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Diagnostic capability of school psychologists in the identification of autism

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DIAGNOSTIC CAPABILITY OF SCHOOL PSYCHOLOGISTS IN THE IDENTIFICATION OF AUTISM

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ABSTRACT

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This study investigated the relationships between school psychologist characteristics and perceived capability to identify autism. A review of literature has suggested autism is not being diagnosed as early as recommended (Wiggins, Baio, & Rice, 2006), resulting in later intervention and less favorable prognoses. In fact, many children are not evaluated before attending school and school psychologists are often the first professionals to evaluate and provide an autism diagnosis or identification (Wiggins et al., 2006).

Participants included 246 school psychologists who reported their degree level, years of experience, work setting, primary population they serve, amount of autism specific training received, clinician or research reliable certification on the *ADOS* (Lord, Rutter, DiLavore, & Risi, 1999), research reliability on the *ADI-R* (Rutter, Le Couteur, & Lord, 2003), number of autism diagnoses made per year, and amount of time spent on an autism diagnostic team. School psychologist characteristics were compared with autism knowledge, perceptions of autism diagnostic skills and experience, likelihood to consult with others, and need for training. Results revealed that *ADOS* clinician reliability was a significant predictor of autism knowledge. Number of diagnoses made per year, years of experience, and specific autism training were significant predictors of perceived skills and experience. Additionally, higher years of experience significantly predicted lower

perceived need for training. Autism knowledge was found to be positively correlated with perceived skills and experience and negatively correlated with perceived need for training. Members of autism diagnostic teams were found to demonstrate higher autism knowledge scores. Lastly, 86.6% of participants reported themselves to be skilled versus unskilled and only slightly more than half reported that they needed additional training in the area of autism diagnosis.

Implications in terms of school psychologist professional development training and service delivery are discussed. Specifically, those individuals who reported higher levels of knowledge and skills also served on autism teams suggesting that these specialized teams may be an important model for school-based services to students who are suspected of autism spectrum disorders. Lastly, limitations to the current study and implications for future research are discussed.

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INTRODUCTION

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According to U.S. National Samples, the prevalence of Autism Spectrum Disorders is on the rise (Liptak, Stuart, & Auinger, 2006). Along with the growing number of identified cases, there has been some concern surrounding the accuracy, timing, and efficiency of autism diagnosis. Although, autism specialists tend to agree on the defining characteristics of autism, research has shown inconsistencies in the timing and accuracy of diagnoses made. There appear to be incorrectly diagnosed children, indicating a possible misunderstanding of diagnostic criteria and the identification of autism symptomology (Kabot, Masi, & Segal, 2003). Inconsistencies in diagnoses may also be a result of insufficient and ineffective assessment tools as well as a lack of training in the utilization of existing tools.

In addition to school, clinical, developmental, and neurological psychologists, autism may be diagnosed by pediatricians, neurologists, or other clinicians who are specifically trained to diagnose the disorder in a multitude of settings (Chawarska, Klin, & Volkmar, 2008). Within educational settings, teams of individuals who typically identify autism often include school psychologists, speech language pathologists, occupational therapists, and special education teachers. Training among members of this team of individuals is likely to vary. School psychologists receive training to diagnose or identify many disorders, including autism. Given their more intensive content and field

experiences, doctoral level school psychologists may be better prepared to identify and diagnose autism correctly when compared to non-doctoral level school psychologists and those who do not have specific training in autism (Reschly & Wilson, 1997). Doctoral level school psychologists and school psychologists who have expertise in autism are likely to have received advanced training in assessment, interpretation of results, and intervention programming,

Autism

Autism, a pervasive developmental disorder, is characterized by deficits in several areas of functioning including reciprocal social interaction, communication, and the presence of stereotyped or repetitive behaviors. Autism characteristics vary greatly between individuals. Delay or lack of development in reciprocal social interaction and communication is likely to exist on a continuum regarding severity and/or frequency. Similarly, the presence of stereotyped or repetitive behaviors is likely to vary regarding severity and frequency as well. Therefore, individuals who qualify for an autism diagnosis may present quite differently across characteristics and symptomology (Jahr, Eikeseth, Eldevik, & Aase, 2007). The variability of symptomology is likely to make autism diagnosis difficult (Matson & Boisjoli, 2007). Because autism is diagnosed by examining the behavioral profile of an individual, school psychologists must be well trained regarding typical and atypical development of social interaction, communication, and repetitive or stereotyped behaviors in order to accurately identify autism symptomology (Chawarska et al., 2008).

Typical social interaction in young children includes smiling socially, playing with others, making eye contact, showing interest in others, and using reciprocal

nonverbal communication (e.g., gestures, body language) (Charwarska et al., 2008). Reciprocal social interaction deficits may present as impairment in nonverbal communication such as lack of eye contact, misunderstanding gestures, lack of response to social smile, or the absence of gesture use (American Psychiatric Association, [APA], 2000). The specific types of deficits are likely to vary by individual. Therefore, some individuals diagnosed with autism may exhibit no eye contact at all whereas others may exhibit too much eye contact, having an intense staring quality. Both instances exemplify inappropriate eye contact, which tends to be a common social interaction deficit displayed in children who have autism. Some children diagnosed with autism do initiate social interaction, while others may not initiate at all or do so rarely (Jahr et al., 2007). These difficulties in social functioning are likely to have a negative impact on child development by limiting opportunities to learn from and about others.

Typical communication includes age appropriate spoken language, the ability to hold a conversation, response to one's name, and use of gestures and nonverbal communication (Chawarska et al., 2008). Communication deficits may present as a delay or lack of development of spoken language, little interest or ability to hold conversation, and lack of pretend or make-believe play. Children diagnosed with autism typically show deficits in verbal and nonverbal communication (APA, 2000). Some children with autism do not speak at all. It can be quite difficult to understand or interpret the behavior, needs, or wants of a child who does not speak. Other children may speak, but display less frequent, articulate, or meaningful speech than expected. Those children who do have verbal abilities may speak without function, meaning they speak but do not direct their speech toward another person or speak without reason (e.g. repeating phrases or

songs from commercials). Therefore, they may be speaking articulately but seem to be speaking simply as a self-soothing activity (Murdock, Cost, & Tieso, 2007).

A third characteristic of children who have autism is the presence of stereotyped or repetitive behaviors. These behaviors may be observed across settings, but are often more easily detected during play. Typical play behavior includes using of toys functionally, playing make-believe or pretend games, transitioning between activities, and taking turns. Presence of stereotyped or repetitive behavior in play may include lining up toys instead of playing with toys, resistance to transition, doing the same thing over and over again (e.g. stacking blocks or spinning the tire on a toy car), and displaying extreme attachments to certain routines in play or toys. Generally, the presence of stereotyped behaviors may include restrictive or repetitive patterns of behaviors, interests, and activities that are abnormal in intensity or focus, inflexible adherence to routine, stereotyped and repetitive, and/or a preoccupation with objects or parts of things (APA, 2000). Children with autism may express stereotyped behaviors in very different ways. Some children may be very insistent regarding adherence to routines, while others may be indifferent to routine. Some children may engage in spinning or hand flapping activity rarely and other children may engage in this behavior frequently (Richler, Bishop, Kleinke, & Lord, 2007). Determining the impact of stereotyped and repetitive behaviors can be very subjective in nature and requires extensive observations across multiple settings.

All autism symptomology should be assessed with regard to the overall developmental level of the child (Chawarska et al., 2008). Therefore, a clear understanding of typical and atypical development of children is necessary in making an

autism diagnosis. For example, when assessing communication, it is imperative to consider what is expected for a child's developmental age. It is important to recognize that children without autism may engage in some of the behavioral symptoms of autism, but not with the intensity or frequency that would qualify them for a diagnosis (Chawarska et al., 2008).

Differential diagnoses within the broader autism spectrum must be considered when making a diagnosis as well. The autism spectrum, or pervasive developmental disorder spectrum; includes autism, Asperger's disorder, pervasive developmental disorder not otherwise specified, Rett's disorder, and childhood disintegrative disorder. Because these disorders display with similar characteristics, differential diagnoses within the spectrum may be challenging (Brock, Jimerson, & Hansen, 2006). Differential diagnoses outside of the autism spectrum may include Fragile X syndrome, speech and language disorders, selective mutism, stereotypic movement disorder, schizophrenia, and attention-deficit hyperactive disorder. Additionally, it is important to be aware of the comorbidity of mental retardation and autism (APA, 2000).

In addition to classic diagnostic criteria, it is not uncommon for autism to be associated with other behavioral, psychological, and medical conditions; which can make diagnosis particularly difficult. It is estimated that 60% of children with autism display symptoms of one or more additional disorders (Brock et al., 2006). Other disorders and symptomology may include hyperactivity, short-attention span, aggressiveness, impulsivity, self-injurious behaviors, and temper tantrums. Autism is also often associated with mental retardation or a cognitive delay, occurring in approximately 70% of children with autism (APA, 2000; Brock et al., 2006). Approximately 50% of those

with autism and mental retardation were found to have intellectual functioning deficits in the mild to moderate range.

Although autism is considered a lifelong disorder, overall prognosis may vary greatly from individual to individual. Those with more severe symptoms throughout childhood and adolescence, and who have other associated symptoms such as hyperactivity and aggression, are less likely to live independently as adults. However, those with less severe symptoms and fewer associated complications throughout childhood and adolescence may develop high levels of adaptation as adults. Approximately one-third of those diagnosed with autism are likely to obtain at least partial independence as adults (APA, 2000). Earlier diagnosis, followed by appropriate intervention services, is likely to result in better prognoses (Charman & Baird, 2002).

Benefits of Early Diagnosis

Early detection and diagnosis of autism spectrum disorders allows for early intervention to take place. Without diagnosis, children with delays in any areas of development are unlikely to be provided with intervention that is specifically targeted to intervene with autism characteristics. Unfortunately, autism intervention programs tend to have long waiting lists. Therefore, early diagnosis provides opportunities for parents to consider intervention options, enroll their children in available programs, and obtain necessary intervention services in a timelier manner (Hume, Bellini, & Pratt, 2005).

Targeted early interventions have shown substantial success in young children with autism (Hume et al., 2005). Interventions implemented before age 5 were shown to have the greatest effect on social, communication, and cognitive growth. McConachie, Le Couteur, and Honey (2005) found that early intervention may be linked to better

prognosis and increased likelihood of spoken language as well. Children with autism who are provided with early intervention show improvement more quickly than those with other neurodevelopmental disorders. In addition to helping children, early intervention services are important to parents as well. Parents of children with autism report early parent training to be beneficial in assisting their child with autism develop, and prefer to receive parent training as early as possible (Hume et al., 2005).

Many autism diagnoses do not take place until children enter a formal educational setting such as preschool or elementary school. Within an educational setting, school psychologists are likely to identify students with autism and help design appropriate educational programming and intervention for identified students. In a recent study of school psychologists, 95% reported an increase in referrals requesting autism assessment (Kohrt, 2004). The reasons for and implications of such an increase are not yet known. However, it is very well known that children who receive targeted, early intervention specific to their autism deficits are more likely to be successful in the long-term, including academic achievement and independent living (Koegal, Koegal, Frea, & Fredeen, 2001). Therefore, it is imperative that school psychologists are equipped to competently assess and identify autism in all children, especially those of early childhood age.

School Psychologists

School psychologist are trained in both psychology and education in order to identify psychological disorders, develop appropriate intervention and treatment plans, and make recommendations as to the most effective learning environment and teaching strategies for those students who have disorders. In the area of autism spectrum

disorders, this would imply identifying the disorders and making recommendations for effective classroom environment, teaching strategies, services to take place inside and outside the school, and referrals to outside agencies (Merrell, Ervin, & Gimpel, 2006).

The title "school psychologist" represents a broad range of professionals with masters, specialists, or doctoral degrees and variations in experiences, type of training, and fieldwork requirements (Merrell et al., 2006). Many school psychologists seek out specialized training through professional development options at conferences or in-service trainings. Additionally, school psychologists may have developed a subspecialty area which represents a topic or area in which they have extensive training and experiences. School psychologists might sub-specialize in neuropsychology, autism, behavior disorders, consultation, or another specific area. These individuals often assume leadership roles in their work settings related to their specific knowledge.

School psychologists who have expertise in the area of autism assessment may serve on specialized identification teams and receive advanced training in autism assessment. These specialists may be certified to administer "gold standard" autism assessment tools (Filipek et al., 1999, p. 460) such as the *Autism Diagnostic Observation Schedule* (ADOS; Lord, Rutter, DiLavore, & Risi, 1999) or the *Autism Diagnostic Interview-Revised* (ADI-R; Rutter, Le Couteur, & Lord, 2003). Those who are not trained to administer such assessments may choose to administer them anyway, choose alternative assessments, or use a combination of tools for diagnosis. A recent study of school psychologists who had purchased the *ADOS* revealed that approximately 50% of the 88 respondents regularly used the *ADOS* and of those, 81% reported that they had attended a formal clinical training (Akshoomoff, Corsello, & Schmidt, 2006). Therefore,

just as there is variability in the symptomology of autism, there is variability in the type and quality of assessment instruments, as well as the skill level of the diagnostician.

Although school psychologists are likely to be trained in assessment and identification of all psychological disorders, the variation in the range, presentation, and severity of autism symptomology may pose challenges to some school psychologists who have not been specifically trained in appropriate assessment or who are not trained to use preferred assessment tools (Brock et al., 2006). The investigation of characteristics of school psychologists who provide autism diagnoses is crucial because the number of autism referrals is likely to continue to increase (Kohrt, 2004). Identifying gaps in knowledge may be useful for the purpose of guiding future training and professional development.

Rationale

Diagnostic Issues

Current research findings suggest autism is not being diagnosed as early as recommended (Wiggins, Baio, & Rice, 2006). This delay results in later intervention and can result in a less favorable prognosis. Research by the Metropolitan Atlanta Developmental Disabilities Surveillance Program through the Center for Disease Control examined 114 autism cases regarding initial evaluations and delivery of autism diagnoses (Wiggins et al., 2006). Cases were collected from both school and non-school sources and involved diagnoses from qualified professionals including school, clinical, and child-focused psychologists. The age between first evaluation and delivery of autism diagnosis revealed a gap of more than one year (Wiggins et al., 2006). Although, the average first evaluations took place at 48 months, autism diagnoses were not typically provided until

61 months (Wiggins et al., 2006). This finding suggested that 13 months were spent without intervention due to misdiagnoses or lengthy assessment and evaluation procedures. Delay in diagnosis may also indicate less obvious symptomology, which can be difficult to recognize or assess (Wiggins et al., 2006). In this study, the "gold standard" autism diagnostic tools (Filipek et al., 1999, p. 460), the ADI-R (Rutter et al., 2003) and the ADOS (Lord et al., 1999) were used in 0% and 7%, of the cases, respectively (Wiggins et al., 2006). This finding may indicate that clinicians are not using appropriate tools to make early diagnoses. With appropriate training and education in assessment and diagnosis, psychologists who diagnose and identify autism are more likely to provide earlier identification, and thus allow for early intervention, in early childhood, preschool, school, private, and hospital settings (Wiggins et al., 2006).

Approximately 24% of children do not receive a diagnosis or identification of autism until entering school (Wiggins et al., 2006). There are many potential reasons for this delay including lack of access to medical care or less severe symptomology that does not arouse parent concern. Therefore, despite recommendations that children with autism spectrum disorders be provided with intense and frequent intervention at the first sign of developmental delay, many children are not afforded an evaluation before attending school (Wiggins et al., 2006). Thus, it is very likely that school psychologists will continue to evaluate and identify students with autism.

School psychologists represent an array of training, degree, experience, and ability levels. By determining the appropriate training, degree and experience levels, and capability in the identification of autism characteristics, we can increase the likelihood that school psychologists are adequately prepared to accurately and efficiently identify

students with autism. Masters and specialist degrees currently dominate the field of school psychology, representing the training of approximately 75% of practicing school psychologists (Curtis et al., 2008). Non-doctoral level training programs typically have similar criteria and training focus that align with the National Association of School Psychologists standards. These programs require approximately two years of university-based training and coursework and a one-year internship. Doctoral level training programs typically require four years of university based training and coursework, a one-year internship, and a dissertation or research project.

Despite the different level of training, non-doctoral and doctoral school psychologists tend to be similar in terms of the quantity of general educational experiences (Reschly & McMaster-Beyer, 1991). However advanced rigor, depth, and sophistication of experiences have been qualitatively found at the doctoral level (Reschly & McMaster-Beyer, 1991). Yet, there has been minimal research conducted to determine if there is a difference in doctoral vs. non-doctoral psychologists in terms of diagnostic skills and abilities.

Statement of the Problem

School psychologists have the opportunity to develop a specialized area of expertise through ongoing professional development. Such experiences may allow them to claim a specialization or concentration area. Generally, those who assert a specialization, will exhibit extensive experience, expertise, and knowledge in that particular area (Merrell et al., 2006). This practice is common within the field of psychology and particularly with autism spectrum disorders. Research surrounding the types of experiences and training of those practitioners who identify themselves as having

a subspecialization in autism is limited. Furthermore, it is not known whether having an "autism specialist" to identify autism is more useful than allowing all school psychologists to take on this difficult task. This information would be very useful for school systems to know when making hiring and placement decisions for their practitioners.

There is some preliminary information that suggests those practitioners with more years of experience and specialized autism training are more efficient in making an autism diagnoses than those with less experience and specialized autism training (Gerbe, 2008). Many school districts across the country provide their school psychologists with specialized trainings and in-service workshops related to autism (Gerbe, 2008). However, these efforts are taking place without any research suggesting the amount of training and experience necessary for professionals to consider themselves proficient in the area in which they are being trained.

The purpose of the current study was to determine the characteristics of school psychologists that were associated with knowledge and practices in identifying autism. The dependent variables consisted of knowledge of autism characteristics, perceived skill and experience level in the identification of autism characteristics, perceived likelihood to consult a supervisor or specialist in making an autism diagnosis or identification, and perceived need for training in the identification of autism characteristics. The independent variables were characteristics of school psychologists, and were examined with the dependent variables through the use of descriptive and inferential statistics.

Research Questions

1. Does school psychologist degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number

of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain autism knowledge?

2. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain perceptions of skills and experience?

3. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain perceptions of need for training?

4. Is autism knowledge correlated with perceptions of skills and experience?

5. Is autism knowledge correlated with perceptions of need for training?

6. Do school psychologists who participate as members of an autism team display higher levels of autism knowledge than those school psychologists who do not identify themselves as members of an autism team?

7. What is the percentage of school psychologists who report themselves to be unskilled and inexperienced versus skilled and experienced?

8. What is the percentage of school psychologists who report themselves to not need training versus in need of training?

The current study looked to establish whether different amounts of training and experience explained diagnostic capability in the identification of autism. The dependent variables were measured using three self-rating scales and one autism knowledge test. The self-ratings consisted of skills and experience, likelihood to consult with a supervisor or specialist, and need for training. The descriptive data gathered from these areas may be useful in the development of future trainings designed for all school psychologists.

The results may be useful for trainers of school psychologists to better understand the levels and types of training associated with greater knowledge and perceived skill in identifying children with autism An examination of the relationship between knowledge of autism characteristics and school psychologists perceptions of their own skill, experience level, and consultation practices may provide insight as to school psychologists abilities to self-evaluate training need. Further, this information may help special education administrators determine the perceived need for more autism specific professional development opportunities among practicing school psychologists. Efficient diagnosis and identification of autism is crucial to positive prognosis and may be more likely with appropriate training.

Limitations

The current study recruited school psychologist participants who were members of state school psychology associations. Because school psychologists are not required to be members of any state associations, generalizability of the study results to school psychologists who are not members of state school psychology associations is questionable. Additionally, those who chose to complete the survey may represent individuals who are particularly interested in the area of autism and again, generalizability of the findings to all school psychologists is questionable.

The present study also collected data via an online survey website. Therefore, it cannot be known if participants solicited outside help when completing the autism knowledge test. Participants also self-reported on their demographic information, perceived skills and experience, likelihood to consult, and need for training. As with most measures of self-report, there is no way to know if the information they provided is

correct or their perceptions were accurate. Because of the nature of the study, there is also no way to suggest causality. Therefore, the current study was limited to examining relationships. The results cannot be used to make determinations regarding the reason or cause for specific outcomes.

Definitions of Terms

Autism: A pervasive developmental disability characterized by social interaction deficits, communication deficits, and presentation of stereotyped or repetitive behaviors (APA, 2000).

Autism Team: A group of professionals who are often assigned the role of diagnosing or identifying autism and work collaboratively to do so.

Consultation: Provision of services between a consultant and consultee which may be triadic in nature, as a third party may benefit from the consultative process. The process often includes the provision of direct services to the consultee, assisting them to develop skills which make them independent of the consultant. This interaction may include asking questions, seeking help regarding case conceptualization, and collaboratively clarifying information (Brown, Pryzwansky, & Shulte, 2001).

Differential Diagnosis: The determination of the nature of a disorder that involves distinguishing from other possible disorders or diagnoses (APA, 2000).

Sub-specialization: Specific areas within a specialization area of psychology. Those who choose sub-specialization areas typically pursue advanced training, education, and practicum experiences in the chosen subspecialty.

Symptomology: A group or cluster of symptoms that typically present simultaneously and are associated with a disorder.

CHAPTER II

LITERATURE REVIEW

History of Autism

Written accounts of childhood behavior and characteristics depicting autism-like characteristics have been documented as far back as 200 years ago. John Haslam's work published in 1809 (as cited in Wolff, 2004) provided written descriptions of developmental delay, language delay, lack of gestures and social interaction, speaking in third person, and stereotyped behaviors in a boy with whom he worked. The boy pulled on his mother's arm to get her attention, was very interested in and spoke only about toy soldiers, and was very solitary, never playing with other children (as cited in Wolff, 2004). These descriptions appear to describe a disorder that is now referred to as autism. Unfortunately, during that time, children with such symptomology would be classified as insane (as cited in Wolff, 2004). In 1879, Henry Maudsley also described such symptomology as "The insanity of early life" and wrote an entire chapter about this condition (as cited in Wolff, 2004). The apparent disconnection from others and limited speech seemed consistent with schizophrenic individuals and thus became known as childhood schizophrenia.

