills-instruction but also in problem behavior management (Nungesser & Watson, 2005). Given that a vast majority (84%) of SLPs provide services to students with autism (ASHA, 2008), measurement of their knowledge and skills in the interrelated areas of autism and problem behavior management seems to be warranted. However, a

review of the existing literature showed a dearth of empirical documentation on the assessment of knowledge and skills specifically of SLPs in relation to autism (Cascella & Colella, 2004; Schwartz & Drager, 2008). Existing research provides a measurement of *self-perception* of knowledge of SLPs as opposed to *content knowledge*. Other studies that did assess knowledge and beliefs (e.g., Stone, 1987), included multiple groups of participants rather than a larger group of SLPs exclusively. Therefore, the purpose of this research was to measure the knowledge and confidence of SLPs regarding autism and the extent to which their educational and professional training prepares them to use evidence-based interventions with this population of students.

Theoretical Foundations for the Study

This study is established on two related lines of research including evidence-based practices in autism intervention and professional standards for SLPs that work with individuals with autism. Each of these is described in below.

Evidence-based practices (EBP) have been described as “the systematic use of best evidence, usually in the form of high quality clinical research to solve clinical problems” (Herbert, Sherrington, Maher, & Moseley, 2001, p. 201). Professional discussions regarding ways to bridge the research-to-practice gap by utilizing EBP have been the focus of the current decade (Meline & Paradiso, 2003; Ratner, 2006). Simpson (2004) notes that especially in the field of autism, the research-to-practice gap has been large and controversial. Over the years, many allegedly “effective” methods have been tried and accepted by both parents and professionals; however, few methods have been demonstrated as scientifically effective. Ultimately, interventions that lack efficacy can result in little or no change or even harm to children with autism (National Autism

Center [NAC], 2009). It is important that SLPs are cognizant of the scientific literature and are incorporating it into their speech therapy interventions.

The NAC, a non-profit organization dedicated to the improvement of the lives of individuals with autism, recently completed a national standards project where a careful analysis of evidence-based practices in autism has been synthesized (2009). Pivotal response treatment, naturalistic teaching strategies, modeling, and comprehensive behavioral treatment have all been recognized as established and evidence-based treatments. The common component among the above mentioned practices is that they are all rooted in the science of Applied Behavior Analysis (ABA).

Increasing amounts of evidence, dating back almost 50 years (Ullman & Krastner, 1965; Willis & Giles, 1976), has demonstrated that the use of ABA has been very effective for children with intellectual disabilities and is the most effective treatment methodology for those with autism (Kimball, 2002; Eikeseth, Smith, Jahr, & Eldevik, 2002; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Sallows & Graupner, 2005; Smith, Groen, & Wynn, 2000; Smith, Eikeseth, Levstrand, & Lovaas, 1997). ABA techniques are widely utilized to decrease problem behaviors as well as increase skills in speech, language, and communication.

The fields of SLP and ABA have been connected for half a century (Koenig & Gerenser, 2006). The relationship between the two fields has evolved over the years as paradigms and trends have shifted, however, both disciplines are dedicated to the improvement of students with skill deficits in speech, language, and communication (Koenig & Gerenser, 2006). In their description of the history (1950-1975) of marriage between SLP and ABA, Koenig and Gerenser (2006) noted the use of ABA techniques

to inform interventions recommended for use by SLPs (e.g., Enquist & Wagner, 1950; Backus & Beasley, 1951; McReynolds, 1966; Brookshire & Martin, 1967; Shriberg, 1971; Baer & Guess, 1971; Holland & Harris, 1968). During the 1980's, novel linguistic paradigms (Chomsky, 1957; Bloom, 1970; Brown, 1973) emerged on the surface and created a shift in the conceptualization of treatment for students with autism (Koenig & Gerenser, 2006, p. 3). In particular, Chomsky (1959) a 'nativist' theorist, challenged Skinner's (1957) analysis of verbal behavior based on the philosophical belief that language and higher mental processes were intricately linked and that the behavioral approach did not lend itself to successfully intervening with language disorders.

Chomsky's diatribe resulted in a decline in the use of ABA techniques by SLPs. Throughout the 1990's, little intellectual or practical discourse occurred between SLPs and applied behavior analysts. However, at the onset of the new millennium a catalyst for change was the increase in the prevalence rate of autism and systematic documentation of the effectiveness of ABA techniques for improving the speech, language and communication skills of students with autism (Ganz & Simpson, 2004; Koegel, Koegel, Frea, & Green-Hopkins, 2003; Tincani, 2004; Tsao & Odom, 2006). These empirical demonstrations utilizing ABA techniques were duly noted by members of ASHA, a leading professional organization for SLPs. Subsequently, ASHA created an ad hoc committee on ASD and published standards including specific (a) guidelines, (b) knowledge and skills, (c) principles, and (d) roles and responsibilities of SLPs who work with individuals with autism (2006a, b, c, d). These professional standards constitute another theoretical foundation for this study.

The guidelines for treatment formulated by ASHA's ad hoc committee stressed

the importance of the role of SLPs in collaborating with families to provide the best treatment. Specifically mentioned was the recommendation that when working with families, SLPs “incorporate... behavioral approaches, in which family members learn and apply specific behavior-shaping strategies in intervention with the person with ASD” (ASHA, 2006a, p. 7, as cited in Marcus, Kunce, & Schopler, 2005). The question posed by ASHA was whether SLPs had the knowledge and training to enable them to utilize ABA techniques effectively with children with autism (ASHA, 2006a, p. 7). Additionally, ASHA’s report indicated that SLPs should be knowledgeable about “functions of challenging behavior” (ASHA, 2006b, p. 4). Based on these reports and delineation of standards, it appears that ASHA supports and recommends the incorporation of behavioral principles in the education of SLPs, however, the organization is less precise about the extent and expanse of knowledge and training necessary for establishing professional confidence.

ASHA notes that upon receiving a master’s degree in SLP, one must complete the Knowledge and Skills Acquisition (KASA) Summary for receiving SLP certification in relation to professional standards (ASHA, 2009). Standard III-C contains the requirement that SLPs be knowledgeable and skilled in the “social aspects of communication (challenging behavior, ineffective social skills, lack of communication opportunities)” (p. 2). Standard IV-G requires SLPs to be able to “select and administer appropriate evaluation procedures, such as behavioral observations...” (p. 6). By reviewing the KASA form, it is clear that some level of applied behavior analytic training is expected of an SLP graduate. However, there is no information on whether SLPs nation-wide utilize these sets of skills when working with students with autism. This

study was designed to contribute to the existing literature by providing specific information on the extent to which SLPs are knowledgeable about autism and feel confident in managing the challenging behavior during intervention.

Knowledge and Skills of SLPs in Autism and Applied Behavior Analysis

Several researchers have investigated the type of training, knowledge, and perspectives of SLPs regarding autism (Beck & Dennis, 1997; Cascella & Colella, 2004; Schwartz & Drager, 2008; Stone, 1987).

Beck and Dennis (1997) surveyed SLPs and teachers regarding their perceptions of classroom-based interventions, such as speech therapy. One of the sections on the survey pertained to classroom management. Authors wanted to specifically investigate teacher and SLP perceptions of problem behavior and attention by students in the classroom setting. Forty-three percent of SLPs disagreed that “behavior management was nonproblematic” whereas 38% percent agreed with the statement. Thirty-five percent disagreed that “attention of targeted children is easily maintained” while 25% agreed with the statement. With both items, the majority of SLP participants disagreed with the statements, suggesting a less than optimal comfort level in managing problem behavior of students receiving speech therapy in the classroom. While this study measured the perceptions of SLPs regarding their behavior management skills, the following studies provide a description of the measurement of knowledge of SLPs based on an evolution of a survey instrument originally developed by Stone (1987).

Stone (1987) originally assessed the knowledge and beliefs of several groups of professionals including SLPs, clinical psychologists, pediatricians, and school psychologists regarding autism. Survey responses were compared to responses of 18

“autism experts.” The items on the survey were developed to include the social, emotional, and diagnostic domains of autism. In Section I of the instrument, a Likert-type scale was provided to participants to select the degree to which they agreed with the stated item. In Section II, participants were asked to respond to questions regarding diagnosis and characteristics of autism. Stone noted that responses of the experts were reliable with perspectives found in the scientific literature of that period in time. However, when compared to the responses of experts, participants representing the four disciplines had varying misconceptions regarding autism. For example, SLPs believed that autism was an emotional disorder, whereas professionals from all disciplines believed individuals with autism had special talents and skills.