This perspective remained unchanged for many years. Both the first and second edition of the Diagnostic and Statistical Manual (DSM), published by the American Psychiatric Association, classified the cluster of symptoms, which we now refer to as

autism, as childhood schizophrenia (Chawarska et al., 2008). During this time, many children who today might have been considered to have autism were instead diagnosed with schizophrenia. Unfortunately, many believe children with autism were classified as having schizophrenia or schizoid personality disorder due to a misunderstanding of the presenting symptomology (Wolff, 2004).

In the 1940s, Leo Kanner identified the classic autism characteristics (as cited in Wolff, 2004). Kanner did not believe that this specific cluster of symptoms was the same thing as schizophrenia and was the first to declare the disorder as autism, rather than schizophrenia. In his work, he noticed similar characteristics among those who came to his clinic and were referred for auditory delay or concern for "feeble mindedness". After spending some time with these children, he described them as having little interaction with humans, strong interest in toys or objects, and potential for good cognitive ability (as cited in Wolff, 2004).

Hans Asperger also wrote a very similar account of symptomology around the same time as Kanner (as cited in Wolff, 2004). Unfortunately, his original work was written in German and was not translated until 1991. However, Asperger described four cases of "autistic psychopathy of children" which included children with extraordinary intellectual gifts in math and science, but who displayed stereotyped behaviors, lack of empathy for others, poor relationships, and idiosyncratic language. He suggested that the condition could be recognized in early childhood and was lifelong. Many now believe his descriptions describe high functioning autism and Asperger's syndrome (Wolff, 2004).

The key features of autism were not widely known until Wing and Gould (1979) published their epidemiological study, which addressed the symptomology of autism. Many considered this study to be a turning point in the understanding of autism and abandonment of psychosis and schizophrenia to describe such symptomology (Wolff, 2004). At this time a shift in diagnosis was made with fewer children being diagnosed with schizophrenia and more with the diagnosis of autism. Wing and Gould were among the first to address treatment for autism.

Although, autism diagnostic criteria have become increasingly detailed throughout revisions of the DSM, the general description of autism has not changed since it was first included. The current diagnostic criteria set forth by the DSM, 4th Edition Text Revision (DSM-IV-TR; APA, 2000) still depicts an almost identical description of autism symptomology first put forth by Leo Kanner (as cited in Hippler & Klicpera, 2004).

Diagnostic Criteria

The Centers for Disease Control and Prevention (CDC, 2009) describes children with autism as displaying deficiencies in social interaction, communication, and emotional development. The CDC further describes many with autism to display stereotyped or repetitive behaviors, such as hand flapping or obsessions with small parts of objects (http://www.cdc.gov/ncbddd/actearly/pdf/parents_pdfs/AutismFactSheet.pdf). Although these descriptions encompass many developmental milestones of childhood, there are many specific characteristics professionals assess, some which may be observed as early as infancy (Clifford, Young, & Williamson, 2007).

Children are typically diagnosed with autism in hospitals, medical offices, and mental health clinics by professionals using the criteria set forth by the DSM-IV-TR (APA, 2000). However, school systems are not obligated to make diagnoses or to use these criteria. Instead, school systems currently use criteria set forth by the Individuals with Disabilities Education Act of 2004. Children qualify for special education services in the U.S. by meeting eligibility criteria under specific disability areas. Therefore, in a school setting children are identified as eligible for special education services under a specific disability such as autism, but this educational label does not imply a medical diagnosis and is not recognized outside of the school.

School Identification of Autism

School psychologists working in a school setting typically use state education criteria when identifying children with disabilities. Although state laws may vary slightly, most will align with federal definitions of the various disability categories as outlined in Public Law 108-446, Individuals with Disabilities Education Act (United States Department of Education, 2004). The school psychologist, parents, and special education team determine which special education category would be most appropriate for the student (Merrell et al., 2006; Noland & Gabriels, 2004). Special education disability qualification legally identifies these children to be eligible for special educational services deemed necessary by the special education team.

The school-based qualifying criteria for autism disorder is slightly different than the criteria set forth by the DSM-IV-TR (APA, 2000). As noted above, qualification of autism placement in the U.S. public school system is governed by Public Law 108-446, Individuals with Disabilities Education Act which states, in particular to autism,

> (i) Autism means a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three, that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences.
>
> (ii) Autism does not apply if a child's educational performance is adversely affected primarily because the child has an emotional disturbance, as defined in paragraph (c)(4) of this section.
>
> (iii) A child who manifests the characteristics of autism after age three could be identified as having autism if the criteria in paragraph (c)(1)(i) of this section are satisfied.
>
> (U.S. Department of Education, 2004, Section 300.8)

Medical Diagnosis of Autism

The DSM-IV-TR (APA, 2000) criteria for autism diagnosis suggests that a total of six (or more) symptoms from impairment in social interaction, impairment in communication, and the presence of restricted repetitive and stereotyped behaviors be present to diagnose autism. Also, it is necessary for the child to display at least two symptoms of qualitative impairment in social interaction, and one symptom each from qualitative impairments in communication and restricted repetitive or stereotyped behaviors (APA, 2000). Further, delays or abnormal functioning present prior to an age of 3 years is necessary in social interaction, language used for communication, or symbolic or imaginary play. Lastly, the disturbance cannot be better accounted for by Rett's Disorder or Childhood Disintegrative Disorder (APA, 2000). Those who meet all of these criteria are eligible for an autism diagnosis. Those who meet some of the criteria may qualify for a diagnosis of another pervasive developmental disorder similar to autism.

Although school identification may take place without use of the DSM-IV-TR (APA, 2000) criteria for autism diagnosis, the key features of each are very similar. DSM-IV-TR diagnostic criteria are more detailed in terms of the number of symptoms required, but the hallmarks, regardless of which identifying system used; include deficits in social interaction and communication, and the presence of repetitive or stereotyped behaviors, as well as an expected appearance of symptoms prior to age 3. Because these three key symptom areas can vary in presentation, especially in young children, a more in-depth presentation of social interaction, communication, and stereotyped behaviors is presented.

Social Interaction

Social interaction deficits may present as impairments in attending to others and actively engaging in play with others. Further, impairments in social interaction skills are often evidenced by lack of eye contact, misunderstanding gestures, or the absence of the use of gestures (APA, 2000). Quality of eye contact includes the ability to look directly into someone's eyes or face or look directly into a camera when being operated by a person has shown, when absent, to be a predictive characteristic of autism (APA, 2000). When given many opportunities to engage in face-to-face interaction, infants with autism often avoid gaze by looking away or orienting themselves in another direction (Chawarska et al., 2008). Infants with autism are unlikely to lean into the body of their caregiver when being held, and are also unlikely to display anticipatory posture such as reaching their arms out before being picked up (Clifford et al., 2007). Overall, joint attention and symbol use are two important features in social interaction skills (Wetherby, Woods, Allen, Cleary, Dickinson, & Lord, 2004). Children who do not use

symbols may have difficulty learning the conventional meaning of different objects through gestures, words, or actions in play (Chawarska et al., 2008).

Overall social interaction is less frequent in children with autism when compared with typically developing children (Jahr et al., 2007). Social interaction deficiencies do tend to overlap with communication skills. Hence, children with social interaction deficiencies are likely to display communication deficiencies as well (Chawarska et al., 2008). Although social and communication deficits are often simultaneously present, there is a significant distinction between the two.

Communication

Communication refers to verbal and nonverbal language. Communication deficits may present as a delay or lack of development of spoken language, little interest or ability to hold conversation, and lack of pretend or make-believe play. Children with autism were found to engage in 40% to 57% less overall communicative activities (including verbal and nonverbal communication) when compared with their same aged peers (Chiang, Soong, Lin, & Rogers, 2008). Clifford and colleagues (2007) found that children with autism are less likely than their typically developing peers to laugh, hug, or show enthusiasm. Although it is common for typically developing children to place objects in the eyesight or face of a caregiver in order to initiate joint attention, this appears rare in children with autism. Recent research has suggested that children with autism do not tend to participate in conventional social games with others, and may reflect a deficit in theory of mind (Clifford et al., 2007).

Children with speech and language delays do not qualify for an autism diagnoses without displaying the key characteristics of autism such as deficits in social interaction,

deficits in communication, and presence of repetitive or stereotyped behavior. Although more research regarding verbal milestones is needed (Bristol-Power & Spinella, 1999), there is sufficient evidence to indicate that children with autism do tend to display uneven language profiles. This inconsistency suggests a lack of understanding of language and an inability to produce meaningful spoken language (Charman, 2010). Similarly, Murdock and colleagues (2007) found that children with autism have significantly less verbal initiations and verbal responses when compared with their typically developing peers. The verbal communication deficit in children with autism is not typically mild and instead quite pervasive.

Nonverbal communication skills are carefully assessed in children with suspected autism. Children with autism tend to demonstrate difficulty initiating nonverbal joint attention despite their mental age (Chiang et al., 2008). Children with autism also tend to display difficulties with dyadic turn taking skills (Chiang et al., 2008). However, it is often the lack of overall language development that usually prompts initial evaluation of the child by specialists.

Repetitive or Stereotyped Behaviors

Repetitive and/or stereotyped behaviors may include restrictive or repetitive patterns of behaviors, interests, and activities that are abnormal in intensity or focus, inflexible adherence to routine, stereotyped and repetitive, and/or have preoccupation with objects or parts of things (APA, 2000). Repetitive gross-motor behaviors may include hand flapping, rhythmic body rocking, spinning, jumping, pacing, and rocking from foot to foot. Repetitive fine-motor behaviors may include hand/finger wiggling or mannerisms, hair twirling, finger tracking, finger posturing, eye crossing, or saliva

swishing. These behaviors often take place for the purpose of sensorimotor stimulation (Schreibman, 2005) and/or calming effects. Stereotyped behaviors also often include ritualistic or compulsive like activities such as lining up toys, organizing toys, perseverating on an activity, adhering to extensive routines, memorization of information (e.g., movie lines, statistics, or other detailed factual information), or a general desire to maintain sameness (Schreibman, 2005).

Although some typically developing and developmentally delayed children may display repetitive or stereotyped behavior from time to time, it is believed to be of a different level of intensity and frequency among children with autism (Chawarska et al, 2008). Research has shown that children with autism tend to display significantly more unusual preoccupations, repetitive use of objects, difficulty with changes in routine, and unusual attachments (Richler et al., 2007). Additionally, Richler and colleagues (2007) found that children with autism tended to display more sensory stimulatory interests and behaviors, abnormal or idiosyncratic responses to sensory stimulation, hand and finger mannerisms, and complex mannerisms.

Assessment of children with possible autism must extend beyond social interaction, communication, and repetitive or stereotyped behaviors. Determining overall developmental level of a child is important for diagnostic purposes and treatment planning. Developmental milestones should be compared to chronological age and general knowledge of the progression of development in young children is necessary to determine if symptomology is abnormal.

Differential Diagnoses

Within the Autism Spectrum

Symptomology and severity are likely to vary greatly among disorders that fall under the umbrella term of Pervasive Developmental Disorders (PDD), or otherwise commonly referred to as Autism Spectrum Disorders (ASDs). This cluster of disorders includes autism, Asperger's syndrome, pervasive developmental disorder- not otherwise specified (PDDNOS), Rett's disorder, and childhood disintegrative disorder (APA, 2000). The specific criteria for each of these disorders is discussed below.

Rett's Disorder. Rett's disorder typically effects only females and can be diagnosed with the use of genetic testing (Brock et al., 2006). This disorder is marked by a period of normal development for the first five months of life, followed by deceleration of head growth, loss of previously acquired fine motor hand skills, loss of social engagement, awkward gait and trunk movements, and severely impairs receptive and expressive language skills often accompanied by severe psychomotor retardation (APA, 2000). Children with Rett's disorder may present similarly to those with autism due to lack of social engagement and communication difficulties, however they do not typically display repetitive behaviors.

Childhood Disintegrative Disorder. Childhood Disintegrative Disorder is also a relatively rare disorder marked by normal development for at least two years in the areas of verbal and nonverbal communication, social interaction, play, and adaptive behavior. However, between the ages of 2 years and 10 years, children with Childhood Disintegrative Disorder show a marked regression in at least two areas such as: expressive or receptive language (communication), social skills, adaptive behavior, or

motor skills. Abnormalities in functioning in two of the following areas must be present: Qualitative impairment in social interaction, communication, or the presence of restricted and repetitive behaviors (APA, 2000). Severity of impairment often has a high degree of effect on quality of life, thus prognosis for independence is not favorable. Childhood Disintegrative Disorder can present similarly to autism because of language and social skills deficits. Therefore, it is important to make sure the atypical development displayed is Childhood Disintegrative Disorder and is not better accounted for by another Pervasive Developmental Disorder or Schizophrenia (APA, 2000).

Asperger's Disorder. A diagnosis of Asperger's Disorder requires that the disturbance of focus is significant in social, occupational, and other important areas of functioning. Individuals with this disorder do not demonstrate significant delays in language, cognition,, self-help skills, or adaptive behavior. Additionally, their disorder is not better described by another Pervasive Developmental Disorder. Asperger's disorder is marked by qualitative impairment in at least two of the following areas: Communication deficits regarding nonverbal behaviors, social interaction deficits including failure to develop peer relationships, lack of spontaneous sharing of emotion, interests, or achievements, or a lack of social or emotional reciprocity. Those with Asperger's Disorder must also display repetitive or stereotyped behaviors, interests, and/or activities depicting at least one of the following: Preoccupation with stereotyped or restricted patterns of interest that is abnormal in intensity or focus, inflexibly adherent to specific nonfunctional routines or rituals, stereotypes and repetitive motor movements, or persistent preoccupation with parts of objects (APA, 2000).

Research has shown that a diagnosis of Asperger's Disorder is likely to be more reliable if made when a child is school-aged (Brock et al., 2006). Overall, prognosis of living independently is favorable in those diagnosed with Asperger's Disorder. The demands of the educational setting may bring symptoms to attention or exacerbate symptoms (McConachie et al., 2005). It is important to note that it is common for children with Asperger's Disorder to be referred for suspected autism before a correct diagnosis is made (McConachie et al., 2005). Children with high functioning autism appear very similar to children with Aspergers and are often difficult to differentially diagnose, however, specially trained experts adhering to the DSM-IV-TR criteria are likely to produce a correct diagnosis (Sciutto & Cantwell, 2005). However, the anticipated DSM-V criteria are expected to combine autism and Asperger's disorder into one disorder; Autism Spectrum Disorder.

Pervasive Developmental Disorder- Not Otherwise Specified. A Pervasive Developmental Disorder- Not Otherwise Specified (PDDNOS) diagnosis is reserved for situations in which a severe and pervasive impairment in the development of social interactions such as verbal or nonverbal communication and repetitive behaviors exists, however complete criteria for autism or Asperger's disorder is not present. Additionally, when considering a diagnosis of PDDNOS, clinicians should rule out any possibility of Schizophrenia, Schizotypal Personality Disorder, or Avoidant Personality Disorder. This diagnosis is sometimes used when an individual displays characteristics similar to autism; however symptomology onset was too late in development to qualify for this diagnosis (APA, 2000).

Unfortunately, PDDNOS is one of the most commonly diagnosed Pervasive Developmental Disorders on the autism spectrum (Matson & Boisjoli, 2007). Children diagnosed with PDDNOS are rarely researched and often hard to qualify for services. This diagnosis is difficult and should be approached carefully, as no specific criteria for PDDNOS exist (Matson & Nebel-Schwalm, 2007).

Differentiating within the five Pervasive Developmental Disorders of the autism spectrum poses some difficulty to professionals. Typically, those individuals with Rett's disorder and childhood disintegrative disorder display complex medical symptomology, greater degree of regression, and are more likely to be diagnosed by medical doctors (Chawarska et al, 2008). Those individuals who display ASD symptomology but do not meet all qualifying criteria for one of the specific disorders are often diagnosed with PDD-NOS (APA, 2001).

Differential Diagnosis Among Other Disorders

Most education settings do not engage in differential diagnosis in the same manner as medically-based settings. Within the school setting, the multidisciplinary team will determine if a student meets the eligibility criteria to receive special education services. A medical diagnosis of autism does not necessarily warrant qualification to receive special education services in the school and instead, the multidisciplinary team within the school may complete additional evaluations and determine special education qualification (Brock et al., 2006). School psychologists operating within educational settings do not typically provide diagnoses and therefore, are not required to consider differential diagnoses. Nonetheless, professionals outside of the education setting will be faced with the challenge of considering differential diagnoses.

Symptoms of other disorders also may present similarly to autism. Differential diagnosis outside of the broad category of Pervasive Developmental Disorders must be considered to ensure appropriate treatment and educational programming (Matson, 2007). When making any diagnosis, including autism, it is imperative to consider other possible diagnoses that may have similar symptoms to autism or those that may co-occur with autism. Distinguishing between autism and other disorders is not only important but also challenging, especially when you consider the young age of the individual.

Approximately 60% of children with autism present with a comorbid cognitive delay or mental retardation (APA, 2000). Assessment of autism is not as easy when this occurs because one must distinguish autism symptomology from other disorders that characteristically display similar symptoms due to cognitive impairment. Symptoms that are consistent with autism such as delayed verbal communication, misunderstanding of non-literal language, and repetitive behaviors such as hand flapping or rocking are also often present in children with cognitive disabilities. Professionals should ensure that they are distinguishing between autism symptoms and cognitive disability symptoms (Brock et al., 2006).

Genetic disorders. Genetic disorders such as Down Syndrome, Fragile X Syndrome, and tuberous sclerosis may present with characteristics similar to autism. However, genetic disorders are very different in nature and treatment when compared with autism (Mailick Seltzer, Abbeduto, Wyngaarden Kraus, Greenberg, & Swe, 2004) because they present with overall delays in development. Although there may be some similarities such as hand flapping or other stereotyped behaviors (Brock et al., 2006), the more global delays as well as physical features (e.g. facial features) commonly associated

with certain genetic disorders can be helpful in differential diagnosis. To complicate matters, although Down Syndrome and Fragile X Syndrome are entirely different disorders from autism, they may present comorbidly as well (Fombonne, 2005). For example, some children diagnosed with tuberous sclerosis are also diagnosed with autism. Taking both disorders into account may help select efficient and effective treatment and educational programming (Jeste, Sahin, Bolton, Ploubidis, & Humphrey, 2008).

Language delays. Language delays co-occur with many different disorders, including autism. Children with speech and language delays do not qualify for an autism diagnosis without displaying the key characteristics of autism such as deficits in social interaction, deficits in communication, and presence of repetitive or stereotyped behavior. Many disorders including Down syndrome, Fragile X syndrome, and tuberous sclerosis present with language delay and language symptomology typical of children with autism and more research is needed to compare these different disorders (Rice, Warren, & Betz, 2005).

Because many disorders present with symptomology similar to autism, researchers have found several characteristics which may be observed before 24 months of age that may help to distinguish between autism and disorders outside the autism spectrum (Trillingsgaard, Ulsted Sorensen, Nemec, & Jorgensen, 2005). These important characteristics are: smiling as social response, responding to name, following pointing, looking to faces, initiating or requesting with verbal and nonverbal communication, and engaging in functional play (Trillingsgaard et al., 2005). Although children with other

disabilities may present similarly to autism, they do not tend to have deficits in these specific areas of concern.

Social impairment disorders. There are several disorders with symptomology revolving around impaired reciprocal social interaction that is less severe than autism. These disorders may include multisystem developmental disorder, nonverbal learning disability syndrome, semantic-pragmatic disorder, attachment disorders, multiplex developmental disorder, and schizoid personality disorder (Scheeringa, 2001). Multisystem developmental disorder is characterized by sensory processing problems. Sensory processing problems may impact social and emotional relationships, motor planning, and hyper or hypo-reactivity to stimulation. Although diagnostic criteria have not yet been established they are likely to include impaired emotional and social relationships, impaired communication, auditory processing deficits, and deficits in the processing of other sensation such as tactile, visual-spatial, or vestibular (Scheeringa, 2001).

Nonverbal learning disability syndrome. Nonverbal learning disability syndrome is characterized by sensory processing impairments which tend to manifest in the form of behavioral difficulties (Sheeringa, 2001). Children with nonverbal learning disability syndrome often have difficulties with pragmatics, coordination, tactile-perceptual sensations, and arithmetic. These deficits all relate to the inability to adjust to new situations and use social judgment (Sheeringa, 2001).

Semantic-Pragmatic disorder. Semantic-pragmatic disorder presents as difficulty using conversational language such as turn taking and reciprocating (Sheeringa, 2001). Children with semantic-pragmatic disorder often struggle to understand relational

appropriateness. These deficits often impact child learning and social-emotional relationships. Formal diagnostic criteria for semantic-pragmatic disorder have not yet been defined but it is expected that they will overlap with autism criteria regarding social interaction and communication but not repetitive and stereotyped behaviors (Sheeringa, 2001).

Attachment disorders. Children with attachment disorders, such as reactive attachment disorder, may exhibit extremely inappropriate responses to parents or caregivers. Attachment disorders are often characterized by additional symptoms such as lack of or indiscriminant attachment behaviors (Sheeringa, 2001). Attachment disorders may look similar to autism but with careful assessment professionals should be able to discriminate between the two by looking for a history of pathogenic care required for attachment disorder diagnoses (APA, 2000).

Multiplex developmental disorder. Multiplex developmental disorder has been proposed in replacement of PDDNOS. It has yet to be incorporated into the DSM but does encompass autism-like characteristics (Sheeringa, 2001). Multiplex developmental disorder is distinguished by symptoms that outline more than one single developmental delay but do not qualify for an autism diagnosis. Proposed criteria across three domains include regulation of affective state and anxiety, impaired social behavior, and impaired cognitive processing. If multiplex developmental disorder is incorporated into a future version of the DSM, it may provide for a more detailed description of the disorder than PDDNOS and may thus lead to more targeted intervention (Sheeringa, 2001).

Schizoid Personality Disorder. Schizoid personality disorder is defined as impaired social interaction skills as a result of indifference to social relationships

(Sheeringa, 2001). Overall, those who have schizoid personality disorder have a profound disinterest in social interaction. Although similar to autism, schizoid personality disorder may be distinguished from autism by consideration for development delays. Those with schizoid personality disorders are not likely to display developmental delays which would be expected in autism (APA, 2000).

It is easy to demonstrate that autism is a complicated diagnosis and requires careful consideration of differential diagnoses in order to ultimately arrive at a correct diagnosis. Professionals well trained in multiple methods of assessment, such as indirect and direct assessment, are likely to be better equipped to identify autism symptomology and consider differential diagnoses.

Rising Prevalence Rates

Despite being difficult to identify and diagnose, the prevalence of autism is on the rise. Recent surveys show prevalence rates to be significantly higher than previously estimated (Fombonne, 2003). The prevalence of autism and autism spectrum disorders appears to be approximately 3 to 4 times higher than was recorded 20 years ago (Fombonne, 2003). Based on data obtained in 1987, Fombonne estimated the prevalence of autism to be 10 per 10,000. The CDC (2009) currently estimates the prevalence of autism to be 1 in 110. Rising prevalence rates do not appear to be unique to the U.S. For example, in Sweden, reports of autism seem to be on the rise as well (Gillberg, Cederlund, Lamberg, Zeijlon, 2006).

The increase in prevalence is believed to stem from a more detailed set of diagnostic criteria, more professionals specifically trained to identify and diagnose autism, and an actual increase in the presence of autism. Other theories for the rise in

autism include concerns over environmental causes (e.g., toxins, vaccines) although there is no definitive evidence to support these claims.

Qualification to Diagnose Autism

Both within and outside the school setting, many professionals are involved in the assessment and diagnosis of children with autism. These professionals may include developmental pediatricians, clinical psychologists, child psychologists, speech and language pathologists, child psychiatrists, pediatric neurologists, special education teachers, and school psychologists. Qualified professionals are expected to have received specialized training in observing developmental disabilities, normal development, and autism (Wiggins et al., 2006). Many professionals assess and diagnose/identify autism through the use of specialized autism teams. Because of the complexity of autism and difficulty of diagnosis, many experts recommend assessment and diagnostic decisions to take place in team environments (Lord et al., 1999; Rutter et al., 2003). Teams are often comprised of several well-trained professionals who have extensive knowledge and expertise in autism. However, within a school setting, it is possible that there are not enough practitioners with expertise and some teams may include individuals who simply volunteered and do not necessarily have a strong knowledge or experience base in autism diagnosis. Although autism teams are sometimes used in school settings, other time it is up to the building level school psychologist to make this identification with the special education team at his or her building.

Consultation

Many school psychologists choose to consult with autism teams in order to make accurate diagnoses or identifications of autism. In the absence of an autism team, school

psychologists may consult with other colleagues, professionals, specialists, or supervisors. Consultation often includes direct services to the consultee from consultant for the purpose of skill building to establish independence from the consultant (Brown, Pryzwansky, & Schulte, 2001). School psychologists may provide and seek consultation services (Brown et al., 2001) and in fact, it is considered consistent with ethical guidelines. It is common practice to utilize consultation when uncertainty persists regarding case conceptualization, decision-making, assessment, and/or diagnosis.

School Psychologists

School psychologists are extensively involved with intervention planning and educational programming for students with disabilities (Williams, Johnson, & Sukhodolsky, 2005). They are trained in assessment and treatment of psychological disorders with regard to the education system. School psychologists also provide consultation to those in the educational environment regarding how to best teach students with and without disabilities. Therefore, an in depth knowledge of autism would allow school psychologists to assess and identify the disorder accurately, develop intervention plans to address all areas of functioning, make recommendations for an appropriate classroom environment, identify effective teaching strategies for students, and recommend further services to take place within the school and by outside agencies (Merrell et al., 2006). Due to the rising prevalence rates of children identified or diagnosed as having autism at school age, school psychologists are likely to be faced with autism identification and diagnoses questions (Wiggins et al., 2006; Noland & Gabriels, 2004).

Training and Degree Options

All school psychologists must have completed a graduate-level program in a discipline of psychology and received a credential, or a certificate of license to practice in the field. However, there is some variability among degree levels which school psychologist may receive. Practicing school psychologists may have Masters, specialist, or doctoral level degrees (Merrell et al., 2006).

Masters and specialists degrees are currently the most common in the field of school psychology (Curtis, Hunley, & Chesno-Grier, 2002). These non-doctoral degrees usually require approximately two years of university-based coursework, plus an internship lasting one full school-year. In order to earn a doctoral degree, graduate students often complete approximately four years of coursework including several practicum courses. Doctoral students then complete a research project or dissertation and an internship lasting one full year (Merrell et al., 2006).

Differences among degree level. Research regarding school psychologist degree level practica and experience is limited. Fagan (2003) noted that there has been explosive growth in school psychology training programs and state associations from 1970 through present day. Much of this growth has taken place at the non-doctoral degree level as licensure or certification for school psychology is attainable without a doctoral level degree through state departments of education. Based on program growth, non-doctoral level school psychologists are anticipated to continue to dominate the field of school psychology (Fagan, 2003). A recent national sample estimated that 75% of currently working school psychologists did not hold a doctoral degree (Curtis et al., 2002).

One of the biggest differences between doctoral and non-doctoral school psychologists is the ability for doctoral students to choose a research or concentration area during their training (Curtis, et al., 2002). Training in an area of concentration tends to focus on assessment, intervention design, consultation, and intervention evaluation. This training may take place in the context of the fellowships, assistantships, and ongoing research projects (Reschly & Wilson, 1997). In addition to extensive training, many doctoral students complete dissertation or research projects in their area of selected specialty. This provides doctoral school psychologists with an opportunity to gain additional knowledge in the current research relevant to their specialty area.

School psychologists with more experience and training tend to provide more in-services and consultation services to their colleagues and school personnel than those who are less experienced or do not have specialized training in a specific area (Curtis et al., 2002). School psychologists practicing in rural settings were found to have the least experience when compared with others in suburban and urban settings (Curtis et al., 2002).

Requirements for Doctoral and Non-doctoral Programs

Many doctoral school psychology programs follow the program requirements and guidelines established by the American Psychological Association (APA) while many non-doctoral school psychology programs adhere to the program requirements and guidelines established by the National Association of School Psychologists (NASP). The most significant difference between the two is the requirement of practicum experiences and research. Although NASP does require practicum experiences during graduate training, the practicum is often completed in one semester or year within a school setting.

This is the typical practicum requirement for many non-doctoral programs, including both specialist and masters (http://www.nasponline.org/certification/NASPapproved.aspx).

APA guidelines suggest that doctoral training include multiple practica experiences across settings. It is typical for doctoral students to engage in field-based experiences throughout their training programs. Therefore, the experiences received are expected to represent a greater variety and be more in depth when comparing doctoral to non-doctoral programs (Commission on Accreditation, 2009).

Certification and Licensure

Graduate-level training programs may be approved or accredited through the two different accrediting bodies; NASP and APA. Accredited programs undergo periodic objective evaluation to ensure that the quality of the training program meets the standards set forth by the accrediting body. Non-doctoral programs in school psychology, including masters and specialist degree level programs, may be approved by NASP however, are not accredited through the APA. Doctoral programs in school psychology may be approved and accredited through both NASP and APA, respectively.

School psychologists who graduate from doctoral programs are eligible for licensure as school psychologists through their state Department of Regulatory Agency after additional practice, supervision, and a national examination. Both doctoral and non-doctoral school psychologists are eligible for licensure or certification through their state departments. Additionally, both are eligible to become nationally certified through NASP. Passing the National School Psychology Exam administered by ETS/Praxis and a review of appropriate coursework and training provides the credential of Nationally

Certified School Psychologist (NCSP) Those individuals who graduate from a non-accredited program may still receive certification through NASP by going through a personal accreditation process which involves submitting coursework, a case study, and syllabi from their training program (Merrell et al., 2006). These various forms of licensure and certification help to ensure that school psychologists have appropriate levels of training in the key areas of practice, including assessment.

Assessment of Autism Symptomology

Autism is a complex and multifaceted disorder, which requires multiple methods of data collection to make an accurate diagnosis. To effectively identify autism, school psychologists are encouraged to administer an autism-screening tool, which serves as an indirect assessment of autism characteristics and is often completed by parents and teachers. Subsequently, school psychologists are encouraged to complete a direct assessment or diagnostic evaluation of autism symptoms (Noland & Gabriels, 2004). Both indirect and direct assessments provide data regarding the skills strengths and deficits in the areas of communication, socialization, and repetitive or stereotyped behaviors.

Indirect Assessment

There are several commonly used screening tools for data collection specific to autism symptomology. The *Gilliam Autism Rating Scale- Second Edition* (*GARS-2*; Gilliam, 2005) is a widely used behavioral checklist for identification of autism symptomology, and helps guide autism diagnosis, for individuals ages 3 to 22 years old. The behavioral checklist is completed during a structured interview with a parent, guardian, teacher, or other adult who knows the child well. The structured interview is

designed to assist psychologists in gathering information that will assist in answering the 42 items. The items were constructed to align with the definitions of autism characteristics established by the American Psychiatric Association and the Autism Society of America. The *GARS-2* is a tool designed to distinguish symptomology of autism from severe behavior associated with other developmental disabilities (Gilliam, 2005). Upon completion of the interview and items, the subtest raw scores are converted into standard scores, which are converted into an Autism Index. Autism Index scores above 90 may suggest higher probability that an individual has autism. This instrument does not require specific training to administer and may be completed in 5 to 10 minutes (Gilliam, 2005).

The *Asperger Syndrome Diagnostic Scale* (*ASDS*; Myles, Bock, & Simpson, 2001) is a behavioral checklist to be filled out by a parent, teacher, or caregiver who knows the child well. The checklist is intended to assist with the diagnosis of Asperger's disorder in individuals ranging in age from 5 to 18 years. The *ASDS* consists of 50 items categorized into 5 subscales including language, social, maladaptive, cognitive, and sensorimotor. Subtest raw scores are converted into standard scores, which are summed and converted into an Asperger Syndrome Quotient. Asperger Syndrome Quotient scores above 90 indicate that the individual is likely to have Asperger's disorder. The *ASDS* was designed to be completed in 10 to 15 minutes and administration requires general familiarity with autism (Myles et al., 2001).

The *Autism Diagnostic Interview-Revised* (*ADI-R*; Rutter et al., 2003) is an in-depth interview to be completed with a parent or caregiver. The *ADI-R* is considered to be part of the "gold standard" diagnostic tools of autism (Filipek et al., 1999, p.460). The

ADI-R differentiates autism from other developmental disorders in children with a mental developmental age of two years or older by focusing on the three domains of autism; communication, social interaction, and repetitive or stereotyped behaviors. The interview is semi-structured, consists of 93 items, and takes approximately 90 to 150 minutes to administer. Although administration is time consuming, the *ADI-R* provides an algorithm to assist in determination of autism and Asperger's disorder diagnosis. Administration should be completed by interviewers specifically trained on use of the *ADI-R* (Rutter et al., 2003).

There are official *ADI-R* trainings available to clinicians and researchers in which these professionals can establish that they are "reliable." All professionals establish "reliability" after they have completed an *ADI-R* training, demonstrated that they have learned the standardized administration procedures, and understand coding rules by achieving at least 90% agreement with the lab at the University of Michigan Autism & Communication Disorders Center. This center is the sole center for regulation of *ADOS* (discussed below) and *ADI-R* training and provides a website outlining the specifics of these instruments and their use (http://www.umaccweb.com/diagnostic_tools/index.html).

The *GARS-2* (Gilliam, 2005), *ASDS* (Myles et al., 2001), and the *ADI-R* (Rutter et al., 2003) are all considered indirect assessments of autism symptomology. School psychologists are not encouraged to make diagnoses or educational placement qualification determinations based on indirect assessment alone. These measures consist of data provided by parents, teachers, or caregivers who are very familiar with the child. However, it is possible that information provided may be subjective, biased, or

inaccurate. Therefore, a direct assessment of the child is recommended after indirect assessment has been completed (Brock et al., 2006).

Direct Assessment

Direct assessment procedures involve the school psychologist objectively observing the child (Brock et al., 2006). However, it is imperative to ask parents, caregivers, or teachers if the observed behavior is typical for the child. Decisions based on direct observation need to ensure that the observed behaviors were reflective of a typical day for the child, and not a particularly good or bad behavioral performance (Brock et al., 2006). Direct assessment tools such as the, *Childhood Autism Rating Scale, Second Edition* (Schopler, Van Bourgondien, Wellman, & Love, 2010) and the *Autism Diagnostic Observation Schedule* (Lord et al., 1999) place children in assessment situations that make autism symptomology very clear to observers if the symptoms do exist. The assessment circumstances provided by these assessment tools are imperative in making a diagnostic decision. Therefore, the use of any assessment tool should be carried out in accordance with the standardized administration instructions. Additionally, the behavior displayed by a child during the assessment should be typical of that child, and not represent overly negative or positive behavior.

The *Childhood Autism Rating Scale, Second Edition* (*CARS2*; Schopler et al., 2010) is a newly revised 15 item observation tool that helps guide diagnostic observation by a psychologist. There is a Standard Version form, High-Functioning Version form, and Questionnaire for Parents/Caregivers included in the new instrument. Data used to score the items in the *CARS2* assessment should be collected by direct observation, however, parent interview and review of client files may be used as well. Each item in

the *CARS2* assessment is scored on a 4 point scale ranging from "normal" to "completely abnormal" when comparing the child suspected of having autism to other children of the same developmental age. Ratings are based on frequency, intensity, duration, and peculiarity of the behaviors in question (Schopler et al., 2010). *CARS2* may be administered by professionals from many different disciplines, and an in-depth knowledge of autism is not a necessary precursor to administration competency. However, because *CARS2* includes a developmental comparison of the child of focus with children of the same developmental age, knowledge of child development is necessary (Schopler et al., 2010). Some professionals choose to use this tool collaboratively with professionals from other disciplines such as psychology, speech pathology, and special education (Brock et al., 2006). Although many professionals consider this instrument as direct assessment, it is more of a direct observation tool and does not include direct testing items to test specific skills via response sets.

The *Autism Diagnostic Observation Schedule* (*ADOS*; Lord, et al., 1999) might also be considered one of the "gold standard" diagnostic tools of autism (Filipek et al., 1999, p.460). The *ADOS* is a semi-structured, direct play-based assessment of specific autism characteristics, with consideration for severity. The *ADOS* uses planned play activities designed to elicit specific social and communication situations during which ratings of specific characteristics and symptomology occurs. The *ADOS* consists of four different versions, or modules. The module to be administered is reliant on the individual's language ability. Module 1 is designed for preverbal or single word language users, Module 2 for individuals who speak in phrases, Module 3 for children or adolescents with fluent speech, and Module 4 for adults with fluent speech. Complete

administration of the *ADOS* takes approximately 30 to 45 minutes, and should be administered by a professional trained specifically in *ADOS* administration (Lord et al., 1999). Current literature cites the *ADOS* as the only direct assessment tool available to evaluate autism symptomology (Bradley-Johnson, Johnson, & Vladescu, 2008).

The *ADOS* assessment publishers recommend that it only be used by professionals who have been trained extensively on the use of the instruments (Lord et al., 1999). There are official *ADOS* trainings available to clinicians and researchers in which professionals can establish that they are "clinician reliable" or "research reliable." Clinicians can be considered "clinician reliable" after they have completed the *ADOS* training, demonstrated that they have learned the standardized administration procedures, and understand coding rules by achieving at least 80% agreement with the lab at the University of Michigan Autism & Communication Disorders Center. Researchers can be considered "research reliable" after they have completed the *ADOS* clinician and research trainings (2 days and 2 ½ days; respectively), demonstrated that they have learned the standardized administration procedures, and understand coding rules by achieving at least 85% agreement with the lab at the University of Michigan Autism & Communication Disorders Center.

The administration of the *ADI-R* (Rutter et al., 2003) in conjunction with the ADOS (Lord et al., 1999), has been described as "the gold standard" in accurate diagnosis of ASD by Filipek et al., who were chosen by the Child Neurology Society and American Academy of Neurology to form Practice Parameters for the Diagnosis and Evaluation of Autism for their respective memberships (1999, p.459). Research has shown the *ADI-R* (Rutter et al., 2003) and the *ADOS* (Lord et al., 1999) to successfully

distinguish autism from other developmental disorders (Ventola et al., 2007). Because these tools tested for very specific symptoms that are often difficult to evaluate such as eye contact, shared enjoyment, showing behaviors, response to joint attention, and quality of overtures, they were found to be better predictors of diagnosis when compared with the *CARS* or cognitive assessment instruments. (Ventola et al., 2007).

Although qualification for educational placement varies by state, school psychologists are likely to have to make a decision regarding whether a child displays autism symptomology and characteristics synonymous with a diagnosis of autism (Brock et al., 2006). Therefore, it is imperative that school psychologists are competent in the administration and interpretation of indirect and direct autism assessment procedures (Brock, et al., 2006). After the determination of autism is made, differentiating within the spectrum is likely to be the next step necessary in proper diagnosis for intervention.

Importance of Early Diagnosis and Intervention

Diagnosis of autism has improved over the past 10 years, and therefore, has important implications for early intervention. Early diagnosis allows for prompt intervention to take place, and thus possibly improves the prognosis of children with autism (Brock et al., 2006). Some cases of autism can now be diagnosed in children as young as two years of age (Charman & Baird, 2002). In the event that professionals are uncertain, it is becoming common practice to use a 'working diagnosis,' and continue further assessment after time has passed to observe whether symptoms change with development and intervention (Charman & Baird, 2002). However, 24% of children receive an autism diagnosis after entering school (Wiggins et al., 2006). These children are unlikely to be receiving intervention or services specific to autism prior to diagnosis.

Therefore, it is possible that several years of crucial intervention may be lost due to late diagnosis (Wiggins et al., 2006).

Assessment which addresses all areas of autism; social interaction, communication, repetitive and stereotyped behaviors, developmental level, differential diagnosis within and external to the spectrum; provides information necessary for comprehensive intervention development. Efficiently planned interventions implemented as early as possible should target all areas of autism development. Unfortunately, Koegal and colleagues (2001) found school-based intervention plans failed to address social and play goals. The exclusion of such goals may indicate that these areas were not assessed extensively or the assessment information was not utilized in the development of goals.

Summary

Accounts of autism-like symptomology date back as far as the 1800s, and although was once thought to be a form of schizophrenia, was clarified as a developmental disability called autism by Leo Kanner in the 1940s (as cited in Wolf, 2004). Since its inclusion into the DSM, the general description of autism symptomology has remained consistent. Autism is diagnosed in medical or mental health clinic settings or identified as an educational disability in school settings. Although these two practices may be different, professionals ultimately assess similar symptoms or criteria.

Autism diagnosis and identification generally requires deficits in social interaction and communication with the presence of stereotyped/repetitive behaviors (APA, 2001). Symptomology and severity vary greatly from individual to individual, and differentiating autism among other disorders is often a difficult task. However, the prevalence of autism is on the rise (Fombonne, 2003) and school psychologists report an

increase in autism referrals (Kohrt, 2004). Proper assessment including indirect and direct methods are critical in gathering a comprehensive picture of the individual (Brock et al., 2006). Although there are many tools that can be used for an autism assessment, the *ADI-R* (Rutter et al., 2003) and *ADOS* (Lord et al., 1999) are considered to be part of the "gold standard" diagnostic tools of autism (Filipek et al., 1999, p.460).

Many agree that autism diagnosis and assessment should take place in teams (Lord et al., 1999; Rutter et al., 2003). Within the school environment, school psychologists are responsible for the assessment of students to determine if they qualify for special education services (Williams et al., 2005). In fact, many children are not diagnosed with autism until they enter school (Wiggins et al., 2006). School psychologists may have doctoral or non-doctoral degrees, be part of an autism assessment team, and be clinician and/or research reliable on the *ADOS* (Lord et al., 1999) and *ADI-R* (Rutter et al., 2003). Investigation of school psychologist's knowledge, skills and experience, consultation practices, and need for training may contribute to our understanding of the current practices in relation to identifying children with autism.

CHAPTER III

METHODOLOGY

Participants

The target population of the study was school psychologists with varying degrees, experiences, and specialized training. All 50 United States school psychology state associations were contacted, with the exception of South Dakota, and given the opportunity to invite their members to participate in the study. The researcher was unable to find a state association website or affiliated contact information for the South Dakota school psychology association. The state associations were asked to send their members a link to the survey or post a link to the survey on their respective websites. A total of 9 state associations participated in sending an email to all of their members informing them about the opportunity to volunteer to participate in the research study and included an internet link to the research survey or by posting a link to the research study on their respective websites. Those states that posted the link on their association website did so for approximately 30 days, included a brief description inviting members to volunteer to participate in the study, and posted the internet link to the research survey on their website.

The state associations who participated and their respective membership totals included: California- 3000 members, Idaho- 188 members, Kentucky- 238 members, Nebraska- 135 members, Nevada- 117 members, New York- 1000 members, North

Carolina- 400 members, Utah- 140 members, and Washington- 450 members. Therefore, approximately 5668 people received an email about the study, or could view the study on their state association website. Therefore, all members of the associations who were currently practicing school psychologists had the opportunity to participate in the study. Additionally, a volunteer sample was utilized by distributing the study Internet link to school psychologists who volunteered their participation to the researcher; consisting of approximately 15 participants who were also members of their respective state organizations. Overall, the study sample was intended to be representative of school psychologists who belong to their school psychology state associations in the U.S.

Although school psychologists are not required to belong to either state or national school psychology associations, it is estimated that 70% do belong to such organizations. Unfortunately, this percentage is likely to vary from one region to another. All practicing school psychologists, including school psychology interns met the inclusion criteria to participate in the study. Those who were not currently practicing school psychologists (e.g., students, retired) did not meet the participation criteria and were asked to refrain from participating.

A power analysis using 8 predictors implied that an N of 109 was necessary to detect a medium effect size (Green, 1991). The current study resulted in 246 participants, and therefore, had a large enough sample to complete the three primary research questions utilizing multiple linear regression analysis.

Powers, Hagans, and Busse (2008) found a response rate of approximately 8% after emailing a link to their internet-based survey to the California Association of School Psychologists members; approximately 250 responses out of 3000. Similarly, Cochrane

and Laux (2007) reported a response rate of 13% when emailing a link to their internet-based survey to school psychologists in Ohio. Averaging these two response rates would yield a response rate for the current study of 10.5%. The current study estimated that approximately 5668 target sample participants were solicited for participation by email from their respective state association or by viewing the invitation to participate on their respective state association's website. Therefore, the response rate found was 4.3%. It should be noted that this is an approximate response rate and is not likely to be accurate because an additional volunteer sample was utilized. Additionally, some target participants received direct contact via email and others could only view the invitation to participate by viewing their respective state association website.

Instruments

The independent variables were measured with a self-report survey in which participants were asked to report their highest degree level relevant to school psychology, years of experience as a school psychologist, primary practice setting and population, number of hours of autism specific training, whether or not they defined themselves as an autism team member, amount of time spent working with the autism team, and whether or not they are "research reliable" or "clinician reliable" regarding administration of the *ADOS* or *ADI-R* (Appendix A).