Many in the field consider Stone’s research to be seminal for understanding the knowledge of professionals who work with children with autism (Campbell, Reichle, Van Bourgondien, 1996; Heidgerken, Geffken, Modi, & Frakey, 2005; Schwartz & Drager, 2008; Stone & Rosenbaum, 1988). Helps, Newson-Davis, and Callis (1999) modified Stone’s (1987) survey instrument and distributed it to participants in London, England. The investigators added nine additional items to the survey and modified the item format in which the content was presented. Three groups of professionals were surveyed including mainstream teachers, specialist teachers (i.e., those working with special education populations), and support staff. Responses were compared with a group of “experts.” Three main findings were noted in the overall conclusions. The first is that participants tended to not recognize children with autism as having challenges in learning. The second was that respondents recognized autism as an emotional

disorder, and third, they did not commonly recognize autism as a developmental disorder.

In 2004, Cascella and Colella investigated the knowledge of SLPs who worked in schools in the state of Connecticut. Information regarding caseloads, university training, continuing education, autism knowledge, and knowledge of communication disorders related to autism was obtained. This study required SLPs to self-report on knowledge regarding autism and educational or intervention strategies including ABA, discrete trial training, incidental teaching, and naturalistic interventions. Means were computed for each intervention by knowledge rating (i.e., *very knowledgeable*, *knowledgeable*, *somewhat knowledgeable*, or *minimally knowledgeable*). Most SLPs reported being “somewhat knowledgeable” about intervention strategies noted above. Overall, results indicated that SLPs were less than optimally knowledgeable and trained in autism and Cascella and Colella (2004) suggested further education was needed for adequate preparation of SLPs that worked with students with autism.

Most recently, Schwartz and Drager (2008) investigated the training, knowledge, and confidence of SLPs in delivering treatment to children with autism. Responses were collected through a survey that included items that were either true/false (i.e., mutually exclusive and objective) or on a Likert-type scale (i.e., ordinal and subjective). Some of the items appeared to have been derived from Stone (1987). The true/false statements were used to obtain responses about the characteristics associated with the diagnostic category of autistic disorder. The Likert scale was used to obtain information on characteristics of autism and related competencies. The authors noted that the participant responses were more consistent with the current scientific literature, when

compared to the participants of Stone's study; however, authors believed that the results were less than optimal for this group although they did not define what they considered to be optimal levels of knowledge levels of knowledge and confidence.

Schwartz and Drager stated that SLPs appeared to be more knowledgeable about autism characteristics than its diagnostic criteria. They suggested that further research focus on accurately evaluating knowledge of SLPs on critical dimensions while undergraduate and graduate programs at universities consider incorporating more focused information on autism "to develop specialized competencies" (p. 67).

The few studies described above specifically targeted SLPs as participants for assessing the knowledge and skills regarding autism. None of the studies, however, specifically assessed the knowledge in applied behavior analysis or techniques specifically designed to measure confidence on problem behavior management. Research with other professionals has also identified similar findings.

Knowledge and Skills Regarding Autism of Other Professionals

Stone and Rosenbaum (1988) replicated an initial study (Stone, 1987) to compare the views of parents, teachers, and experts regarding autism. The findings were similar to results of previous research in that teachers and parents held various misconceptions about the disorder and intervention strategies which were incompatible with the scientific literature. The experts, however, held beliefs that were more synonymous with the current literature in autism. Stone and Rosenbaum expressed concern over the need for effective collaboration between parents and teachers. It must be kept in mind that the prevalence for autism was much lower during that decade (Hulit

& Howard, 1997). Since then, research has documented other views regarding the etiology and methods for intervention for individuals with autism.