School psychologist degree level. School psychologists were asked to report their degree level. There were two choice options. The non-doctoral level encompasses Masters (M.A. and M.S.), Specialist (Ed.S. and SSP), Certificate for Advanced Study (CAGS), and any other relevant non-doctoral degrees. Doctoral level encompasses Doctor of Philosophy (Ph.D.), Doctor of Psychology (Psy.D.), Doctor of Education

(Ed.D.), and any other relevant doctoral degrees. The actual sample consisted of 204 non-doctoral level school psychologists who comprised 82.9% of the sample and 42 doctoral level school psychologists who comprised 17.1% of the sample. This is reasonably close to the distribution among the national sample as it was recently estimated that non-doctoral degrees, including masters and specialist degrees, to comprise 75% of currently working school psychologists (Curtis et al., 2002).

Experience. School psychologists were asked to report their years of experience working as a school psychologist; the number of years they have been working as a school psychologist. Participants were asked to include their internship training year as one year of experience. The current sample reported a mean of 10.62 years of experience indicating that participants tended to have fewer years of experience than the national average of 14 years (Curtis et. al., 2008).

Main practice setting. School psychologists were asked to report the setting in which they spend most of their time (e.g. early childhood, elementary, or secondary settings). School psychologists were also asked to report whether they work in public schools, private schools, private practice, hospitals, etc.

Autism training. School psychologists were asked to estimate the number of hours of training they have received in the last five years specific to identifying or diagnosing autism spectrum disorders. This included district level in-services, professional presentations at association conferences, graduate level classes, fellowships, externships, or internship rotations.

Number of children diagnosed or identified as having autism per year. School psychologists were asked to report the number of children or adolescents that they

diagnose or identify as having autism per year. Although some school psychologists cannot diagnose autism within the education setting by law, they are able to "identify" autism for the purpose of educational placement. Throughout the survey instrument, "diagnose" and "identify" were used together in order to allow these participants to contribute without confusion.

Autism team member and time spent as a member of an autism team. School psychologists were asked to indicate if they consider themselves or identify themselves as a member of an autism assessment, identification, or diagnostic team. If participants indicated that they did participate on an autism team, they were asked to indicate how much time per week they spent participating as a member of the autism assessment, identification, or diagnostic team. Response choices included: 1-10 hours, 11-20 hours, 21-30 hours, 31-40 hours, or more than 40 hours per week.

Certification on *ADOS.* School psychologists were asked to report if they had obtained clinician reliability certification or research reliability certification on the *ADOS* (Lord et al., 1999). As noted, these reflect two different types of training and levels of proficiency. Individuals who have achieved research reliability, were intended to only endorse this level if it applied as it assumes proficiency at the clinical level only. However, participants were able to select both clinical and research reliability in the instrument and 12 participants did endorse both levels of reliability on the *ADOS.*

Certification on *ADI-R.* School psychologists were asked to report if they had obtained "reliability" certification on the *ADI-R* (Rutter et al., 2003). There is only one level of reliability available on this instrument.

Dependent Variables

Knowledge about Childhood Autism among Health Workers

Autism knowledge was measured using the *Knowledge about Childhood Autism among Health Workers* (*KCAHW*) questionnaire (Bakare, Ebigbo, Agamoh, & Menkiti, 2008). Permission for use of this instrument was granted by the authors via email in March of 2009 (Appendix D). The *KCAHW* (Appendix B) developed by Bakare and colleagues (2008) is a 19-item instrument that measures knowledge of the symptoms of autism in health care workers. Each correctly answered item may earn 1 point, for a total of 19 points, with higher scores reflecting a greater degree of knowledge. Item responses are multiple choice and include: A-Yes, B-No, and C-Don't know. Bakare and colleagues (2008) reported that the *KCAHW* demonstrated good internal consistency and reliability ($N = 50$, Crohnbach's Alpha = .97).

The instrument was originally developed for use with health care workers in a neuro-psychiatric hospital in Nigeria. Participants for the original reliability and validity testing included psychiatric nurses who had been employed for a minimum of 5 years working in general psychiatry nursing. All participants had obtained diplomas in general nursing and psychiatric nursing. In Nigeria, these health care workers were the most likely to handle cases of autism and autism spectrum disorders (Bakare et al., 2008). In the U.S., school psychologists are one of the professionals who fulfill this role and thus, this instrument may be appropriate for use with this population. However, no research was available regarding use of the *KCAHW* with either school psychologists or an American sample.

The original *KCAHW* (Bakare et al., 2008) questionnaire contains 19 questions but was slightly modified for this study by omitting one question. The question omitted was "The onset of autism is usually in:" with answer choices including: neonatal age, infancy, and childhood. The correct answer indicated by the authors was childhood. Because this is a debatable answer and inconsistency can be found across research studies and experts, the current researcher omitted this question from the current study. This was also the only question that did not have a response of A-Yes, B-No, or C- Don't Know.

The modified *KCAHW* contained 18 items. Correct answers were awarded 1 point and incorrect answers awarded 0 points. The questionnaire allowed for scores ranging from 0 through 18 (Appendix A). The answer key for this measure was provided by the original researchers and agreed upon by autism experts (Appendix B).

Survey of Skills, Experience, Likelihood to Consult, and Need for Training

The *Survey of Skills, Experience, Likelihood to Consult, and Need for Training (SSELCNT;* Appendix A), is an unpublished survey that was developed by the researcher specifically for this project. The *SSELCNT* is survey of school psychologists' perceptions of their skills and experience, likelihood to consult, and need for training regarding in terms of the domains of autism diagnosis. The survey is divided into three sections to measure the areas of skills and experience, likelihood to consult, and need for training. Participants rated themselves on each section using a Likert scale with the options of: 1- Fully Unskilled and Inexperienced, 2- Mostly Unskilled and Inexperienced, 3- Somewhat Unskilled and Inexperienced, 4- Somewhat skilled and Experienced, 5- Mostly Skilled and Experienced, 6-Fully Skilled and Experienced (Appendix A).

Skills and experience. School psychologists were asked to rate their skills and experience level in identifying or diagnosing characteristics among the six different diagnostic domains of autism that should be considered to make an identification or diagnosis: social interaction, communication, repetitive or stereotyped behaviors, delays in overall development, differentiating among disorders on the spectrum, and differential diagnoses. As such, there were six questions on this section of the survey. **Likelihood to consult.** School psychologists were asked to rate their likelihood to consult with a supervisor or autism specialist (or autism team) for assistance with diagnosis or identification among the six different diagnostic domains of autism, which are often considered in making an identification or diagnosis (described above). Participants were also asked three additional questions regarding: whether they are required to consult, with whom they are likely to consult, and if they are likely to work alone or with a team upon receiving a referral. Those participants who reported that they work with a team were not administered the likelihood to consult items, because they would be consulting as part of this team.

Need for training. School psychologists were asked to rate their need for training with diagnosis or identification among the six different diagnostic domains of autism which should be considered to make an identification or diagnosis. This area also included six questions.

Pilot Study

A pilot study (Appendix C) was conducted from June 2009 – September 2009. This study was conducted to demonstrate reliability and validity of the instruments. Two groups were selected by the researcher; a non-expert group and an expert group. The

non-expert group consisted of undergraduate students in their junior or senior year at the University of Northern Colorado enrolled in an educational psychology course. Therefore, these participants were expected to be familiar with autism, but not have the ability to diagnose autism. The expert group consisted of faculty, clinicians, and fellows currently employed by JFK Partners in the Medical School of the University of Colorado. These participants have worked on autism diagnostic teams. Therefore, these participants were expected to be extensively trained and highly skilled in the diagnosis of autism. A total of 58 participants completed the pilot survey; 36 from the non-expert group and 22 from the expert group. The participants completed the *Survey of Skills and Experience, Likelihood to Consult a specialist of supervisor, and Need for Training (SSELCNT), Autism Survey*, and the *Knowledge of Childhood Autism among Health Workers* (*KCAHW*). The demographic questionnaire was not administered, as the groups were chosen based on their experiences and the pilot was not conducted to analyze the diagnostic capability of these groups. Instead, the pilot was conducted to demonstrate that the instruments measuring the dependent variables would differentiate between those who are well trained to diagnose autism and those who are not.

The *SSELCNT* was divided and analyzed by skills and experience, likelihood to consult a specialist or supervisor, and need for training. The skills and experience based questions demonstrated Cronbach's Alpha of .975, implying high reliability within the six skills and experience items for all participants. Further, the non-expert (NE) and expert (E) groups scored differently on the skills and experience items (t (56) = 8.37, p<.001; NE Group M= 2.48, SD = 1.20; E Group M= 5.05, SD = 1.01). The likelihood to consult questions demonstrated Cronbach's Alpha of .95 implying high reliability within

the 6 likelihood to consult items. However, the non-expert and expert groups did not score differently on the likelihood to consult items (t (28.18) = -.117, p= .908; NE Group M= 4.81, SD = 1.46; E Group M= 4.85, SD = 0.59).

It was difficult to determine why these groups did not differ on this question. It is possible that both endorsed the likelihood to consult at high levels, but would do so for different reasons. For example, the experts may be part of an autism team where consultation is a part of team practice. The non-exerts may have endorsed consultation because they recognized their lack of training in the area of autism identification. Therefore, this question did not appear to differentiate between groups.

The need for training items demonstrated Cronbach's Alpha of .987 implying high reliability within the six items measuring need for training. Further, the non-expert (NE) and expert (E) groups scored differently on the need for training items (t (45.683) = 6.143, p< .001; NE Group M= 4.77, SD = 1.48; E Group M= 2.31, SD = 1.44).

Table 1

Reliability of Measures in Pilot Study

Measure	Chronbach's Alpha	Chronbach's Alpha Based on Standardized Items	N of items
SSELCNT Skills/Experience	.975	.976	6
SSELCNT Likelihood to Consult	.950	.951	6
SSELCNT Need for Training	.987	.987	6
KCAHW	.936	.937	18

Note. SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; KCAHW = Knowledge about Childhood Autism among Health Workers.

The *KCAHW* demonstrated Cronbach's Alpha of .936 (*M*= 10.94, SD= 5.74) (Table 1). Principal component rotated factor analysis pattern matrix of the *SSELCNT* resulted in 3 separate factors; skills and experience, likelihood to consult, and need for training (Table 2). A promax with Kaiser normalization method was utilized.

Table 2

Factor Analysis on SSELCNT in Pilot Study

Item in *SSELCNT*	Component 1	Component 2	Component 3
Need for Training 1	.829		
Need for Training 2	.860		
Need for Training 3	.965		
Need for Training 4	.987		
Need for Training 5	1.026		
Need for Training 6	.985		
Skills & Experience 1		1.024	
Skills & Experience 2		.989	
Skills & Experience 3		.975	
Skills & Experience 4		.892	
Skills & Experience 5		.725	
Skills & Experience 6		.786	
Likelihood Consult 1			.923
Likelihood Consult 2			.878
Likelihood Consult 3			.923
Likelihood Consult 4			.893
Likelihood Consult 5			.877
Likelihood Consult 6			.868

Note. SSELCNT = *Note.* SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey.

An independent samples T-test yielded a significant difference between the non-expert and expert groups (t (48.411) =-10.672, p< .001; NE Group *M*= 7.55, *SD* = 4.54; E Group *M*= 16.50, *SD* = 1.68). All statistical assumptions were met including independence, normality, and equal variances using Levine's test.

The pilot study (Appendix C) helped to form several new questions on the *SSELCNT* (Appendix A) regarding participant likelihood to consult with a specialist or supervisor. Because the original questions on the pilot were not found to differentiate between the non-expert and expert groups, the addition of several questions in the proposed study is likely to aid in understanding the answers of participants and making the information more useful. The *Autism Survey* and the *KCAHW* were administered during the pilot study to test autism knowledge. Using both tests may be redundant and prevent participation by making the final instrument appear longer than participants would prefer. Therefore, the researcher chose to keep the test that had stronger reliability and more autism diagnosis focus; the *KCAHW*.

Procedures

Prior to any collection of data, the current study was approved by the University of Northern Colorado's Internal Review Board. The researcher then requested school psychology state associations to aid in the distribution of the survey internet link via an email or posting to the state association's website as described in the Participant section.

The following school psychology state associations agreed to assist the researcher in the distribution of the study information and internet link: California Association of School Psychologists, Idaho School Psychologists Association, Kentucky Association for Psychology in the Schools, Nebraska School Psychologist Association, Nevada Association of School Psychologists, New York Association of School Psychologists, North Carolina School Psychologist Association, Utah Association of School Psychologists, and Washington State Association of School Psychologists. The following state associations sent the study information via email: California, Kentucky,

Nebraska, North Carolina, and Washington. California, Idaho, Nevada, New York, and Utah posted a description of the project and link to the study website on Survey Monkey on their websites. California did send the email and posted the information on their website.

State associations who did not respond or were not willing to readily do so (e.g, required payment, membership, or extensive paperwork) were not included in the study. The researcher is a member of the California Association of School Psychologists and the New York Association of School Psychologists; which ultimately allowed access to the target samples from each state as these privileges are not granted to nonmembers.

All members of the associations were provided an opportunity to view the information and link to the study website (for approximately 30 days) on the state association website or received emails from their respective associations (pending correct email addresses were kept on file). It cannot be determined if each member received the emails or saw the posted information on the websites. The researcher also utilized a volunteer sample of acquainted school psychologists who volunteered to participate in the study. The volunteer participants were sent the original Survey Monkey link and completed the survey anonymously.

The email sent by the associations and the website postings informed the participants that the study is about school psychologists and autism, and indicated that all participation was confidential, anonymous as no identifying information would be collected, and that all participants who completed surveys would be eligible to enter a drawing for one of four $25.00 Visa gift cards. No follow up emails could be sent as the

researcher did not have control over the emails and the state associations agreed to send an email to members one time only.

Those who wished to participate were able to click on an internet hyperlink which routed them directly to the study on the Survey Monkey website. Informed consent had to be electronically provided by clicking on the button, which indicated understanding of consent and agreement to participate in the study. If participants did not check the box, they were not able to continue or participate. No identifying information was collected. Therefore, all participants were asked to complete this survey only one time. Participants were also instructed to complete the survey independently; without the use of other people, the internet, books, or other materials. The entire survey can be found in Appendix A. Completion of the survey was expected to take approximately 10 minutes.

After completion of the survey, participants were redirected to a "Thank you" screen that allowed them to enter into the drawing for one of four $25.00 Visa gift cards. Participants who wished to enter the drawing had to provide their name, email address, and phone number. The information entered in the gift card drawing was not able to be matched to the participant's survey in any way. The gift card drawing took place after all data were collected and analyzed in May 2011. The gift card entry data were entered into SPSS and selected via the use of random selection by the statistical software. The four participants were notified via email of their winning status. After the winners confirmed their mailing addresses, the $25.00 Visa gift card was mailed to them via USPS regular mail.

Data collection took place from October 2010 until January 2011 upon which the survey on Survey Monkey was closed. All data were downloaded onto an external hard

drive and flash drive that were both kept in a locked filing cabinet in a locked office of the researchers private home. All expenses relevant to the Survey Monkey website and the gift card drawing were paid exclusively by the researcher.

Data Analysis

Crohnbach's alpha was used to report reliability of the *KCAHW* and *SSELCNT* instruments. Additionally, factor analyses were utilized to evaluate the *KCAHW* and *SSELCNT* for internal consistency and factor loadings. In order to answer the research questions a review of descriptive statistics, comparisons of means, reporting of frequencies, standard simultaneous entry multiple linear regression, Pearson correlations, and Independent sample T-tests were conducted. All inferential statistical analyses were conducted with a significance level of .05. Effect sizes were calculated by using Cohen's *d*. All statistical procedures were conducted using the Statistical Package for the Social Sciences, IBM Premium GradPack Version 19.0. All results are discussed in Chapter IV of this manuscript.

CHAPTER IV

RESULTS

Demographics and Descriptive Data

The purpose of this study was to explore the relationships between school psychologist characteristics and diagnostic capability to identify autism. For the purposes of this study, "Diagnostic capability" included four variables: knowledge of autism, perceived skills and experience in diagnosing or identifying autism, perceived likelihood to consult others when diagnosing or identifying autism, and perceived need for training regarding autism diagnosis or identification of autism. This chapter discusses the descriptive statistics of the study sample and the results pertaining to the predictive characteristics of school psychologists as related to knowledge, skills and experience, likelihood to consult, and need for training in terms of autism diagnosis/identification.

Sample

The target population of the study was practicing school psychologists with varying degrees, experiences, and specialized training. A total of 346 participants began the survey on Survey Monkey and agreed to the participant informed consent, however, only 246 participants completed the survey. Incomplete surveys were eliminated using listwise exclusion and all reported data is based on the 246 participants who completed the survey. The sample is described in terms of demographic characteristics and professional practices related to autism.

Representativeness of the current sample. It appears that the current sample may have a higher than expected number of school psychologists who have a special interest area in autism or particular or extensive experiences in autism. Though 346 people opened the survey on SurveyMonkey, only 246 completed the entire survey. Of the 100 original participants who did not complete the study, 82 stopped the survey during the autism knowledge instrument. Perhaps these participants did not think the study applied to them or did not have a large amount of experience in the area of autism; thus making them feel it was not necessary to complete the survey. Although it is not possible to determine the cause of this, the representativeness of the sample should be considered carefully.

Demographic Characteristics

The demographic characteristics of the sample were analyzed using simple descriptive statistics. The variables included: degree level, years of experience, primary work setting, primary population with whom practitioner works, number of hours of autism specified training received in the past 5 years, *ADOS* and *ADI-R* reliable status, number of children diagnosed or identified as having autism per year, and autism assessment, identification, or diagnostic team membership.

Degree level. The sample consisted of 204 non-doctoral level school psychologists which comprised 82.9% of the sample and 42 doctoral level school psychologists which comprised 17.1% of the sample. The sample was slightly different from the nationwide demographics of practicing school psychologists as put forth by Charvat and the National Association of School Psychologists (Charvat, 2008). His survey found that 24.5% of practicing school psychologists held doctoral degrees.

Years of experience. Total years of experience working as a school psychologist reported by the sample resulted in a mean of 10.62, median of 8.50 (*SD* = 8.585, *N*=246), and was found to be positively skewed, as participants tended to have fewer years of experience than the national average (X=14 years) (Curtis et al., 2008).

Primary work setting. The majority of the sample reported their primary work setting to be public school (91.5%, *n*= 225), followed by private school (2.8%, *n*=7), private practice (1.2%, *n*=3), hospital (0.4%, *n*=1), and other (4.1%, *n*=10). Those who chose "other" were able to enter their work setting and reported: half-time in private-practice and half-time in a public special education school, charter-schools, center-based BOCES, Federal School on a military base, preschool agency, private preschool agency, therapeutic private preschool, public alternative school, university, and internship placement. The current findings represent a slightly higher number of school psychologists working in public schools than the national average, 83.9% (Charvat, 2008).

Primary population worked with as a school psychologist. Participants in the sample also reported that the primary population with whom they worked included 67.9% (*n*=167) with the elementary school population, 21.5% (*n*=53) with the secondary school population, and 10.6% (*n*=26) with the early childhood population.

Number of hours of autism specified training received in the past 5 years. Participants were asked to report the average total number of autism specified training hours that they had received in the past 5 years. These training options included in-services, attending professional presentations within conventions or conferences, and fellowships, externships, internship rotations, post-doctoral positions, or university level

courses specific to autism. The mean number of hours was reported to be 45.46 (SD=57.85, N=246). The data suggested that participants received a wide-range of autism specified training hours, but that the there was a great deal of variation among the sample, ranging from 0 (*n*=8) hours to 360 hours (*n*=1). There were two modes in the sample, 10 hours (*n*=11) and 20 hours (*n*=11), and the data were positively skewed. Therefore, much of the sample reported smaller amounts of autism specific training and a small amount of the sample reported a substantially higher amount of training.

***ADOS* and *ADI-R* reliable status.** Of the sample, only 18.7% (*n*=46) reported that they were *ADOS* Clinician Reliable. Further, 7.7% (*n*=19) of the sample reported that they were *ADOS* Research Reliable. Lastly, 8.5% (*n*=21) of the sample reported being *ADI-R* Research Reliable. Because participants were able to select both of the *ADOS* options; clinician reliable and research reliable; additional frequencies were analyzed to determine how many participants reported both clinician and research reliability on the *ADOS*. Of the 19 participants who reported *ADOS* research reliability, 12 of them also indicated *ADOS* clinician reliability. Thus, 53 participants (21.5%) reported they were either clinician or research reliable on the ADOS.

There are no national estimates on the percentage of school psychologists who are *ADOS* or *ADI-R* trained. The data indicated that very few practitioners have achieved this status, and may imply that they do not use these instruments a great deal or are not trained as recommended by the instrument authors. Notably, reliability certification is not required for the *ADOS* or *ADI-R*, but strongly recommended (Rutter et al., 2003; Lord et al., 1999).

Number of children diagnosed or identified as having autism per year. The average number of children diagnosed or identified per year was reported to be 3.88, and the sample resulted in a positively skewed distribution as a higher number of participants reported fewer children diagnosed (*M*=3.88, *SD*=6.876, *N*=246, *Range* = 0-75). Although some school psychologists cannot diagnose autism within the education setting by law, they are able to "identify" autism for the purpose of educational placement. Throughout the survey instrument, "diagnose" and "identify" were used together in order to allow these participants to contribute without confusion.

Autism team membership. Participants were asked whether or not they considered themselves to be a member of an autism assessment, identification, or diagnostic team. Of the total sample, 48% (*n*= 118) identified themselves as spending 0 hours working on an autism team and indicated they were not a member of a team. The remaining 48% (*n*=118) identified themselves as a team member and reported spending 1-10 hours per week in team related activities, 1.2% (*n*= 3) of participants reported spending 11-20 hours per week, 1.6% (4) of participants reported spending 21-30 hours per week, and 1.2% (*n*= 3) of participants reported spending 31-40 hours per week working with the team.

Professional Practices Related to Autism

Only 81 (32.9%) participants reported that they were required to consult with a specialist or autism team when encountering an autism referral question. Further, participants reported that when presented with a referral requiring assessment of a student or child with symptomology suspected to be autism, they were most likely to: work on a team (*n*=209, 85%), work on their own (*n*=23, 9.3%), or refer the case to someone else

(*n*=14, 5.7%). Those participants who reported that they were most likely to work on a team were not administered the survey questions regarding their likelihood of consulting with other professionals. Therefore, only 37 participants were asked to respond to these items. Therefore, the responses to the likelihood to consult scale were not analyzed due to the small sample size.