Almost a decade after Stone's (1987) initial study was published, Campbell, Reichle, and Bourgondien (1996) conducted an investigation to evaluate the reliability and validity of Stone's original survey instrument. Eighty-three participants who worked in the field of autism responded to the survey at a conference. Individuals representing a variety of disciplines completed the survey (e.g., SLPs, teachers, teacher aids, and experts). One month after the conference, the respondents were contacted by mail and asked to respond to the survey a second time. There was a 72.3% return rate after the mailing. Analysis for internal consistency indicated the overall reliability was .74. Validity measures indicated the instrument tended to measure one factor (i.e., knowledge and beliefs about autism) rather than multiple factors and exploring this further with a larger, more variable sample would be necessary. Four items were identified as "rogue" items. Two were removed from the survey in an effort to improve the internal consistency and two remained in the survey.

Adequate preparation of health-care professionals was also studied by Heidgerken, Geffken, Modi, and Frakey (2005). They investigated the knowledge and beliefs regarding autism of professionals in health care settings including SLPs, medical doctors, and psychologists utilizing the survey based on Stone's (1987) research. Since Stone's survey had been evaluated for psychometric properties and was demonstrated to be reliable and valid (Campbell, Reichle, & Bourgondien, 1996), the investigators replicated Stone's study but modified the section on diagnostic criteria to reflect information presented in the *DSM-IV*, rather than the *DSM-III* (used in Stone's original

research). When analyzing the results, participants were placed in one of three groups: Center for Autism and Related Disabilities (CARD) employees (i.e., “the experts”), Specialists (i.e., psychiatry, SLP, and clinical psychology), and Primary Providers (i.e., family practitioners, pediatricians, and neurologists). It was found that the specialists and primary providers held more outdated views when compared to the experts. However, the primary providers held even older beliefs when compared to the specialists and experts supporting that they may not be comfortable in making a diagnosis or advocating for services of their patients.

In another study, Nungesser and Watkins (2005) surveyed 45 preschool teachers regarding their perceptions of challenging behavior. Teachers responded that they usually used “reactive” responses to challenging behavior, such as time-out, loss of privileges, and use of physical restraint rather than “proactive” methods like functional analysis or using language to communicate choices. Findings also showed that not all teachers believed that communication difficulties were related to problem behavior. Although the participants were teachers, the authors focused on the importance of SLPs having a strong understanding of the relationship between challenging behavior and social-communication skills. Nungesser and Watkins urged SLPs to consider four recommendations all of which were reported to be endorsed in the behavioral and developmental literature.

First, they encouraged SLPs to be mindful of the functions that maintain student problem behavior. Using functional communication training to replace maladaptive behaviors would likely result in an increase of desirable behavior; however, SLPs need an understanding of the concept of behavioral functions to implement appropriate

replacement behaviors. Second, they suggested that SLPs engage in the classroom settings to inform, teach, and model methods for staff and provide shadowing or direct intervention to students in a natural environment to facilitate language development, reducing the probability of problem behaviors. Third, they recommended SLPs to teach emotional language skills designed to provide students with the opportunity to express feelings verbally rather than through maladaptive behaviors. Finally, Nungesser and Watkins (2005) recommended that SLPs utilize other students in the classroom to model skills, engage in role play of appropriate skills, and create interactions to promote generalization of newly learned skills.

APPENDIX C
DETAILED INSTRUMENT DEVELOPMENT PROCESS

Survey Development

To evaluate whether SLPs are knowledgeable about autism and applied behavior analysis (ABA) and competent in implementing interventions for problem behavior, a survey instrument was developed. Initial steps in survey development involved determining the constructs to be measured. Analyses of the scientific literature resulted in the identification of three constructs: general knowledge regarding autism and ABA, advanced knowledge on these areas, and confidence in managing the problem behavior of children with autism during intervention or speech therapy sessions.

Identification of constructs. The first construct, general knowledge, included the most basic information SLPs should have learned regarding autism and applied behavior analysis. Information typically learned in an introductory autism course, for example, diagnostic characteristics, educational needs, origins, causes and effective interventions and teaching methods were part of the general knowledge construct.

The second construct, advanced knowledge, was created to include more in-depth information on autism (e.g., specific diagnostic assessment instruments or development of function-based behavioral interventions) as well as evaluate skills in application of knowledge (e.g., problem-solving). This constitutes advanced knowledge for professionals who directly intervene with students with autism. Having this knowledge enables SLPs to actively problem solve during intervention (e.g., utilizing specific behavior analytic procedures to manage problem behavior). Additionally, advanced knowledge allows professionals to distinguish between myths and factual information or unscientific methods and evidence-based intervention practices.

The third construct that was measured was comfort level of SLPs associated with

managing various types of problem behavior of students with autism (i.e., confidence) during intervention or speech therapy. The purpose of identifying this construct was to determine whether or not a relationship existed between knowledge and comfort levels experienced by SLPs when working directly with students with autism.

Organization of the survey. After identifying the constructs, a survey instrument was designed to obtain information on three main sections: *Educational and Professional Background*, *Understanding Regarding Autism* (including general and advanced knowledge), and *Confidence in Managing Challenging Behavior*.

Section I, Educational and Professional Background, requested information such as participant's degree and year it was conferred, memberships and certifications held, work setting, number of years as a practitioner, and number of students with autism on the SLP's caseload. In addition, participants provided information on the type of training received at their speech language pathology university program (e.g., names of intervention methods). Information on the Educational and Professional Background was critical for predicting variables and their relations to the knowledge and confidence of SLPs when working with students with autism. The items included in this section were derived from a review of past research discussed previously (Casella & Colella, 2004; Schwartz & Drager, 2008; Stone, 1987).

Section II, Understanding Regarding Autism, included statements with (a) mutually exclusive and exhaustive response categories (i.e., true, false or do not know) and (b) closed-ended questions (i.e., multiple-choice)(Johnson & Christensen, 2008). This section included questions related to general and advanced knowledge. Items developed for this section were either replicated or modified based on previous survey

instruments developed by Stone (1987) and Campbell and colleagues (1996) who further evaluated Stone's instrument to establish its psychometric properties.

Additionally, a review of the scientific literature was conducted to include questions that reflected knowledge about current trends and practices (e.g., Cascella & Colella, 2004; Schwartz & Drager, 2008; National Research Council, 2001) and basic and advanced knowledge disseminated by educators in the field (e.g., Cooper, Heron, & Heward, 2007; Miller, 2006; Skinner, 1957).

In the last section of the survey, Confidence in Managing Challenging Behavior, participants were required to identify their comfort when dealing with a variety of problem behaviors displayed by children with autism during intervention. Previous research has reported on SLP confidence in working with students with autism regarding goal writing, overall confidence, and other basic management skills (Cascella & Colella, 2004; Schwartz & Drager, 2008). To extend this line of research, this investigation examined comfort levels and confidence of SLPs in managing problem behaviors of students with autism. Problem behaviors listed in this section were obtained from a variety of sources that confirmed these behaviors were commonly displayed by individuals with autism (Brinkley et al., 2007; Hastings, Brown, Mount, & Cormack, 2001).

Item development. Experts in survey research methodology suggested some guidelines that should be followed when developing items for a questionnaire (Alreck & Settle, 2004). These authors noted the importance of items that are focused, brief, clear, and request precise information that is clearly understood by respondents. In addition, they noted the need to ensure that items on a questionnaire are free of

inherent bias and technical errors.

Inapplicable questions, over-demanding recall, and double-barreled questions are all examples of internal threats to measurement error (Alreck & Settle, 2004). Inapplicable questions are those that participants are asked to respond to even though the question does not apply to them. For example, in this proposed survey, participants were asked, “Do you work with at least one child who has autism?” This question was asked to ensure that only individuals who work with students with autism participated in the survey. If SLPs that did not work with students with autism responded to the survey, the results would most likely underestimate overall knowledge and confidence.

Similarly, over-demanding recall occurs when information is requested that may be too out-dated to be reported accurately (Johnson & Christensen, 2008). In the survey, instead of asking the respondents how many individuals with autism they have worked with up to this point in time (i.e., which could be hard to remember), they were asked to report on the number of students with autism with whom they currently worked. Following this, the pretest instrument was then evaluated to establish content validity.

Content validity. Content validity is a relatively objective assessment made individually by content area experts to determine whether items on an instrument measure the construct that they are designed to measure (Schiavetti & Metz, 2002; Johnson & Christensen, 2004). For the proposed study, a list of twenty-three experts in the field of Autism, ABA, verbal behavior, and speech-language pathology was created on the basis of their research contributions to the existing literature. Initially, ten of the twenty-three experts were invited through e-mail to serve as “content area experts” and evaluate the survey instrument.