Preliminary Analyses

Preliminary analyses were completed with the data to determine the reliability and internal consistency of the measures. Additional factor analyses were completed to determine the internal consistency of the instruments. It was expected that each of the instruments were measuring one factor; as all of the individual scales/instruments in this study were intended to measure specific constructs.

Reliability and Validity of the *KCAHW*

Participant scores on the *KCAHW* yielded a mean of 15.47 (*N*= 246, *SD* = 1.99). Possible scores on the *KCAHW* ranged from 0 through 18 and the sample produced a range of 7-18. Although the overall sample scores were normally distributed (Skew = -1.001, Kurtosis= 1.267), the psychometrics of the test did not reach the desired level of reliability (Cronbach's alpha = 0.606).

Further, a principal component rotated factor analysis pattern matrix with Promax rotation revealed 8 factors (Table 3), rather than the desired one factor. Additional analysis of the scree plot, based on eigenvalues, showed lack of a distinct elbow, further suggesting that the *KCAHW* is loading on multiple factors. Contrary to expectations, the knowledge test may be supplying information regarding 8 different factors rather than the intended one. Thus, all results utilizing the total score on the autism knowledge measure,

KCAHW, should be interpreted with caution. Use of the *KCAHW* occurred in research questions 1, 4, 5, and 6.

Table 3

Pattern Matrix of the KCAHW

KCAHW	Pattern Matrix							
Item	1	2	3	4	5	6	7	8
7	.723							
5	.718							
6	.690							
8	.583							
4		.848						
13		.838						
14			.870					
15			.865					
10				.836				
12				.739				
17					.828			
18					.767			
2						.896		
3						.539		
16							.775	
9	.443						-.511	
1							.349	.769
11								-.626

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization
8 components extracted. Rotation Converged in 11 iterations.

Note. KCAHW = Knowledge of Childhood Autism among Healthcare Workers.

Reliability and Validity of the *SSELCNT*

Participant scores on the Skills and Experience portion of the *SSELCNT* yielded a mean of 25.92 (*N*= 246, *SD* = 5.60). Possible scores on this portion of the SSELCNT were 6 through 36 and the sample produced a range of 6 – 36. The overall scores for this sample were considered to be fairly normally distributed (Skew = -1.009, Kurtosis= 1.891, Table 4), and the psychometrics of the test were found to be reliable (Cronbach's alpha = 0.93). Further, principal component factor analysis pattern matrix revealed one factor, further suggesting that the Skills and Experience portion of the *SSELCNT* survey was internally consistent (Table 4).

Table 4

Component Matrix of Skills and Experience portion of SSELCNT

SSELCNT Skills and Experience Items	Component
SE Item 1- Social	.919
SE Item 3- Rep Behaviors	.905
SE Item 2- Communication	.876
SE Item 4- Development	.868
SE Item 5- Diff Diagnosis in Spectrum	.855
SE Item 6- Diff Diagnosis Out of Spectrum	.768

Extraction Method: Principal Component Analysis.
1 component extracted.

Note. SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; SE = Skills and Experience, Diff = Differential.

Participant scores on the Need for Training portion of the *SSELCNT* yielded a mean of 20.760 (*N*= 246, *SD* = 7.07). Possible scores on this portion of the *SSELCNT* were 6 through 36 and the sample produced a range of 6 – 36. The overall sample scores were normally distributed (Skew = 0.025, Kurtosis= -0.353, Table 5) and the psychometrics of the test were found to be reliable (Cronbach's alpha = 0.93). Further,

principal component factor analysis pattern matrix with revealed one factor, further suggesting that the Need for Training portion of the *SSELCNT* survey was internally consistent (Table 5).

Table 5

Component Matrix of Need for Training portion of SSELCNT

SSELCNT Need for Training Items	Component
NT Item 1- Social	.927
NT Item 3- Rep Behaviors	.918
NT Item 2- Communication	.879
NT Item 4- Development	.877
NT Item 5- Diff Diagnosis In Spectrum	.807
NT Item 6- Diff Diagnosis Out of Spectrum	.748
Extraction Method: Principal Component Analysis. 1 component extracted.	

Note: SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; NT = Need for Training, Diff = Differential.

Participant scores on the Likelihood to Consult portion of the *SSELCNT* yielded a mean of 23.513 (*N*= 37, *SD* = 10.52). The overall sample scores were normally distributed (Skew = -0.131, Kurtosis= 1.526) and the test appeared to be reliable (Cronbach's alpha = 0.94). Further, principal component factor analysis pattern matrix revealed 1 factor, further suggesting that the likelihood to consult portion of the *SSELCNT* survey was internally consistent (Table 6).

Table 6

Component Matrix of Likelihood to Consult portion of SSELCNT

SSELCNT Likelihood to Consult Items	Component
LC Item 1- Social	.959
LC Item 3- Rep Behaviors	.959
LC Item 4- Development	.951
LC Item 5- Diff Diagnosis In Spectrum	.870
LC Item 6- Diff Diagnosis Out Spectrum	.783
LC Item 2- Communication	.739
Extraction Method: Principal Component Analysis. 1 component extracted.	

Note. SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; LC = Likelihood to Consult, Diff = Differential.

As noted, no further analysis occurred with this component of the measure because of the small sample size. Participants who reported that they would prefer to work within a team were not administered the Likelihood to Consult items. This is a potential weakness of the study, as working with a team was not defined clearly. This item could have been interpreted as working with an autism expert/diagnostic team or a general multidisciplinary team.

Although the *SSELCNT* measure was found to be an appropriate measure for the use of research question analyses, analysis of the *KCAHW* revealed low reliability and internal consistency.

Statistical Analyses of Research Questions

A variety of statistical procedures, such as multiple linear regression, Pearson correlation, independent samples *T*-tests and frequency analyses, were utilized in order to answer the research questions. The set of statistical assumptions for each analysis is

discussed accordingly with each respective research question. The primary analysis is then discussed along with effect size, where applicable, and implications of the results.

Assumptions of Research Questions 1, 2, and 3

The first three research questions were answered by conducting a standard simultaneous entry multiple linear regression analysis. Assumptions of the multiple linear regression; including linearity of the variables, normal distribution of the standardized residuals, and homogeneity of variances; were analyzed using scatterplots, histograms, and cumulative probability plots. The scatterplot of the regression standardized residuals predicted values and the studentized residuals revealed an equal spread, suggestion linearity of the variables. Observations of the histogram for the standardized residuals of the respective total scores; *KCAHW,* Skills and Experience, and Need for Training; revealed a reasonably normal distribution with several outliers, thus suggesting independence and normality of errors. The observed cumulative probability plot (normative P-P plot) of the regression standardized residuals also revealed the data to be normally distributed around zero, which suggested no problems with homoscedasticity. Additionally, multicollinearity was not present in the data as the model variables were not found to be highly correlated with one another. The correlation matrices for each of the first three research questions can be found in Appendix E. Therefore, the assumptions for the multiple linear regression analyses were met for research questions 1, 2, and 3.

Bonferroni Correction

Additionally, a Bonferroni correction was used for the first 3 research questions to control for Type I error. Because three multiple regression analyses were utilized the

original *p* value of .05 was divided by 3; resulting in a new *p* value of .0166 (.05/3=.0166). Although some consider the Bonferroni correction to overly conservative and unnecessary, others conclude that it is preferred when trying to control for false-positive findings (Mundfrom, Perrett, Schaffer, Piccone, & Roozeboom, 2006).

Research Question #1

Q1. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain autism knowledge, as demonstrated by the total scores on the *KCAHW*?

Multiple linear regression analysis revealed that the independent/predictor variables (degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*) predicted the dependent/criterion variable of autism knowledge (as demonstrated by the total scores on the *KCAHW*). The linear combination of predictor variables was significantly related to autism knowledge, $F(8, 237) = 2.899$, $p<.016$ (Table 7). The sample multiple correlation coefficient was .299 suggesting that that 9% ($R^2= 0.089$) of the variance in autism knowledge could be accounted for by the linear combination of degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*. Only one predictor in the model was significant. *ADOS* Clinician reliability accounted for 5% of the variability in autism knowledge scores (-

$0.228^2 = 0.051$) while the other predictor variables only contributed an additional 4% combined (9% - 5% = 4%). This suggests that participants who were *ADOS* Clinician reliable scored higher on the autism knowledge measure *KCAHW*, as the categorical variables in the model were effect coded with a -1 value implying "yes" responses and 1 values implying "no" responses.

However, practical implications of the results are limited. According to Sink and Stroh (2006), adjusted R^2 can be considered an unbiased effect size of a multiple linear regression analysis. According to the model, adjusted $R^2 = .058$, and is considered small. Therefore, although the results were found to be significant, implications for practical utilization should be carefully considered. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 7

Results of the Complete Model Multiple Linear Regression for RQ1

Model	Sum of Squares	df	Mean Square	*F* value	Sign.
Regression	86.568	8	10.821	2.899	.004*
Residual	884.672	237	3.733		
Total	971.240	245			

Note. df = degrees of freedom; Sign. = Significance (p).
*p < .016

Research Question #2

Q2. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on

the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain perceptions of skills and experience, as demonstrated on the skills and experience total score on the *SSELCNT* survey?

Multiple linear regression analysis revealed that the independent/predictor variables (degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R* predicted the dependent/criterion variable of perceived skills and experience (as demonstrated by the total skills and experience score on the *SSELCNT*). The linear combination of predictor variables was significantly related to perceived skills and experience, $F(8, 237) = 5.189$, $p<.016$ (Table 8). The sample multiple correlation coefficient was .386 suggesting that that 15% *(*R^2= 0.149) of the variance in perceived skills and experience could be accounted for by the linear combination of degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*. Three predictors in the model were significant. Number of Diagnoses/Identifications made per year accounted for 8% of the variability in perceived skills and experience (0.276^2 = 0.076), Years of Experience accounted for 3% of the variability in perceived skills and experience (0.174^2= 0.030), and Total Autism Training Hours accounted for 4% of the variability in perceived skills and experience (0.208^2 = 0.043). The other predictor variables contributed minimal amounts that were not significant. This suggests that participants who reported higher numbers of autism diagnoses, more years of experience,

and higher total autism training hours also perceived their skills and experience in autism diagnosis to be higher as well.

Similar to the previous research question, the practical implications of these results are limited. As previously reported, adjusted R^2 can be considered an unbiased effect size and an adjusted R^2= .120, is considered small. Again, results with small effect sizes should be considered regarding the practical implications (Sink & Stroh, 2006).

Table 8

Results of the Complete Model Multiple Linear Regression for RQ2

Model	Sum of Squares	df	Mean Square	*F* value	Sign.
Regression	1147.674	8	143.459	5.189	.000*
Residual	6551.858	237	27.645		
Total	7699.533	245			

Note. Df = degrees of freedom; Sign. = Significance (p).
*p < .016

Research Question 3

Q3. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain perceptions of need for training, as demonstrated on the need for training total score on the *SSELCNT* survey?

Multiple linear regression analysis revealed that the independent/predictor variables (degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on

the *ADI-R)* predicted the dependent/criterion variable of perceived need for training (as demonstrated by the total need for training scores on the *SSELCNT*). The linear combination of predictor variables was significantly related to perceived need for training, $F(8, 237) = 5.320$, $p<.016$ (Table 9). The sample multiple correlation coefficient was .390 suggesting that that 15% *(*R^2= 0.152) of the variance in perceived need for training could be accounted for by the linear combination of degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*.

One predictor in the model was significant. Years of Experience accounted for 4% of the variability in perceived need for training ($-0.188^2 = 0.035$) and notably, represented a negative relationship. The other predictor variables explained an additional 11% of variability in perceived need for training; however, none were individually statistically significant. This suggests that participants who reported more years of experience perceived their need for training in autism diagnosis to be lower because there was a negative relationship between the variables. However, as with the previous research questions, the current results may be limited in regards to practical implications because the adjusted R^2= .124 is considered small.

Table 9

Results of the Complete Model Multiple Linear Regression for RQ3

Model	Sum of Squares	df	Mean Square	*F* value	Sign.
Regression	1864.390	8	233.049	5.320	.000*
Residual	10382.459	237	43.808		
Total	12246.850	245			

Note. df = degrees of freedom; Sign. = Significance (p).
*p < .016

Research Question #4

Q4. Is autism knowledge, as measured by the *KCAHW*, correlated with perceptions of skills and experience as demonstrated by the total skills and experience score from the *SSELCNT* survey?

Research question 4 was analyzed conducting a Pearson correlation between autism knowledge score (total score on the *KCAHW*) and total skills and experience score on the *SSELCNT* survey. Assumptions of the Pearson correlation were analyzed. Normality of the individual variables was assessed by examining the respective histograms. Both the *KCAHW* autism knowledge test and the skills and experience total scores were found to be normally distributed. Further, there was independence of observations for each variable.

The correlation between total autism knowledge scores on the *KCAHW* and total perceived skills and experience scores on the *SSELCNT* was significant $r(244) = .298$, $p<.05$ (Table 10, Table 11). However, the effect size of this relationship is considered to be small based on Cohen's *d* and suggested classification of effect sizes. Although participants with higher scores on the autism knowledge test tended to perceive their skills and experience to be higher as well, as demonstrated by the positive significant

correlation, this relationship was small and has limited practical implications. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 10

Descriptive Statistics of the Variables in RQ 4

Variable	Mean	Std. Deviation	*N*
Total Autism Knowledge Score	15.4675	1.99104	246
Total Skills and Experience Score	25.9228	5.60595	246

Note. Std. = Standard

Table 11

Correlation Matrix of Autism Knowledge and Skills and Experience

	Autism Knowledge	Skills and Experience
Autism Knowledge		
Pearson Correlation	1	298*
Sig. (2-tailed)		.000
N	246	246
Skills and Experience		
Pearson Correlation	.298*	1
Sig. (2-tailed)		.000
N	246	246

Note. Sig = Significance.
*p < .05, two-tailed

Research Question 5

Q5. Is autism knowledge, as measured by the *KCAHW*, correlated with perceptions of need for training as demonstrated by the need for training total score from the *SSELCNT* survey?

Research question 5 was answered by conducting a Pearson correlation between autism knowledge score (total score on the *KCAHW*) and total need for training score on

the *SSELCNT* survey. Assumptions of the Pearson correlation were analyzed. Normality of the individual variables was assessed by examining the respective histograms. Both the *KCAHW* autism knowledge test and the need for training total scores were found to be normally distributed. Further, there was independence of observations for each variable.

The correlation between total autism knowledge scores on the *KCAHW* and total perceived need for training scores on the *SSELCNT* was significant $r(244) = -.218$, $p<.05$ (Tables 12 and 13). However, the effect size of this relationship was considered to be small based on Cohen's *d* and suggested classification of effect sizes. Participants with higher scores on the autism knowledge test tended to perceive their need for training to be lower, as demonstrated by the negative significant correlation. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 12

Descriptive Statistics of the Variables in RQ 5

Variable	Mean	Std. Deviation	N
Total Autism Knowledge Score	15.4675	1.99104	246
Total Need for Training Score	20.7602	7.07016	246

Note. Std. = Standard

Table 13

Correlation Matrix of Autism Knowledge and Need for Training

		Autism Knowledge	Need for Training
Autism Knowledge			
	Pearson Correlation	1	-.218*
	Sig. (2-tailed)		.001
	N	246	246
Need for Training			
	Pearson Correlation	-.218*	1
	Sig. (2-tailed)	.001	
	N	246	246

Note. Sig = Significance.
*$p < .05$, two-tailed.

Research Question #6

Q6. Do school psychologists who participate as members of an autism team display higher levels of autism knowledge as demonstrated by scores on the *KCAHW*, than those school psychologists who do not identify themselves as members of an autism team?

Research question 6 was answered by conducting an independent samples T test. The two independent samples consisted participants who reported being a member of an autism team (n = 128) and those who reported that they were not members of an autism team (n = 118). The test variable was autism knowledge as demonstrated on the total score of the *KCAHW*.

Assumptions of the Independent Samples T Test were analyzed including: normality, independence, and equality of variances. The test variable, autism knowledge total score on the *KCAHW*, was determined to be reasonably normal by examination of histograms. The test variable scores between each group are independent of one another, as it was only possible for each participant to be in one group. However, equal variances

between the two groups on the test variable was not found, as Levene's Test for Equality of Variances was significant (F= 4.933, p= .027). Therefore, degrees of freedom were adjusted from 244 to 226.485, as appropriate, because equal variances could not be assumed. However, it should be noted that T tests are often found to be fairly robust, despite violations of assumptions and typically produce valid results without intervention (Glass & Hopkins, 1996).

The independent-samples t-test was significant, t(226.485)= -3.320, p <.05, d=.214 (Table 14), suggesting a difference between the groups. School psychologists who identified themselves as being part of an autism team scored higher (M= 15.86, SD= 1.75) on the autism knowledge test than participants who did not identify themselves as being part of an autism team (M= 15.03, SD= 2.14). The effect size of this finding was calculated by utilizing the equation for d, mean difference divided by SD pooled. The effect size calculation resulted in d=.214, which is considered a small effect size. Consequently, the practical implications of this result should be considered with caution. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 14

Autism Team Descriptive Statistics on Autism Knowledge Test

	Member of Team	N	Mean	Std. Deviation
Knowledge Score	No	118	15.0339	2.14409
	Yes	128	15.8672	1.75406

Note. Std. = Standard.

Research Question #7

Q7. What is the percentage of school psychologists who report themselves to be unskilled and inexperienced versus skilled and experienced as

demonstrated by the mean scores on the skills/experience items of the *SSELCNT* survey?

Research question 7 was answered by conducting a frequency analysis on the dichotomized total scores of the skills/experience items of the *SSELCNT* survey. Because the possible scores on this portion of the *SSELCNT* were 6-36, the middle of the range was identified to be 21. The total scores were dichotomized, or put into two groups, by putting all participants with total scores of 21.0 and below into the unskilled and inexperienced group and all participants with total scores of about 21.0 into the skilled and experienced group. Frequency tables revealed that 86.6% (*n*=213) of the total sample perceived themselves skilled and experienced regarding autism diagnosis and 13.4% (*n*=33) of the total sample perceived themselves unskilled and inexperienced regarding autism diagnosis (Table 15).

Table 15

Skills and Experience Variable Recoded Dichotomously

	Frequency	Percent	Valid Percent
Unskilled and inexperienced	33	13.4	13.4
Skilled and Experienced	213	86.6	86.6
Total	246	100.0	100.0

Note. Original data recoded by dichotomizing to represent 2 groups.

Research Question #8

Q8. What is the percentage of school psychologists who report themselves to not need training versus in need of training as demonstrated by the mean scores on the need for training items of the *SSELCNT* survey?

Research question 8 was answered by conducting a frequency analysis on the dichotomized total scores of the need for training items of the *SSELCNT* survey. Because the possible scores on this portion of the *SSELCNT* were 6-36, the middle of the range was identified to be 21. The total scores were dichotomized, or put into two groups, by putting all participants with total scores of 21.0 and below into the no need for training group and all participants with total scores of about 21.0 into the need for training group. Frequency tables revealed that 51.6% (*n*=127) of the total sample perceived themselves as needing training regarding autism diagnosis (Table 16).

Table 16

Need for Training Variable Recoded Dichotomously

	Frequency	Percent	Valid Percent
No need for Training	119	48.4	48.4
Need for Training	127	51.6	51.6
Total	246	100.0	100.0

Note. Original data recoded by dichotomizing to represent 2 groups.

Post-Hoc Analyses

Additional post hoc analyses were conducted with the *KCAHW* to determine feasibility of use for future studies. Additional principal component rotated factor analysis pattern matrix with Promax rotation and 2 forced factors can be found in Table Appendix F. In conceptually analyzing the instrument, it appears that items 14 through 18 are more theoretical and research based instead of symptom descriptions; unlike the rest of the items. Although the pattern matrix of the forced 2 factor loadings revealed

that items 14-18 did not load strongly with the first 13 items, they did not load strongly together either. Additionally, the first 14 items did not load strongly together on one factor and revealed lower than optimal factor loadings in this format. Several items loaded on both factors and one item did not load above .10 on any factors. Therefore, the post hoc analysis of the *KCAHW* did not reveal that symptomology questions would load similarly on one factor and theory/research based items on another factor. It seems that this instrument may contain questions important to autism; however, future use for the purpose of determining diagnostic capability should be carefully considered.

Summary

The preliminary analysis revealed low reliability on the autism knowledge instrument; the *KCAHW*. Therefore, all results utilizing the *KCAHW* should be interpreted with caution. However, the skills and experience, likelihood to consult, and need for training scales of the *SSELCNT* were found to be reliable and displayed adequate factor loadings via factor analysis. Multiple regression analyses revealed that *ADOS* clinician reliability was a significant predictor of autism knowledge, although other school psychologist characteristics, such as degree level, years of experience, and number of autism specific training hours were not found to predict autism knowledge.

Additionally, number of diagnoses/identifications made per year, years of experience, and specific autism training were found to be significant predictors of school psychologist perceived skills and experience in their ability to diagnose or identify autism. Although these variables are different than those found to predict autism knowledge, it appears that school psychologists who make a higher number of diagnoses/identifications of autism, have more years of experience as school

psychologists, and have received more autism specific training perceived their skills and experience to be higher than those who have lower levels of these variables. Lastly, more years of experience was found to predict lower levels of perceived need for training. However, all of the multiple regression analyses resulted in small effect size; implying weak practical implications of the results.

Additional Pearson correlation analysis revealed that autism knowledge was positively correlated with perceived skills and experience but negatively correlated with perceived need for training. Further, school psychologists who scored higher on the autism knowledge instrument also perceived their need for training to be lower than school psychologists who did not score as high on the knowledge instrument. Again, these results were found to have a small effect size and should be interpreted with caution, as there may be limitations in practical use. Additionally, these results utilized the autism knowledge instrument, *KCAHW*, which demonstrated poor reliability and should be interpreted with caution.