After indicating that they would participate, these experts received a copy of the survey with instructions for evaluating the questions on the instrument. They were instructed to critically analyze each item to determine whether it should be retained, discarded, or modified in relation to the construct it was supposed to measure. Seven of the ten experts evaluated the survey to validate the content of the questions. Their recommendations were compiled and reviewed on an item-by-item basis. Questions where no modifications were suggested by any content area expert were retained as initially worded. Modifications were made as suggested by experts on those items that were considered critical for measurement of a construct but needed clarity or specificity. No questions were recommended for removal.

The final survey. After completing content validation procedures, modifications were made to the items based on content area expert's recommendations. Minor wording changes were made based on the suggestions of the content area experts. After decisions were made, a total of forty-four items remained on the questionnaire and were sent to the participants.

IRB Approval Procedure. Institutional Review Board (IRB) approval was obtained from the University of North Texas IRB to complete this investigation. Survey Monkey, an online survey agent was used to collect and store data from the respondents. A data file was downloaded from Survey Monkey and imported into SPSS so that statistical computations could be initiated.

The first page of the online survey was the electronic informed consent letter. The participants provided their consent by clicking the "continue" tab found at the bottom of the page. This directed them to the beginning of the actual survey. Survey

Monkey settings were adjusted to reduce the possibility of individual participants taking the survey more than once.

COMPREHENSIVE REFERENCE LIST

- Alreck, P.L., & Settle, R.B. (2004). *The survey research handbook* (3rd ed.). New York: McGraw-Hill/Irwin.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (Revised 4th ed.) Washington, DC: Author.
- American Speech-Language-Hearing Association. (2006a). *Guidelines for speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Guidelines]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2006b). *Knowledge and skills needed by speech-language pathologists for diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Knowledge and Skills]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2006c). *Principles for speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Technical Report]. Available from www.asha.org/policy.
- American-Speech-Language-Hearing Association. (2006d). *Roles and responsibilities of speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span* [Position Statement]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2008). *2008 Schools Survey report: Caseload characteristics trends*. Rockville, MD: Author.
- American Speech-Language-Hearing Association (2009). *Knowledge and skills acquisition (KASA) summary form for certification in speech-language pathology*. Rockville, MD: Author. Retrieved from: <http://www.asha.org/uploadedFiles/certification/KASASummaryFormSLP.pdf>
- Barbera, M.L. & Rasmussen, T. (2007). *The verbal behavior approach: How to teach children with autism and related disorders*. London: Jessica Kingsley Publishers.
- Beck, A. R., & Dennis, M. (1997). Speech-language pathologists' and teachers' perceptions of classroom-based interventions. *Language, Speech, and Hearing Services in Schools, 28*, 146-153.
- Brinkley, J., Nations, L., Abramson, R. K., Hall, A., Wright, H. H., Gabriels., Gilbert, J. R., Pericak-Vance, M. A. O., & Cuccaro, M. L. (2007). Factor analysis of the Aberrant Behavior Checklist in individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorder, 37*, 1949-1959.

- Buschbacher, P., & Fox, L. (2003). Understanding and intervening with the challenging behavior of young children with autism spectrum disorder. *Language Speech and Hearing Services in Schools, 34*, 217-227.
- Camarata, S. M., Hughes, C. A., & Ruhl, K. L. (1988). Mild/moderate behaviorally disordered students: A population at risk for language disorders. *Language, Speech, and Hearing Services in Schools, 19*, 182-190.
- Campbell, D. G., Reichle, N. C., & Van Bourgondien, M. E. (1996). The autism survey: An evaluation of reliability and validity. *Journal of Autism and Developmental Disorders, 26*(6), 621-634.
- Carr, E., & Durand, V. M., (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18*, 111-126.
- Cascella, P. W., & Colella, C. S. (2004). Knowledge of autism spectrum disorders among Connecticut school speech-language pathologists. *Focus on Autism and Other Developmental Disabilities, 19*, 245-252.
- Centers for Disease Control and Prevention. Morbidity and mortality weekly report. Surveillance summaries, February 9, 2007. MMWR 2007; 56 (No. SS-1).
- Centers for Disease Control and Prevention. Morbidity and mortality weekly report. Surveillance summaries, December 18, 2009. MMWR 2009; 58 (No. SS-10; 1—20).
- Cooper, J., Heron, T., & Heward, W. (2007). Applied behavior analysis. Columbus, OH: Pearson Merrill Prentice Hall.
- Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*, 98-104.
- Courville, T., & Thompson, B. (2001). Use of structure coefficients in published multiple regression articles: β is not enough. *Educational and Psychological Measurement, 61*, 229–248.
- Day, H. M., Horner, R. H., & O'Neill, R. E. (1994). Multiple functions of problem behaviors: Assessment and intervention. *Journal of Applied Behavior Analysis, 27*, 279-289.
- Derby, K. M., Wacker, D. P., Berg, W., DeRaad, A., Ulrich, S., Asmus, J., Harding, J., Pruty, A., Laffey, P., & Stoner, E. A. (1997). The long-term effects of functional communication training in home settings. *Journal of Applied Behavior Analysis, 30*, 507-531.
- Donnellan, A., Mirenda, P. L., Mesaros, R. A., & Fassbender, L. L. (1984). Analysing the communicative functions of aberrant behavior. *Journal of the Association for Persons with Severe Handicaps 9*(3), 201-212.

- Durand, V. M., & Carr, E. G. (1992). An analysis of maintenance following functional communication training. *Journal of Applied Behavior Analysis, 25*, 777-794.
- Durand, V. M. (1993). Functional communication training using assistive devices: Effects on challenging behavior and affect. *Augmentative and Alternative Communication, 9*, 168-176.
- Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2002). Intensive behavioral treatment at school for 4 to 7 year old children with autism: A 1-year comparison controlled study. *Behavior Modification, 26*, 49-69.
- Hastings, R. P., Brown, T., Mount, R. H., & Cormack, K. F. M. (2001). Exploration of psychometric properties of the Developmental Behavior Checklist. *Journal of Autism and Developmental Disorders, 31*, 423-431.
- Heflin, L. J., & Alaimo, D. F. (2007). *Students with autism spectrum disorders: Effective instructional practices*. Upper Saddle River, NJ: Pearson Education.
- Heidgerken, A., Geffken, G., Modi, A., & Frakey, L. (2005). A survey of autism knowledge in a health care setting. *Journal of Autism and Developmental Disorders, 35*(3), 323-330.
- Helps, S., Newsom-David, I.C., & Callias, M. (1999). Autism: The teacher's view. *Autism, 3*, 287-298.
- Herbert, R.D., Shererington, C., Maher, C., & Moseley, A. M. (2001). Evidence-based practice – imperfect but necessary. *Physiotherapy Theory and Practice, 17*, 201-211.
- Hulit, L. M., & Howard, M. R. (1997). *Born to talk: An introduction to speech and language development* (2nd ed.). Boston: Allyn & Bacon.
- Johnson, R. B., & Christensen, L. B. (2004). *Educational research: Quantitative, qualitative, and mixed approaches* (2nd ed.). Boston, MA: Allyn and Bacon.
- Johnson, R. B., & Christensen, L. B. (2008). *Educational research: Quantitative, qualitative, and mixed approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Johnson, T. L. (2000). Pilot study of dental hygienists' comfort and confidence levels and care planning for patients with disabilities. *Journal of Dental Education, 64*(12), 839-846.
- Kieffer, K. M. (1999). An introductory primer on the appropriate use of exploratory and confirmatory factor analysis. *Research in the Schools, 6*(2), 75-92.
- Kimball, J.W. (2002). Behavior-analytic instruction for children with autism: Philosophy matters. *Focus on Autism and Other Developmental Disabilities, 17*, 66-75.