CHAPTER V

DISCUSSION

The purpose of this study was to identify school psychologist characteristics that predict diagnostic capability in identifying autism. Diagnostic capability was defined as the demonstration of autism knowledge, perceptions of skills and experience in autism diagnosis or identification, and need for training in autism diagnosis and identification. Autism knowledge, as demonstrated on the *KCAHW*, was compared to perceived skills and experience and need for training, in order to explore if a relationship was present. Additionally, school psychologists who work on autism diagnostic or identification teams were compared to those who did not regarding autism knowledge. Lastly, the percentages of school psychologists who reported themselves skilled and experienced versus unskilled and inexperienced and not needing training versus needing training were compared. This chapter discusses a review of the study, procedures utilized, discussion of findings, and discussion of implications. The chapter also addresses the limitations of the current study and implications for future research.

Summary

Many have highlighted the need for research regarding the rising prevalence of Autism Spectrum Disorders (e.g., Liptak et al., 2006). Despite being difficult to identify and diagnose, the prevalence of autism is on the rise. Recent surveys show prevalence rates to be significantly higher than previously estimated (Fombonne, 2003). The current

prevalence of autism and autism spectrum disorders appears to be approximately 3 to 4 times higher than was estimated 20 years ago (Fombonne, 2003). With this rate of increase it is inevitable that school psychologists will be responsible for identifying and program planning for students with autism.

One of the obvious questions is the degree to which practitioners are prepared to make accurate and efficient diagnoses of autism. Although autism specialists tend to agree on the defining characteristics of autism, research has discovered inconsistencies in actual diagnoses made, implying a possible misunderstanding of the diagnostic criteria (Kabot et al., 2003) and the identification of autism symptomology.

Approximately 24% of children receive an autism diagnosis after entering school (Wiggins et al., 2006). Therefore, diagnosis or identification is likely to be made by a school psychologist. In recent years, 95% of school psychologists have reported an increase in referrals requesting autism assessment (Kohrt, 2004). The implications of such an increase are not yet known. However, it is widely accepted that children who receive targeted, early intervention specific to their autism deficits are more likely to be successful in the long-term; including academic achievement and independent living (Koegal et al., 2001). Conversely, undiagnosed children are unlikely to receive crucial intervention or services relevant to autism prior to diagnosis. Therefore, it is imperative that school psychologists are equipped to competently assess and identify autism in all children, especially those of early childhood age (Brock, et al., 2006).

School psychologists represent a wide variety of professionals; including doctoral and non-doctoral degrees, varying levels of experience, varying work settings and populations worked with (Curtis et al., 2002), and varying exposure to autism cases.

Although school psychologists are trained in assessment and treatment of psychological disorders (Merrell et al., 2006), not all work on an autism diagnostic/identification team, receive specific training in autism, or have direct training in autism assessment tools such as the *ADOS* (Lord, et al., 1999) or *ADI-R* (Rutter et al., 2003.) Additionally, because of rising prevalence rates of children identified or diagnosed as having autism within the school environment, school psychologists are likely to be faced with autism identification and subsequent autism diagnosis questions (Wiggins et al., 2006; Noland & Gabriels, 2004).

The current study expanded on the research regarding the exploration of predictive school psychologist characteristics regarding autism knowledge, perceived skills and experience to diagnose or identify autism, and perceived need for training in terms of autism diagnosis or identification. Additionally, the current study aimed to examine the relationships between demonstrated autism knowledge and perceived skills and experience and need for training in autism diagnosis or identification. Moreover, autism diagnostic/identification team membership status was compared to autism knowledge and school psychologist perceptions of skills/experience and need for training was surveyed.

Autism knowledge was measured using the *KCAHW* questionnaire, which was (Bakare et al., 2008) originally developed for use with health care workers in a neuro-psychiatric hospital in Nigeria. Although this instrument was piloted to interpret appropriate use with those who are and are not familiar with autism in the United States and deemed appropriate for use in the current study, it ultimately resulted in poor reliability and internal consistency in the current study. It is possible that the *KCAHW*

contained questions that were too basic or rote regarding autism knowledge for the current population.

The average scores on the *KCAHW* were found to be high (M = 15.47 out of 18 possible points) and seemed to indicate that participating school psychologists were well versed in autism knowledge as measured by this instrument. The high mean score on the *KCAHW* also likely contributed to the low reliability of the instrument. Additionally, it should be noted that the mean autism knowledge score of the current sample is comparable to the mean score of the expert group on the pilot study (M = 16.50), and it appeared that the current sample contained a high number of school psychologists who were very familiar with autism.

Although it has not been established exactly which autism criteria cause school psychologists difficulty in diagnosis or identification, it has been determined that there is difficulty in determining diagnosis and identification (Kabot et al., 2003). Therefore, there continues to be a missing gap in the literature regarding the cause of difficulty. Perhaps, this instrument did not contain questions about the diagnostic criteria that pose the most difficulty or perhaps, the problem does not lie with knowledge of autism. It could also be hypothesized that possessing a high level of knowledge does not ensure application of the knowledge for diagnostic or identification purposes. However, it does seem that the issues regarding diagnostic difficulty to diagnose or identify autism may not solely lie within the realm of knowledge.

Several school psychologist characteristics were found to be predictive of autism knowledge, perceptions of skills and experience to diagnose or identify autism, or perceptions of need for training in terms of autism diagnosis or identification.

Relationships between demonstrated autism knowledge and perceptions of skills and experience and need for training were also present. Differences in knowledge between school psychologists who are members of autism diagnostic/identification teams were also found. Because half of the total sample reported that they were members of autism teams, post-hoc analysis of this group will be discussed. Lastly, the survey of perceptions of skills and experience and need for training revealed interesting results. Although all of the findings resulted in small effect sizes, the results may imply useful considerations in regards to school psychologist needs and the training of current and future school psychologists.

Overall Model Prediction of Autism Knowledge

The overall model consisted of degree level, years of experience working as a school psychologist, amount of autism specified training, amount of time spent participating as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and research reliability on the *ADI-R*. Of the variables examined, the total model explained only 9% of the variability in autism knowledge scores. *ADOS* clinician reliability was found to be the only significant predictor variable and accounted for 5% of the variability in autism knowledge scores.

Although the effect size is small, those who choose to complete *ADOS* Clinician training tend to receive more in-depth training in terms of autism symptomology and the appropriate way to observe and challenge children regarding communication, social interaction, and repetitive/stereo typed behaviors in order to evaluate this symptomology. Although this study cannot determine the direct cause, those who seek *ADOS* clinician

reliability certification may be more interested and knowledgeable initially. Further, the *KCAHW* inquires about a variety of autism diagnostic criteria and associated features, which are directly tested in the *ADOS* (Lord et al., 1999). Enduring extensive training to become *ADOS* clinician reliable is likely to teach school psychologists about specific diagnostic criteria in such depth that they are better equipped to demonstrate higher knowledge.

The University of Michigan Autism & Communications Disorders Center (http://www.umaccweb.com/education/index.html) provides the commonly recognized training and certification on the *ADOS* and *ADI-R*. The trainings have many components and participants must demonstrate a high level of knowledge of the instruments and autism characteristics to receive clinician or research reliable certification. The trainings utilize direct teaching, modeling, video, direct practice of knowledge and skills, and feedback. To obtain *ADOS* clinician reliability, one must attend the clinician training workshops (2 days), demonstrate standardized administration of all modules, and demonstrate inter-rater reliability of 80% agreement regarding independently scored administrations of the test with the University of Michigan or other designate site able conduct the trainings. To obtain *ADOS* research reliability, one must attend the clinician and research reliability workshops (2 days and 2 ½ days; respectively), demonstrate standardized administration of all modules, and demonstrate inter-rater reliability of 85% agreement regarding independently scored administrations of the test with the University of Michigan or other designate site able conduct the trainings. These are the reliability standards put forth by The University of Michigan Autism & Communications Disorders Center (http://www.umaccweb.com/education/index.html). Therefore, *ADOS* research

reliability is considered an even higher level of training; but was not found to be a significant predictor in the analysis in the current study.

ADOS research reliability requires a professional to attend the same trainings as clinician reliable practitioners, but also complete a higher level of inter-rater reliability and additional research reliable trainings. There were very few participants who reported that they were *ADOS* research reliable (*n*=19) compared with clinician reliable (*n*=46), and 12 of these individuals endorsed both areas. Consequently, significance was unlikely to be found due to the small number of participants who were *ADOS* research reliable in the sample. Therefore, within the current study, it cannot really be known if *ADI-R* research reliability is predictive of autism knowledge due to the small sample of participants who did have this characteristic. However, it can be determined that *ADOS* research reliability is less common than clinician reliability, perhaps because of the additional requirements and difficulty of attainment.

Expanding on past research, the *ADOS* trainings are unique in that they are typically intense 2-day workshops utilizing direct teaching, practice, modeling, and either live or video examples. Additionally, those who complete clinician reliability trainings must practice administration, demonstrate administration skills and scoring, and receive feedback. Implications of this finding may not necessarily have to do with the *ADOS* instrument per se, but perhaps the nature in which clinicians are trained. Previous medical research has found that intensive multi-day workshops increase knowledge and skills among practitioners (Fritsche, Neumayer, Kunz, Greenhalgh, & Falck-Ytter, 2002). Opportunities to apply skills and knowledge after receiving intensive teaching has been found as a preferred method among nursing students, as this led to positive graduation

outcomes and was reportedly favored by the students (Kemsley, McClauland, Feiganbaum, & Riegle, 2011). Conceivably, school psychologist in-trainings and workshops constructed to deliver knowledge and advance skills may benefit from practice opportunities and feedback after delivery of an intensive multi-day training.

According to previous literature, it is important to note that autism assessment includes more than the assessment of autism symptomology (Brock et al., 2006). Comprehensive assessment includes the examination of all areas of development; intellectual, academic achievement, speech/language/communication, physical, behavioral, social/emotional, developmental history, and adaptive functioning (Brock et al., 2006; Chawarska et al., 2008). In addition, an ample understanding of typical and atypical development is crucial in distinguishing between appropriate and inappropriate behavior. In addition to the many tools utilized for the overall assessment, a comprehensive model of autism symptomology assessment set forth by Bradley-Johnson and colleagues (2008), includes records review and interviews, rating scales, and direct assessment. Notably, recent research has highlighted the ADOS to be the only direct testing instrument for autism symptomology (Bradley-Johnson et al., 2008). Building on this research, the current study revealed that only 18.7% of the sample reported being *ADOS* clinician reliable and 7.7% *ADOS* research reliable. Collectively, about one fifth of the total sample was reliable, in some form, on the *ADOS* instrument. Importantly, this does not imply that the rest of the sample does not use the *ADOS* for assessment purposes, as though clinician and research reliability is strongly recommended, it is not required for use. Retrospectively, it would have been helpful to know the frequencies of clinicians who use the *ADOS* for assessment purposes when trying to make a diagnosis or

identification and this may be an area for future research. Additionally, if not utilizing this instrument, it would also be helpful to know how clinicians are directly examining the diagnostic or identification criteria of autism.

Overall Model Prediction of Perceived Skills and Experience

The overall model of degree level, years of experience working as a school psychologist, amount of autism specified training, amount of time spent participating as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and research reliability on the *ADI-R* was found to significantly explain school psychologist perceptions of skills and experience; and explained 15% of the variability in perceived skills and experience. However, only three predictors in the model were found to be significant; number of autism cases per year, years of experience working as a school psychologist, and total autism specified training hours in the past 5 years.

Although there is limited research regarding school psychologists' knowledge of autism or skills and experience regarding autism diagnosis, other studies have shown that educators and parents can be successful in working with children with autism when they are directly taught about autism and then supplied access to a consultant (Ruble & Dalrymple, 2002). This is congruent with the current study findings in that autism specific training was found to be a significant predictor of perceived skills and experience. Although it cannot be determined if perceived skills and experience is related to actual skills and knowledge, those who received specific training in autism tended to rate their skills and experience to diagnose or identify autism as higher than those who had not received this training. It appears that direct exposure and experience

with children who have autism may be instrumental to school psychologist's skills and experience to diagnose or identify this disorder. Conversely, one could hypothesize that those with high levels of skills and experience may be more likely to be referred such cases, resulting in more cases diagnosed per year.

Additionally, the current study found that those who have more experience as a school psychologist seemed more likely to perceive their skills and experience to diagnose or identify autism as higher as well. Previous research has found that overall experience working with children who are developing typically and who have developmental delays and disorders; and exposure to direct cases are crucial in the development of clinical skills to provide accurate assessment (Chawarska et al., 2008). Though the effect size for this analysis was small, it is important to recognize that more experience, higher numbers of autism cases, and more autism specific training may help school psychologists to perceive their skills and experience in autism cases as higher, or more advanced.

Because 25.2% (*n*=62) of school psychologists reported that they had zero autism cases per year and 48% (*n*= 118) reported zero autism specific training hours received in the last 5 years, it could be recommended that future research ascertain what types of experiences and trainings would be most beneficial to school psychologists. Employers of school psychologists may wish to provide professional development opportunities regarding autism specific training to broaden the experiences and exposure of their employees, and thus, increase school psychologist skills. Perhaps employers may wish to mandate several hours of professional development every 3 years in regards to knowledge of autism assessment and identification. With specific training and exposure

to cases, school psychologists may feel better equipped, in terms of skills and experience, to diagnose or identify a child as having autism when faced with such a case. Although it is difficult to provide the experience of working on autism cases if the opportunity does not exist, the current findings may suggest trainings to include real children. Recent research has found that the use of technology such as webcams and videos have been found to be successful in training psychologists regarding psychotherapy techniques (Manring, Greenberg, Gregory, & Gallinger, 2011). Utilization of the same approach, in terms of autism assessment, may allow for the substitution of real life experiences via videos. Alternatively, employers may wish to have school psychologists "rotate" as an apprentice with the autism team for a period of time.

Overall Model prediction of perceived Need for Training

Although the overall model explained 15% of the variability in perceived need for training, only one individual predictor was found to be significant; years of experience working as a school psychologist accounted for 4% of the variability in perceived need for training. The negative relationship suggested that those with more years of experience reported less perceived need for training in terms of autism diagnosis and identification. Though the effect size was considered to be small, this may imply that those school psychologists with more years of experience feel that they do not need training in autism diagnosis because they have, perhaps, been challenged with numerous autism cases many times throughout their career.

One may assume that school psychologists with more years of experience may have had the opportunity to attend a great deal of autism specific training, however, this was not found to be the case in the current study; as autism specific training in the past 5

years was not found to be a significant predictor of perceived need for training. Although it could be argued that school psychologists with more years of experience could have received training more than 5 years ago, the literature and research on autism is ever-changing and it is beneficial to receive training periodically to stay up to date with current findings (Charman, 2010). However, the training that is provided may be delivered at a basic level and not meet the needs of more specialized groups. Additionally, trainings are often delivered in a traditional classroom structure and do not allow for real life or video exposure to children with autism, an approach that was previously found successful in teaching new skills to psychologists (Manring et al., 2011).

Autism Knowledge, Perceived Skills and Experience, and Need for Training

The current study found a positive relationship between autism knowledge and skills and experience in autism diagnosis. Although the effect size of this finding was considered to be small, school psychologists who perceived their skills and experience more highly than those who did not also scored higher on the autism knowledge instrument. The autism knowledge instrument contained statements about social, communication, and repetitive/stereotyped behavior symptomology in addition to associated features of autism. Those who scored highly on this instrument demonstrated that they knew many of the diagnostic criteria and associated features of autism. Consistent with other literature, school psychologists appear to be fairly accurate in their self-assessments (Miller & Jome, 2010).

The current study also found a negative relationship between autism knowledge and need for training; suggesting that school psychologists who scored higher on autism

knowledge reported less perceived need for training. This finding has important implications because many school psychologists self-select the workshops, trainings, and continuing education unit courses that they attend. Therefore, those who have a high level of autism knowledge in terms of diagnosis may choose to attend other professional development trainings that are geared toward their needs.

These findings expand on previous literature suggesting that psychologists be informed and encouraged to self-assess (Kaslow et al., 2007). More specifically, it has been recommended that psychologists be encouraged to assess their own skills and subsequent need for additional training or education (Kaslow et al., 2007). The current findings show that autism knowledge scores were positively correlated with school psychologist's perceptions of skills and experience. Additionally, higher autism knowledge scores were negatively correlated with need for training. This finding is consistent with the ideal that as ethical professionals, school psychologists should be aware of their level of competence. In terms of the current study, implications that school psychologists may be accurately self-assessing are critical to autism diagnosis/identification. However, these findings do not necessarily imply that school psychologists who have lower autism knowledge and perceive their need for training to be high; will in response, actually seek and receive training.

Autism Knowledge and Autism Team Membership

School psychologists who reported themselves to be members of an autism team were found to score higher on the autism knowledge test than those school psychologists who did not report themselves to be team members. It is difficult to ascertain if team membership contributes to autism knowledge in any way, however the current study

sample seemed to represent a high percentage (52%) of school psychologist who were on autism teams. It is likely that autism team members undergo more autism specific training and have more exposure to autism cases than non-team members. Many autism diagnostic teams are provided with additional trainings and professional development opportunities that their counterparts are not offered (Chawarska et al., 2008).

Post-hoc analysis of autism team membership. Additional analyses were performed on this group specifically and revealed that of the 128 participants who identified themselves as an autism assessment, identification, or diagnostic team member, 32 reported having *ADOS* Clinician Reliability, 14 reported having *ADOS* Research Reliability, and 14 reported having *ADI-R* Research Reliability. Compared with the total sample; 46 *ADOS* Clinician Reliable, 19 *ADOS* Research Reliable, 21 *ADI-R* Research Reliable; it seems that most of those who reported reliability on these instruments tended to be part of autism teams. Of those who reported being on autism teams, in higher perceived skills and experience ($M = 27.25$) than the total sample ($M = 25.92$) and slightly lower perceived need for training ($M = 19.59$) than the total sample ($M = 20.760$). This may be because those who reported being on autism teams also reported higher numbers of autism specified training hours received in the past 5 years ($M = 55.73$) when compared with the total sample ($M = 45.46$). This additional training likely contributed to knowledge, skills and experience, and need for additional training.

Expanding on previous research, it is important to distinguish the difference between a multidisciplinary team and a specialty autism diagnostic/identification team (McClure, MacKay, Mamdani, & McCaughney, 2010). In the current study, approximately 52% of participants identified as participating as a member of an autism

assessment, identification, or diagnostic team. Typically, school psychologists' work within a special education team to determine which special education category would be most appropriate for all students being assessed (Merrell et al., 2006; Noland & Gabriels, 2004). Often the special education teams consist of the school psychologist, speech/language pathologist, occupational therapist, administrator, regular education teacher, special education teacher, and parents of the child. Although autism diagnostic teams may consist of the same team members by occupational title, these teams often solely focus on the diagnosis or identification of autism (McClure et al., 2010). Further, autism diagnostic teams often undergo extensive training regarding autism, development, differential diagnosis, and delivery of diagnosis. Therefore, although school psychologists may be working within a multi-disciplinary team to make an autism diagnosis, a regular multidisciplinary team is qualitatively different than an autism diagnostic team and may not result in the same accuracy and knowledge in diagnosis as working with a specialized autism team.

However, McClure and colleagues (2010) intensively trained regular multi-disciplinary teams and then compared them with the already-established autism specialty diagnostic team in the UK. They reported using a 5-day intensive training including the following 5 components: collecting comprehensive clinical history specific to autism, clinical assessment and use of the *ADOS*, determining diagnosis based on diagnostic criteria, delivery of results, and writing of reports. Results revealed that the newly trained teams did not differ from the already established team after both teams completed diagnosis on the same children.

McClure and colleagues (2010) utilized the multi-day intensive training method found effective by previous research (Fritsche et al., 2002). Additionally, this research also utilized the comprehensive assessment components established as appropriate in autism assessment (Bradley-Johnson et al., 2008). Although approximately half (48%) of the current study participants did not identify themselves as working as a member of an autism assessment, identification, or diagnostic team, it appears that with the correct training, these individuals could quickly become ready to do so.

School Psychologist Perceptions of Skills and Need for Training

It is interesting that much of the sample reported being skilled (86.6%), yet more than half (51.6%) of the sample reported needing training. School psychologists may be aware that the literature and research on autism is always growing, and that they may benefit from receiving recurring training to keep their skills and knowledge up to date (Charman, 2010). Further, the *ADOS* and *ADI-R* are becoming more widely used over time (Lord et al., 1999; Rutter et al., 2003), and school psychologists who have not received formal training on the "gold standard" autism assessment tools (Filipek et al., 1999, p. 460) may wish to do so.

Expanding on the previous literature implying that autism diagnosis/identification be addressed in autism teams (Filipek et al., 1999), the current sample may have indicated a need for training in order to allow them to participate as members of such teams. Previous research has indicated that training regular multi-disciplinary teams to act as specialized autism diagnostic/identification teams can be highly effective (McClure et al., 2010) with the use of an intensive multi-day training approach (Fritsche et al.,

2002). Additionally as previously discussed, other professionals indicate they prefer an intensive multi-day training approach (Kemsley et al., 2011).

Implications of the Study

The current findings suggest the importance of further professional development targeted toward school psychologist needs, which in turn, may have long-term implications for the prognosis of children who school psychologists evaluate. The current sample found a large percentage of school psychologists who reported little or no recent training specific to autism diagnosis. Providing opportunities for professional development may essentially, allow for the growth of knowledge and skills and subsequently, lead to earlier diagnosis and better intervention (Brock et al., 2006).

Although this finding appears as though a many school psychologists need to be trained, it is possible to approach autism diagnosis or identification with an autism team. The current study found those on autism teams to have more training and experience in autism diagnosis/identification. This finding has positive implications, as those who have more training and perceive themselves to be skilled and experienced are those school psychologists that seem to diagnose/identify autism on a regular basis. The use of an autism diagnostic or identification team may be an efficient way to approach autism training and autism diagnosis/identification concerns. An autism diagnostic or identification team will only require a small group of school psychologists to be trained so extensively. Many researchers agree that a team approach should be utilized in the diagnosis of autism (Lord et al., 1999; Rutter et al., 2003).

Access to an autism diagnostic/identification team may allow school psychologists to provide diagnoses or identifications of children who have autism more

effectively and at an earlier age. Although it may not be practical to train all school psychologists to be part of such teams, previous research has found the development and trainings of such teams to be successful by directly teaching over an intensive multi-day format (McClure et al., 2010), utilizing video training, and incorporating a similar autism assessment model put forth by Bradley-Johnson and colleagues (2008).