- Lalli, J. S., Casey, S., & Kates, K. (1995). Reducing escape behavior and increasing task completion with functional communication training, extinction, and response chaining. *Journal of Applied Behavior Analysis, 28*, 261-268.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*, 3-9.
- Mancil, G. R., Conroy, M. A., Nakao, T., & Alter, P. (2006). Functional communication training in the natural environment: A pilot investigation with a young child with autism spectrum disorder. *Education and Treatment of Children, 29*, 615-633.
- Marcus, L. M., Kunce, L. J., & Schopler, E. (2005). Working with families. In F. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders* (3rd ed., pp. 1055-1086). Hoboken, NJ: Wiley.
- Martin, C. A., Drasgow, E., Halle, J. W., & Brucker, J. M. (2005). Teaching a child with autism and severe language delays to reject: Direct and indirect effects of functional communication training. *Educational Psychology, 25*, 287-304.
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation, 97*(4), 359-372.
- Meline, T., & Paradiso, T. (2003). Evidence-based practice in schools: Evaluating research and reducing barriers. *Language, Speech, and Hearing Services in the Schools, 34*, 273-283.
- Miller, L. K. (2006). *Principles of everyday behavior analysis* (4th ed.). Belmont, CA: Thomson Wadsworth.
- National Autism Center. (2009). *National standards report*. Randolph, MA: Author. Retrieved from: http://www.nationalautismcenter.org/pdf/NAC%20NSP%20Report_FIN.pdf
- 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.
- Nungesser, N. R., & Watson, R. V. (2005). Preschool teachers' perceptions and reactions to challenging classroom behavior: implications for speech-language pathologists. *Language, Speech, and Hearing Services in Schools, 36*, 139-151.
- Ratner, B. N. (2006). Evidence-based practice: An examination of its ramifications for the practice of speech-language pathology. *Language, Speech, and Hearing Services in the Schools, 37*, 257-267.

- Reed, V.A. (1994). *An introduction to children with language disorders* (2nd ed.) New York: Macmillan College Publishing Company, Inc.
- Sallows, G. O., & Graupner, T. D. (2005). Intensive behavioral treatment for children with autism: Four-year outcome predictors. *American Journal on Mental Retardation, 110*, 417-438.
- Scheuermann, B., Webber, J., Goodwin, M., & Boutot, A. (2003). Issues in teacher education in autism. *Focus on Autism and Developmental Disabilities, 18*(3), 197-206.
- Schiavetti, N., & Metz, D. E. (2002). *Evaluating research in communicative disorders* (4th ed.). Boston: Allyn and Bacon.
- Schwartz, H., & Drager, K. D. R. (2008). Training and knowledge in autism among speech-language pathologists: A survey. *Language Speech and Hearing Services in Schools, 39*, 66-77.
- Shukla, S., & Albin, R. W. (1995). Effects of extinction alone and extinction plus functional communication training on covariation of problem behaviors. *Journal of Applied Behavior Analysis, 29*, 565-568.
- Skinner, B. F. *Verbal behavior*. New York: Appleton-Century-Crofts; 1957.
- Simpson, R. L. (2004). Finding effective intervention and personnel preparation practices for students with autism spectrum disorders. *Exceptional Children, 70*(2), 135-144.
- Simpson, R. L., & Myles, B. S. (2008). *Educating children and youth with autism: Strategies for effective practice* (2nd ed.). Austin, TX: PRO-ED.
- Smith, T., Eikeseth, S., Levstrand, M., & Lovaas, O. I. (1997). Intensive behavioral treatment for preschoolers with severe mental retardation and pervasive developmental disorder. *American Journal on Mental Retardation, 102*, 238-249.
- Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation, 105*, 269-285.
- Sprague, J. R., & Horner, R. H. (1992). Covariation within functional response classes: Implications for treatment of severe problem behavior. *Journal of Applied Behavior Analysis, 25*, 735-745.
- Stone, W. L. (1987). Cross-disciplinary perspectives on autism. *Journal of Pediatric Psychology, 20*(2), 615-630.
- Stone, W. L., & Rosenbaum, J. L. (1988). A comparison of teacher and parent views of autism. *Journal of Autism and Developmental Disorders, 18*(3), 403-414.

Ullman, L. P., & Krasner, L. (1965). *Case studies in behavior modification*. New York: Holt, Rinehart and Winston.

Whitmire, K. A., & Eger, D. L. (2003). *Issue brief on personnel preparation and credentialing in speech-language pathology*. (COPSSE Document No. IB-5E). Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education.

Willis, J., & Giles, D. (1976). *Great experiments in behavior modification*. Indianapolis: Hackett.