Implications of Diagnosis/Identification

Ultimately, intense training has shown success in resulting in accurate diagnosis of autism (Mcclure et al, 2010). Importantly, without a diagnosis or identification, children affected by autism are unlikely to receive any intervention (Brock et al., 2006). Children who receive targeted, early intervention specific to their autism deficits are more likely to be successful in the long-term; including academic achievement and independent living (Koegal et al., 2001). Therefore, early and accurate diagnosis by a well-trained school psychologist may have a positive long-term impact for children and their families (Brock et al., 2006; Chawarska, 2008).

Many parents respond negatively and emotionally when receiving a diagnosis of autism (Nissenbaum, Tollefson, & Reese, 2002). Negative responses include denial, getting upset, misperceiving the diagnosis, and ignoring the professionals by becoming distracted. Some parents get angry and frustrated with the team of professionals or with most people around them (Nissenbaum et al., 2002). Much of the negative response to the diagnosis is justified given the challenges of raising a child with autism. However, some of the negative response to a diagnosis of autism may be associated with the expected and/or feared social challenges. Many parents report feeling stigmatized by their child's disorder via judgment and isolation (Gray, 1993). The stigma placed upon

the child and the family of a child with autism can come from many places including oneself, family, friends, school personnel, and complete strangers. This stigma may present social challenges to parents regarding their individualism, home and family life, community settings, and school settings (Gray, 1993). Therefore, before putting a child and family into such a position of difficulty, one should be certain that the supplied diagnosis is accurate.

Limitations

As previously discussed, those who chose to complete the survey may represent individuals who were particularly interested or experienced in the area of autism and again, generalizability of the findings to all school psychologists is questionable. Given the high percentage of individuals with ADOS training and who were members on autism teams, it seems likely that this was the case.

The present study also collected data via an online survey website. Therefore, it cannot be known if participants solicited outside help when completing the autism knowledge test. Participants also self-reported regarding their levels of training, certification status, perceived skills and experience, likelihood to consult, and need for training. As with most measures of self-report, there is no way to know if the information they provided is correct or their perceptions were accurate.

Participants who reported that they would prefer to work within a team were not administered the likelihood to consult items. This is a potential weakness of the study, as working with a team was not defined clearly. This item may have been interpreted as working with an autism expert/diagnostic team or a general multidisciplinary team.

Because of the nature of the study, there is also no way to suggest causality. Therefore, the current study was limited to examine relationships. The results cannot be used to make determinations regarding causes of outcomes. Lastly, the autism knowledge instrument was found to have poor reliability and internal consistency, and therefore is a significant limitation within the study.

Suggestions for Further Research

The current findings suggest that some school psychologist report needing additional training in terms of autism diagnosis or identification. Therefore, it may be useful to provide supplementary trainings including the opportunity to interact with real children with autism. Because experience with actual cases was reported in conjunction with higher levels of skills and experience, it may be useful to provide experiences to school psychologists who have little contact with children with autism. It would be useful to distinguish if real-life experiences; including an inexperienced school psychologist on the autism diagnostic team with experienced members, could be useful to the inexperienced school psychologist in building skills, knowledge, and providing a guided opportunity to diagnose or identify autism. Subsequently, it may be practical to then ascertain what types of experiences will provide students and employees with the most useful and cost-effective experiences as well.

Notably, there continues to be a gap in the literature regarding the cause of difficulty of diagnosis. Future research would add usefulness to the field by identifying the most difficult diagnostic criteria to learn and assess. As it seems that the issues regarding diagnostic difficulty to not solely lie within the realm of knowledge.

It would also be helpful to have a better understanding of the different instruments that clinicians are using in making their diagnosis, especially as related to the *ADOS* and ADI-R. If these are the "gold standard" it would be interesting to know the degree to which they are being used and whether the individuals who are using them are appropriately trained.

Future research would be helpful in focusing on autism diagnostic/identification teams regarding the types of training and practices that are associated with efficient and accurate diagnosis. Additionally, future research would be helpful regarding autism diagnosis or identification in regards to school psychologists and the school system environment.

Because many professionals consider autism a very debilitating diagnosis it is essential that professionals are confident in providing families with an accurate diagnosis of autism and sensitive delivery of such a conclusion (Nissenbaum et al., 2002). In medical and clinical settings, it is typical for parents to be provided with a great deal of information along with the diagnosis. Many diagnostic meetings or conversations include delivering the diagnosis and providing the parents information about the disorder, their child, treatments and therapies, prognosis, follow-up evaluations, family/home implications, and school implications (Nissenbaum et al., 2002). However, not all children and families have easy access to such services. Although it is unclear if school psychologists working within school systems create a similar supportive environment, with professional development training they should certainly be able to do so (Nissenbaum et al., 2002). Specifically, school psychologists who are carefully trained to

provide a sensitive delivery of diagnosis or identification may be able to provide clear information about autism and nurturing and safe environment for the family.

Intervention planning often immediately follows the delivery of a diagnosis of autism. Efficiently planned interventions targeting all areas of autism characteristics and development have shown to be ideal when implemented as early as possible. However, some intervention plans may be inefficient if social and play goals are not addressed (Koegel et al., 2001.) Research has found that children identified as having autism in the public schools tend to have individualized education plans that did not address developing functional play or social skills (Koegel et al., 2001). Although intervention recommendations provided by private sources include social and play goals, it is difficult to determine if these recommendations are appropriately applied given the nature of the setting. However, the school setting is quite different and it is essential that school psychologists address the social and play deficits of diagnosed children. The school environment provides a unique opportunity for professionals to monitor intervention and track progress, as other private environments (i.e. clinics, hospitals, etc.) may not provide because attendance is not legally mandated or as frequent as attending school. Therefore, school psychologists may have a unique opportunity to influence treatment plans, implementation, and progress monitoring. Future research addressing appropriate intervention development, implementation, and progress monitoring may allow for better prognosis for children.

School psychologists are an integral part of diagnosing or identifying autism and making recommendations for effective classroom environment, teaching strategies, and additional services important to children with autism and their families. With the

provision of targeted education and professional development, school psychologists may be better equipped to diagnosis or identify autism more efficiently, in turn resulting in earlier recommendations for the child, earlier provision of intervention, and potentially more favorable outcomes in terms of meeting goals.

Conclusion

School psychologists are an integral part of diagnosing or identifying autism and making recommendations for effective classroom environment, teaching strategies, and additional services important to children with autism and their families. School psychologists who work on autism teams seem best prepared to provide autism diagnoses/identifications. With the provision of targeted education and professional development, school psychologists may be better equipped to provide diagnosis or identify autism more efficiently, and in turn implement earlier intervention for children and their families. With early accurate diagnosis and targeted intervention, it is likely that individuals with autism will experience more favorable outcomes in meeting life-long goals. Providing diagnoses/identifications in an autism team format may be the first integral step toward progress for those with autism.

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Appendix A

Survey from Survey Monkey

School Psychologists and Autism

1. Informed Consent

1. Informed Consent for Participation in Research
University of Northern Colorado

Project Title: Diagnostic Capability of School Psychologists in the Identification of Autism

Researcher: Jennifer D. Ries, M.S.
School of Applied Psychology and Counselor Education (School Psychology)
Phone: 954-551-2851

Research Advisors: Katherine Koehler-Hak, Ph.D. & Robyn Hess, Ph.D.
School of Applied Psychology and Counselor Education (School Psychology)
Phone: (970) 351-1687 & (970) 351-1636

This survey is intended for School Psychologists ONLY.

I am researching knowledge, skills, experience, likelihood to consult, and need for training as it pertains to the identification and/or diagnosis of autism. The survey is completely anonymous and will take place on the SurveyMonkey website. No identifying information will be collected. After data collection, all data will be stored on a password protected computer in a locked office. No risks are anticipated regarding your participation in this study. This study is not designed to provide you with any training in the topics of school psychology, teaching, or autism spectrum disorders. Completion of this survey is not expected to take longer than 10 minutes.

After you submit the completed survey, an additional webpage will open allowing you to enter the drawing for one of four $25.00 Visa gift cards. Personal information entered for the drawing will not be traced to any completed survey. A random number generator will be utilized to select the winners. The winner will be selected in the spring of 2011 and contacted via email or phone (provided only if you enter into the drawing) to obtain the appropriate mailing address.

Please DO NOT USE ANY OUTSIDE SOURCES to answer any of the questions in the survey (internet, books, another person, etc.).

School Psychologists and Autism

ALL QUESTIONS IN THIS SURVEY PERTAIN TO AUTISM ONLY (not Asperger's or the Autism Spectrum in general).

Please feel free to contact me at (954) 551-2851 or jennries@yahoo.com if you have any questions or concerns about this research.

Thank you for assisting me with my research.

Sincerely,

Jennifer D. Ries, M.S.
School Psychology Ph.D. Candidate

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above, please check "Yes, I agree" and continue only if you would like to participate in this research. If you do not consent to the research study, please STOP and do not continue. You may print a copy of this form for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Sponsored Programs and Academic Research Center, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1907

Thank you.

- ○ Yes, I agree to participate in the study.
- ○ No, I do not agree to participate and will close this website immediately.

School Psychologists and Autism

2. Demographics

2. Please select the highest degree you have earned relevant to your position as a school psychologist:

- ○ Masters (M.A. or M.S.), Specialist (Ed.S., SSP), and/or Certificate for Advanced Study (CAGS). All non-doctoral degrees qualify for this selection.
- ○ Doctor of Psychology (Psy.D.), Doctor of Education (Ed.D.) and/or Doctor of Philosophy (Ph.D.). All doctoral degrees qualify for this selection.

3. Please list the number of years you have been working as a school psychologist. This number should include your internship year.

Years of Experience

4. Please indicate your primary work setting:

- ○ Public School
- ○ Private School
- ○ Private Practice
- ○ Hospital
- ○ Other (please specify)

5. Please indicate the primary population with which you work:

- ○ Early Childhood
- ○ Elementary School
- ○ Secondary School

6. Estimate the number of hours of Autism specified training you have received:

Estimate the number of hours of in-services or trainings (not including conferences) you have attended specific to autism spectrum disorders in the last 5 years.

Estimate the number of hours you have spent attending professional presentations within conventions or conferences specific to diagnosing or identifying autism in the last 5 years. (For example: APA, NASP, State, or other professional convention or conference presentations focused on the identification of autism spectrum disorders would qualify.)

Estimate the number of hours you have spent participating in a fellowship, externship, internship rotation, postdoc, or university level course specific to autism in the last 5 years. (For example: If you took a course which dedicated one 3-hour class period to diagnosing or the identification of autism then you would write "3". However if you completed an entire 3 credit semester length course [15 weeks x 3 hours per week] dedicated to diagnosing or the identification of autism then you would write "45".)

School Psychologists and Autism

7. Are you a certified reliable clinician administrator of the Autism Diagnostic Observation Schedule (ADOS):

- ○ Yes
- ○ No

8. Are you a certified research reliable administrator of the Autism Diagnostic Observation Schedule (ADOS):

- ○ Yes
- ○ No

9. Are you a certified reliable administrator of the Autism Diagnostic Interview-Revised (ADI-R):

- ○ Yes
- ○ No

10. Estimate the total number of children you diagnose or identify as having autism per year:

Number of children: _____

11. Do you consider yourself or identify yourself as a member of an autism assessment, identification, or diagnostic team?

- ○ Yes
- ○ No

School Psychologists and Autism

3. Time Spent Participating with Autism Team

12. How much time per week do you spend participating as a member of an autism assessment, identification, or diagnostic team?

- ○ 1-10 hours per week
- ○ 11-20 hours per week
- ○ 21-30 hours per week
- ○ 31-40 hours per week
- ○ More than 40 hours per week

School Psychologists and Autism

4. Knowledge of Childhood Autism among Healthcare Workers

Knowledge of Childhood Autism among Health Workers (KCAHW)
Adapted and modified from Bakare, Ebigbo, Agamoh, and Menkiti (2008).

Please answer the following questions without referencing any outside materials for assistance (such as diagnostic manuals, internet web-pages, or other professionals). All questions refer to autism and not Asperger's disorder or other differential diagnoses.

Answer Options:
A=Yes
B= No
C= Don't know

Does a child with autism exhibit the following:

13. Does a child with autism exhibit the following:

	Yes	No	Don't know
Marked impairment in use of multiple non-verbal behaviors such as eye contact, facial expression, body postures, and gestures during social interaction.	○	○	○
Failure to develop peer relationships appropriate for developmental age.	○	○	○
Lack of spontaneous will to share enjoyment, interest or activities with other people.	○	○	○
Lack of social or emotional reciprocity.	○	○	○
Staring into open space and not focusing on anything specific.	○	○	○
The child can appear deaf or cognitively impaired.	○	○	○
Loss of interest in the environment or surroundings.	○	○	○
Social smile is usually absent in a child with autism.	○	○	○
Delay or total lack of development of spoken language.	○	○	○
Stereotyped or repetitive movement (e.g. Hand or finger flapping or twisting).	○	○	○
May be associated with abnormal eating habits.	○	○	○
Persistent preoccupation with parts of objects.	○	○	○
Rigidity or extreme preference for regimented routine activities.	○	○	○
Autism is a form of Childhood Schizophrenia.	○	○	○
Autism is an auto-immune condition.	○	○	○
Autism is a neuro-developmental disorder.	○	○	○
Autism may be associated with mental retardation.	○	○	○
Autism may be associated with epilepsy.	○	○	○

School Psychologists and Autism

5. Skills and Experience

14. Please rate your skill and experience level to diagnose or identify characteristics in each of the following domains of autism spectrum disorder using the following Likert scale:

	1- Fully Unskilled / Inexperienced	2- Mostly Unskilled / Inexperienced	3- Somewhat Unskilled / Inexperienced	4- Somewhat Skilled / Experienced	5- Mostly Skilled / Experienced	6- Fully Skilled / Experienced
Social interaction	○	○	○	○	○	○
Communication	○	○	○	○	○	○
Repetitive or stereotyped behaviors	○	○	○	○	○	○
Delays in overall development	○	○	○	○	○	○
Differentiating among disorders on the spectrum (e.g. Severe Autism and High Functioning Autism, Asperger's disorder and high functioning autism, childhood disintegrative disorder, Rett's Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified)	○	○	○	○	○	○
Differential diagnoses (Such as: Fragile X Syndrome, Mental Retardation, Speech and Language Disorders, Selective Mutism, Stereotypic Movement Disorder, Schizophrenia, Attention-Deficit Hyperactive Disorder, etc.)	○	○	○	○	○	○

School Psychologists and Autism

6. Likelihood to consult

15. When you receive a referral which requires assessment of a student or child with symptomology suspected to be autism, are you most likely to: (select one choice)

- ○ Work on your own
- ○ Work with a team
- ○ Refer the case to someone else

16. Are you required to consult a specialist or autism team when presented with a potential autism case or referral question?

- ○ Yes
- ○ No

School Psychologists and Autism

7. Likelihood to consult (continued)

17. Please rate your likelihood to consult a supervisor or specialist (e.g., ask questions, conceptualize the case, clarify conflicting information) for assistance with diagnosis or identification of each of the following domains of autism spectrum disorder using the following Likert scale:

	1- Completely Unlikely	2- Mostly Unlikely	3- Somewhat Unlikely	4- Somewhat Likely	5- Mostly Likely	6- Completely Likely
Social interaction	○	○	○	○	○	○
Communication	○	○	○	○	○	○
Repetitive or stereotyped behaviors	○	○	○	○	○	○
Delays in overall development	○	○	○	○	○	○
Differentiating among disorders on the spectrum (e.g. Severe Autism and High Functioning Autism, Asperger's disorder and high functioning autism, childhood disintegrative disorder, Rett's Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified)	○	○	○	○	○	○
Differential diagnoses (Such as: Fragile X Syndrome, Mental Retardation, Speech and Language Disorders, Selective Mutism, Stereotypic Movement Disorder, Schizophrenia, Attention-Deficit Hyperactive Disorder, etc.)	○	○	○	○	○	○

School Psychologists and Autism

18. If you answered 4, 5, or 6 for any of the above questions referring to likelihood to consult, please indicate with whom you consult: (check all that apply)

- [ ] supervisor
- [ ] autism specialist
- [ ] autism diagnostic team
- [ ] another school psychologist
- [ ] clinical psychologist
- [ ] speech-language pathologist
- [ ] occupational therapist
- [ ] physical therapist
- [ ] physician
- [ ] Other (please specify who)

School Psychologists and Autism

8. Need for Training

19. Please rate your need for training in terms of diagnosis or identification in each of the following domains of autism spectrum disorder using the following Likert scale:

	Fully Not Needed	Moderately Not Needed	Somewhat Not Needed	Somewhat Needed	Moderately Needed	Fully Needed
Social interaction	○	○	○	○	○	○
Communication	○	○	○	○	○	○
Repetitive or stereotyped behaviors	○	○	○	○	○	○
Delays in overall development	○	○	○	○	○	○
Differentiating among disorders on the spectrum (e.g. Severe Autism and High Functioning Autism, Asperger's disorder and high functioning autism, childhood disintegrative disorder, Rett's Disorder, and Pervasive Developmental Disorder- Not Otherwise Specified)	○	○	○	○	○	○
Differential diagnoses (Such as: Fragile X Syndrome, Mental Retardation, Speech and Language Disorders, Selective Mutism, Stereotypic Movement Disorder, Schizophrenia, Attention-Deficit Hyperactive Disorder, etc.)	○	○	○	○	○	○

School Psychologists and Autism

9. Good Bye.

Thank you.

Please click "Done" below.

Appendix B

Knowledge of Childhood Autism among Health Workers (KCAHW) Answer Key

Adapted from Bakare, Ebigbo, Agamoh, and Menkiti (2008).

Please answer the following questions without referencing any outside materials for assistance (such as diagnostic manuals, internet web-pages, or other professionals).

Answer Options:
A=Yes
B= No
C= Don't know

Does a child with autism exhibit the following:

1. Marked impairment in use of multiple non-verbal behaviors such as eye contact, facial expression, body postures, and gestures during social interaction. _A__
2. Failure to develop peer relationships appropriate for developmental age. _A__
3. Lack of spontaneous will to share enjoyment, interest or activities with other people. _A__
4. Lack of social or emotional reciprocity. _A__
5. Staring into open space and not focusing on anything specific. _B__
6. The child can appear deaf or cognitively impaired. _A__
7. Loss of interest in the environment or surroundings. _B__
8. Social smile is usually absent in a child with autism. _A__
9. Delay or total lack of development of spoken language. _A__
10. Stereotyped or repetitive movement (e.g. Hand or finger flapping or twisting). _A__
11. May be associated with abnormal eating habits. _A__
12. Persistent preoccupation with parts of objects. _A__
13. Rigidity or extreme preference for regimented routine activities. _A__
14. Autism is a form of Childhood Schizophrenia. _B__
15. Autism is an auto-immune condition. _B__
16. Autism is a neuro-developmental disorder. _A__
17. Autism may be associated with mental retardation. _A__
18. Autism may be associated with epilepsy. _A__

Appendix C

Pilot Survey

Informed Consent for Participation in Research
University of Northern Colorado

Project Title: Diagnostic Capability of School Psychologists in the Identification of Autism-Pilot Study

Researcher: Jennifer D. Ries, M.S.
School of Applied Psychology and Counselor Education (School Psychology)
Phone: 954-551-2851

Research Advisors: Katherine Koehler-Hak, Ph.D. & Robyn Hess, Ph.D.
School of Applied Psychology and Counselor Education (School Psychology)
Phone: (970) 351-1687 & (970) 351-1636

I am researching knowledge, skills, experience, likelihood to consult, and need for training as it pertains to the identification and/or diagnosis of autism. The survey is completely anonymous. No identifying information will be collected. After data collection, all data will be stored on a password protected computer in a locked office. No risks are anticipated regarding your participation in this study. This study is not designed to provide you with any training in the topics of school psychology, teaching, or autism spectrum disorders. Completion of this survey is not expected to take longer than 15 minutes.

Please feel free to contact me at (954) 551-2851 or jennries@yahoo.com if you have any questions or concerns about this research.

Thank you for assisting me with my research.

Sincerely,

Jennifer D. Ries, M.S.
School Psychology Ph.D. Candidate

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above, please continue only if you would like to participate in this research. If you do not consent to the research study, please STOP and do not continue. You may retain a copy of this form for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Sponsored Programs and Academic Research Center, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1907

Directions: Please rate your <u>skill and experience level</u> to diagnose or identify characteristics in each of the following domains of autism spectrum disorder using the following Likert scale:

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6

Fully Unskilled	Mostly Unskilled	Somewhat Unskilled	Somewhat Skilled	Mostly Skilled	Fully Skilled

_____ 1. Social interaction

_____ 2. Communication

_____ 3. Repetitive or stereotyped behaviors

_____ 4. Delays in overall development

_____ 5. Differentiating among disorders on the spectrum (e.g. Severe Autism and High Functioning Autism, Asperger's disorder and high functioning autism, childhood disintegrative disorder, Rett's Disorder, and Pervasive Developmental Disorder- Not Otherwise Specified)

_____ 6. Differential diagnoses

(Such as: Fragile X Syndrome, Mental Retardation, Speech and Language Disorders, Selective Mutism, Stereotypic Movement Disorder, Schizophrenia, Attention-Deficit Hyperactive Disorder, etc.)

Are you <u>required</u> to consult a specialist or autism team when presented with a potential autism case or referral question? (If yes, skip to "need for training" questions.)

Circle: **1. Yes**
2. No
3. Not Applicable

Directions: Please rate your <u>likelihood to consult a supervisor or specialist</u> for assistance with diagnosis or identification of each of the following domains of autism spectrum disorder using the following Likert scale:

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6

Completely Unlikely	Mostly Unlikely	Somewhat Unlikely	Somewhat Likely	Mostly Completely Likely

_____ 1. Social interaction

_____ 2. Communication

_____ 3. Repetitive or stereotyped behaviors

_____ 4. Delays in overall development

_____ 5. Differentiating among disorders on the spectrum (e.g. Severe Autism and High Functioning Autism, Asperger's disorder and high functioning autism, childhood disintegrative disorder, Rett's Disorder, and Pervasive Developmental Disorder- Not Otherwise Specified)

_____ 6. Differential diagnoses

(Such as: Fragile X Syndrome, Mental Retardation, Speech and Language Disorders, Selective Mutism, Stereotypic Movement Disorder, Schizophrenia, Attention-Deficit Hyperactive Disorder, etc.)

Directions: Please rate your <u>need for training</u> in terms of diagnosis or identification each of the following domains of autism spectrum disorder using the following Likert scale:

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6

Fully Needed	Moderately Needed	Somewhat Needed	Somewhat Not Needed	Moderately Fully Not Needed

_____ 1. Social interaction

_____ 2. Communication

_____ 3. Repetitive or stereotyped behaviors

_____ 4. Delays in overall development

_____ 5. Differentiating among disorders on the spectrum (e.g. Severe Autism and High Functioning Autism, Asperger's disorder and high functioning autism, childhood disintegrative disorder, Rett's Disorder, and Pervasive Developmental Disorder- Not Otherwise Specified)

_____ 6. Differential diagnoses

(Such as: Fragile X Syndrome, Mental Retardation, Speech and Language Disorders, Selective Mutism, Stereotypic Movement Disorder, Schizophrenia, Attention-Deficit Hyperactive Disorder, etc.)

Autism Survey©

Directions: Please answer the following questions on this survey as best you can. Do not spend too much time on any one question. For each of the following statements, write in the number that best reflects how much you AGREE with each statement.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6

Fully Agree	Mostly Agree	Somewhat Agree	Somewhat Disagree	Mostly Disagree	Fully Disagree

_____ 1. Autism is an emotional disorder.

_____ 2. Early intervention can lead to significant gains in children's social and communication skills.

_____ 3. All children with autism display poor eye contact.

_____ 4. Children with autism typically perform better when tasks are presented visually than when tasks are presented verbally.

_____ 5. Problems with social relatedness that are present in autism are different from social problems seen in other psychiatric conditions.

_____ 6. Autism is more frequently diagnosed in males than females.

_____ 7. Children with autism do not show attachments, even to parents/caregivers.

_____ 8. Research indicates that sensory integration therapy is an effective treatment for autism and its symptoms.

_____ 9. Children with autism are deliberately uncooperative.

_____ 10. Most parents/caregivers of children with autism report their first concerns were related to the child's social behavior.

_____ 11. Autism tends to run in families.

_____ 12. We now have treatments that can cure autism.

_____ 13. Children with autism can grow up to live independently.

_____ 14. There is one approach/program that works for all children with autism.

_____ 15. It is important that all children diagnosed with autism receive some form of special education services at school.

_____ 16. Autism occurs more commonly among high socioeconomic and educational levels.

_____ 17. Autism can be diagnosed as early as 18 months.

_____ 18. With the proper treatment, most children diagnosed with autism eventually outgrow the disorder.

_____ 19. Children with autism do not show affection.

_____ 20. The need for routines and sameness is one of the earliest behavioral features of autism.

Knowledge of Childhood Autism among Health Workers (KCAHW)

Adapted and modified from Bakare, Ebigbo, Agamoh, and Menkiti (2008).

Please answer the following questions without referencing any outside materials for assistance (such as diagnostic manuals, internet web-pages, or other professionals).

Answer Options:
A=Yes
B= No
C= Don't know

Does a child with autism exhibit the following:

1. Marked impairment in use of multiple non-verbal behaviors such as eye contact, facial expression, body postures, and gestures during social interaction. _____
2. Failure to develop peer relationships appropriate for developmental age. _____
3. Lack of spontaneous will to share enjoyment, interest or activities with other people. _____
4. Lack of social or emotional reciprocity. _____
5. Staring into open space and not focusing on anything specific. _____
6. The child can appear deaf or cognitively impaired. _____
7. Loss of interest in the environment or surroundings. _____
8. Social smile is usually absent in a child with autism. _____
9. Delay or total lack of development of spoken language. _____
10. Stereotyped or repetitive movement (e.g. Hand or finger flapping or twisting). _____
11. May be associated with abnormal eating habits. _____
12. Persistent preoccupation with parts of objects. _____
13. Rigidity or extreme preference for regimented routine activities. _____
14. Autism is a form of Childhood Schizophrenia. _____
15. Autism is an auto-immune condition. _____
16. Autism is a neuro-developmental disorder. _____
17. Autism may be associated with mental retardation. _____
18. Autism may be associated with epilepsy. _____

Appendix D

Permission to use the *KCAHW* (2008)

From: Jennifer D. Ries, jennries@yahoo.com
To: mobakare2000@yahoo.com, peterebigo@yahoo.com, ahamagomoh@usa.net, lovelynkem@yahoo.com
Subject: Use of the KCAHW
Date: Tuesday, March 31, 2009

Dear Muideen Bakare, Peter Ebigo, Ahamefule Agomoh, and Nkem Menkiti:

I am a school psychology doctoral student with a specialty in autism at the University of Northern Colorado. My dissertation focus is identifying the training needs of school psychologists in the identification of autism spectrum disorders. During my literature review, I came across your work and the development of the KCAHW. The instrument focus looks extremely useful. I would like to use this instrument to assess the knowledge of school psychologists about childhood autism. Would you grant me permission to use this instrument in my dissertation?

I look forward to your reply.

Thank you,

Jennifer D. Ries, M.S.

From: Bakare Muideen, mobakare2000@yahoo.com
To: Jennifer D. Ries, jennries@yahoo.com
Cc: peterebigo@yahoo.com, ahamagomoh@usa.net, lovelynkem@yahoo.com
Subject: Re: Use of the KCAHW
Date: Tuesday, March 31, 2009

Dear Jennifer,

Thank you for your mail.

We have no objection to your using the instrument (KCAHW Questionnaire) as long as the reference is properly cited. So, feel free to use the instrument.

If you think there is any other way we could be of help, please do not hesitate to contact us.

Sincerely,

Dr. Muideen O. Bakare
(Corresponding Author)

Appendix E

Correlation Tables for Research Questions 1, 2, & 3

Table 17

Correlation Table from Research Question 1

	KScore	ND	YE	HOT	TH	DL	ADOSCR	ADOSRR	ADIRRR
KScore	1.000	.168	-.033	.203	.064	.090	-.228	-.124	-.104
ND	.168	1.000	.035	.349	.224	.126	-.151	-.176	-.158
YE	-.033	.035	1.000	-.040	-.030	-.144	-.004	.094	-.002
HOT	.203	.349	-.040	1.000	.234	.156	-.195	-.290	-.171
TH	.064	.224	-.030	.234	1.000	-.006	-.144	-.265	-.183
DL	.090	.126	-.144	.156	-.006	1.000	-.051	-.091	.093
ADOS CR	-.228	-.151	-.004	-.195	-.144	-.051	1.000	.330	.339
ADOS RR	-.124	-.176	.094	-.290	-.265	-.091	.330	1.000	.348
ADIR RR	-.104	-.158	-.002	-.171	-.183	.093	.339	.348	1.000

Note. KScore = KCAHW Total Score; ND = Number of Diagnoses per Year; YE = Years of Experience; HOT = Hours on Autism Team per week; TH = Total Autism Training Hours in the last 5 years; DL = Degree Level; ADOS CR = ADOC Clinician Reliable Status; ADOS RR= ADOS Research Reliable Status; ADIR RR= ADIR Research Reliable Status.

Table 18

Correlation Table from Research Question 2

	SEScore	ND	YE	HOT	TH	DL	ADOSCR	ADOSRR	ADIRRR
SEScore	1.000	.276	.174	.223	.208	-.010	-.143	-.083	-.119
ND	.276	1.000	.035	.349	.224	.126	-.151	-.176	-.158
YE	.174	.035	1.000	-.040	-.030	-.144	-.004	.094	-.002
HOT	.223	.349	-.040	1.000	.234	.156	-.195	-.290	-.171
TH	.208	.224	-.030	.234	1.000	-.006	-.144	-.265	-.183
DL	-.010	.126	-.144	.156	-.006	1.000	-.051	-.091	.093
ADOSCR	-.143	-.151	-.004	-.195	-.144	-.051	1.000	.330	.339
ADOSRR	-.083	-.176	.094	-.290	-.265	-.091	.330	1.000	.348
ADIRRR	-.119	-.158	-.002	-.171	-.183	.093	.339	.348	1.000

Note. SEScore = Skills and Experience Total Score; ND = Number of Diagnoses per Year; YE = Years of Experience; HOT = Hours on Autism Team per week; TH = Total Autism Training Hours in the last 5 years; DL = Degree Level; ADOS CR = ADOC Clinician Reliable Status; ADOS RR= ADOS Research Reliable Status; ADIR RR= ADIR Research Reliable Status.

Table 19

Correlation Table from Research Question 3

	NTScore	ND	YE	HOT	TH	DL	ADOSCR	ADOSRR	ADIRRR
NTScore	1.000	-.230	-.188	-.224	-.205	.003	.204	.154	.148
ND	-.230	1.000	.035	.349	.224	.126	-.151	-.176	-.158
YE	-.188	.035	1.000	-.040	-.030	-.144	-.004	.094	-.002
HOT	-.224	.349	-.040	1.000	.234	.156	-.195	-.290	-.171
TH	-.205	.224	-.030	.234	1.000	-.006	-.144	-.265	-.183
DL	.003	.126	-.144	.156	-.006	1.000	-.051	-.091	.093
ADOSCR	.204	-.151	-.004	-.195	-.144	-.051	1.000	.330	.339
ADOSRR	.154	-.176	.094	-.290	-.265	-.091	.330	1.000	.348
ADIRRR	.148	-.158	-.002	-.171	-.183	.093	.339	.348	1.000

Note. NTScore = Need for Training Total Score; ND = Number of Diagnoses per Year; YE = Years of Experience; HOT = Hours on Autism Team per week; TH = Total Autism Training Hours in the last 5 years; DL = Degree Level; ADOS CR = ADOC Clinician Reliable Status; ADOS RR= ADOS Research Reliable Status; ADIR RR= ADIR Research Reliable.

Appendix F

Pattern Matrix of the KCAHW Post Hoc Analysis

Table 20

Pattern Matrix of the KCAHW Post Hoc Analysis

KCAHW Item	Factor 1	Factor 2
1		
2	.120	
3	.455	.138
4	.429	
5	.655	
6	.496	.200
7	.719	
8	.461	.125
9	.482	
10	.313	
11	.221	.216
12	.412	-.224
13	.404	.229
14	-158	.823
15		.800
16	.210	.213
17		.324
18	.173	

Extraction Method: Principle Component Analysis.
Rotation Method: Proxmax with Kaiser Rotation.
Rotation converged in 3 iterations.

Appendix G

Article to be Submitted for Publication

ABSTRACT

Ries, Jennifer Dawn. *Diagnostic Capability of School Psychologists in the Identification of Autism.* Doctor of Philosophy dissertation, University of northern Colorado, 2011.

This study investigated the relationships between school psychologist characteristics and perceived capability to identify autism. A review of literature has suggested autism is not being diagnosed as early as recommended (Wiggins, Baio, & Rice, 2006), resulting in later intervention and less favorable prognoses. In fact, many children are not evaluated before attending school and school psychologists are often the first professionals to evaluate and provide an autism diagnosis or identification (Wiggins et al., 2006).

Participants included 246 school psychologists who reported their degree level, years of experience, work setting, primary population they serve, amount of autism specific training received, clinician or research reliable certification on the *ADOS* (Lord, Rutter, DiLavore, & Risi, 1999), research reliability on the *ADI-R* (Rutter, Le Couteur, & Lord, 2003), number of autism diagnoses made per year, and amount of time spent on an autism diagnostic team. School psychologist characteristics were compared with autism knowledge, perceptions of autism diagnostic skills and experience, likelihood to consult with others, and need for training. Results revealed that *ADOS* clinician reliability was a significant predictor of autism knowledge. Number of diagnoses made per year, years of experience, and specific autism training were significant predictors of perceived skills and experience. Additionally, higher years of experience significantly predicted lower perceived need for training. Autism knowledge was found to be positively correlated with perceived skills and experience and negatively correlated with perceived need for

training. Members of autism diagnostic teams were found to demonstrate higher autism knowledge scores. Lastly, 86.6% of participants reported themselves to be skilled versus unskilled and only slightly more than half reported that they needed additional training in the area of autism diagnosis.

Implications in terms of school psychologist professional development training and service delivery are discussed. Specifically, those individuals who reported higher levels of knowledge and skills also served on autism teams suggesting that these specialized teams may be an important model for school-based services to students who are suspected of autism spectrum disorders. Lastly, limitations to the current study and implications for future research are discussed.

Diagnostic Capability of School Psychologists in the Identification of Autism

U.S. National Samples have shown that the prevalence of Autism Spectrum Disorders is on the rise (Liptak, Stuart, & Auinger, 2006). Despite the number of diagnoses made, there has been some concern surrounding the accuracy, timing, and efficiency of autism diagnosis. Although, autism specialists tend to agree on the defining characteristics of autism (Kabot, Masi, & Segal, 2003), research has shown inconsistencies in actual diagnoses made, implying a possible misunderstanding of diagnosis (Kabot et al., 2003) and the identification of autism symptomology. Inconsistencies in diagnoses may also be a result of insufficient, ineffective assessment tools and lack of training to utilize existing tools appropriately.

Autism Diagnosis

Current research findings suggest autism is not being diagnosed as early as recommended (Wiggins, Baio, & Rice, 2006). This delay results in later intervention and can result in a less favorable prognosis. Research by the Metropolitan Atlanta Developmental Disabilities Surveillance Program through the Center for Disease Control examined 114 autism cases regarding initial evaluations and delivery of autism diagnoses (Wiggins et al., 2006). Cases were collected from both non-school sources and school sources and involved diagnoses from qualified professionals including school, clinical, and child-focused psychologists. The focus of the study was placed on the autism cases and not the professionals involved. The age between first evaluation and delivery of autism diagnosis revealed a gap of more than one year (Wiggins et al., 2006). Although, the average first evaluations took place at 48 months, autism diagnoses were not typically

provided until 61 months (Wiggins et al., 2006). This finding suggested that 13 months were spent without intervention due to misdiagnoses or lengthy assessment and evaluation procedures. Delay in diagnosis may also indicate less obvious symptomology which can be difficult to assess and thus more difficult to diagnose (Wiggins et al., 2006). However, the "gold standard" autism diagnostic tools (Filipek et al., 1999, p. 460), the *ADI-R* (Rutter, Le Couteur, & Lord, 2003) and the *ADOS* (Lord, Rutter, DiLavore, & Risi, 1999) were used in 0% and 7%, respectively, with the autism cases diagnosed in the study (Wiggins et al., 2006). With appropriate training and education in assessment and diagnosis, psychologists who diagnose and identify autism are more likely to provide earlier identification, and thus allow for early intervention, in early childhood, preschool, school, private, and hospital settings (Wiggins et al., 2006).

Approximately 24% of children do not receive a diagnosis or identification of autism until entering school (Wiggins et al., 2006). There are many potential reasons for this including lack of access to medical care or less severe symptomology which does not provoke parent concern. Therefore, despite recommendations that children with autism spectrum disorders be provided with intense and frequent intervention at the first sign of developmental delay; many children are not even afforded an evaluation before attending school (Wiggins et al., 2006). Thus, it is very likely that school psychologists will continue to provide autism evaluations and identifications; which will essentially allow for proper school intervention to take place and for parents to seek appropriate external services to target their child's autism characteristics. Correct diagnosis is crucial in the selection and implementation of targeted intervention.

School Psychologists

The title "school psychologist" may represent a broad range of professionals with masters, specialists, or doctoral degrees and variations in experiences, type of training, and fieldwork requirements (Merrell, Ervin, & Gimpel, 2006). Many school psychologists seek out specialized training in areas which appeal to them through professional development options at conferences or in-service trainings. Additionally, school psychologists may have developed a subspecialty area which represent a topic or area which they have extensive training and experiences.

For example, an individual with expertise in autism may have served on autism diagnostic or identification teams and be trained in autism assessment. Such school psychologists may be certified to administer "gold standard" autism assessment tools (Filipek et al., 1999, p. 460) such as the *Autism Diagnostic Observation Schedule* (ADOS; Lord, et al., 1999) or the *Autism Diagnostic Interview-Revised* (ADI-R; Rutter, et al., 2003). Those who are not certified to administer such assessments may choose alternative assessments that are not considered preferable within the field. Therefore, just as there is variability in the symptomology of autism, there is variability in the type and quality of assessment instruments, as well as the skill level of the diagnostician.

In recent years, 95% of school psychologists have reported an increase in referrals requesting autism assessment (Kohrt, 2004). Therefore, it is imperative that school psychologists are equipped to competently assess and identify autism in all children, especially those of early childhood age.

The purpose of the present study was to quantitatively evaluate the different characteristics among school psychologists that may explain variations in diagnostic

capability in the identification of autism. School psychologists represent an array of training, degree, experience, and ability levels. The determination of appropriate training, degree and experience levels, and capability in the identification of autism characteristics may afford the field of school psychology greater likelihood of efficient and appropriate training.

Method

Participants

The target population of the study was school psychologists with varying degrees, experiences, and specialized training. All 50 United States school psychology state associations were contacted, with the exception of South Dakota, and given the opportunity to invite their members to participate in the study. The researcher was unable to find a state association website or affiliated contact information for the South Dakota school psychology association. The state associations were asked to send their members a link to the survey or post a link to the survey on their respective websites. A total of 9 state associations participated in sending an email to all of their members informing them about the opportunity to volunteer to participate in the research study and included an internet link to the research survey or by posting a link to the research study on their respective websites. Those states that posted the link on their association website did so for approximately 30 days, included a brief description inviting members to volunteer to participate in the study, and posted the internet link to the research survey on their website.

The state associations who participated and their respective membership totals included: California- 3000 members, Idaho- 188 members, Kentucky- 238 members,

Nebraska- 135 members, Nevada- 117 members, New York- 1000 members, North Carolina- 400 members, Utah- 140 members, and Washington- 450 members. Therefore, approximately 5668 people received an email about the study, or could view the study on their state association website. Therefore, all members of the associations who were currently practicing school psychologists had the opportunity to participate in the study. Additionally, a volunteer sample was utilized by distributing the study Internet link to school psychologists who volunteered their participation to the researcher; consisting of approximately 15 participants who were also members of their respective state organizations. Overall, the study sample was intended to be representative of school psychologists who belong to their school psychology state associations in the U.S.

Although school psychologists are not required to belong to either state or national school psychology associations, it is estimated that 70% do belong to such organizations. Unfortunately, this percentage is likely to vary from one region to another. All practicing school psychologists, including school psychology interns met the inclusion criteria to participate in the study. Those who were not currently practicing school psychologists (e.g., students, retired) did not meet the participation criteria and were asked to refrain from participating.

A power analysis using 8 predictors implied that an N of 109 was necessary to detect a medium effect size (Green, 1991). The current study resulted in 246 participants, and therefore, had a large enough sample to complete the three primary research questions utilizing multiple linear regression analysis.

Powers, Hagans, and Busse (2008) found a response rate of approximately 8% after emailing a link to their internet-based survey to the California Association of School

Psychologists members; approximately 250 responses out of 3000. Similarly, Cochrane and Laux (2007) reported a response rate of 13% when emailing a link to their internet-based survey to school psychologists in Ohio. Averaging these two response rates would yield a response rate for the current study of 10.5%. The current study estimated that approximately 5668 target sample participants were solicited for participation by email from their respective state association or by viewing the invitation to participate on their respective state association's website. Therefore, the response rate found was 4.3%. It should be noted that this is an approximate response rate and is not likely to be accurate because an additional volunteer sample was utilized. Additionally, some target participants received direct contact via email and others could only view the invitation to participate by viewing their respective state association website.

Instruments

The independent variables were measured with a self-report survey in which participants were asked to report their highest degree level relevant to school psychology, years of experience as a school psychologist, primary practice setting and population, number of hours of autism specific training, whether or not they defined themselves as an autism team member, amount of time spent working with the autism team, and whether or not they are "research reliable" or "clinician reliable" regarding administration of the *ADOS* or *ADI-R* (Appendix A).

School psychologist degree level. School psychologists were asked to report their degree level. There were two choice options. The non-doctoral level encompasses Masters (M.A. and M.S.), Specialist (Ed.S. and SSP), Certificate for Advanced Study (CAGS), and any other relevant non-doctoral degrees. Doctoral level encompasses

Doctor of Philosophy (Ph.D.), Doctor of Psychology (Psy.D.), Doctor of Education (Ed.D.), and any other relevant doctoral degrees. The actual sample consisted of 204 non-doctoral level school psychologists who comprised 82.9% of the sample and 42 doctoral level school psychologists who comprised 17.1% of the sample. This is reasonably close to the distribution among the national sample as it was recently estimated that non-doctoral degrees, including masters and specialist degrees, to comprise 75% of currently working school psychologists (Curtis et al., 2002).

Experience. School psychologists were asked to report their years of experience working as a school psychologist; the number of years they have been working as a school psychologist. Participants were asked to include their internship training year as one year of experience. The current sample reported a mean of 10.62 years of experience indicating that participants tended to have fewer years of experience than the national average of 14 years (Curtis et. al., 2008).

Main practice setting. School psychologists were asked to report the setting in which they spend most of their time (e.g. early childhood, elementary, or secondary settings). School psychologists were also asked to report whether they work in public schools, private schools, private practice, hospitals, etc.

Autism training. School psychologists were asked to estimate the number of hours of training they have received in the last five years specific to identifying or diagnosing autism spectrum disorders. This included district level in-services, professional presentations at association conferences, graduate level classes, fellowships, externships, or internship rotations.

Number of children diagnosed or identified as having autism per year. School psychologists were asked to report the number of children or adolescents that they diagnose or identify as having autism per year. Although some school psychologists cannot diagnose autism within the education setting by law, they are able to "identify" autism for the purpose of educational placement. Throughout the survey instrument, "diagnose" and "identify" were used together in order to allow these participants to contribute without confusion.

Autism team member and time spent as a member of an autism team. School psychologists were asked to indicate if they consider themselves or identify themselves as a member of an autism assessment, identification, or diagnostic team. If participants indicated that they did participate on an autism team, they were asked to indicate how much time per week they spent participating as a member of the autism assessment, identification, or diagnostic team. Response choices included: 1-10 hours, 11-20 hours, 21-30 hours, 31-40 hours, or more than 40 hours per week.

Certification on *ADOS.* School psychologists were asked to report if they had obtained clinician reliability certification or research reliability certification on the *ADOS* (Lord et al., 1999). As noted, these reflect two different types of training and levels of proficiency. Individuals who have achieved research reliability, were intended to only endorse this level if it applied as it assumes proficiency at the clinical level only. However, participants were able to select both clinical and research reliability in the instrument and 12 participants did endorse both levels of reliability on the *ADOS.*

Certification on *ADI-R*. School psychologists were asked to report if they had obtained "reliability" certification on the *ADI-R* (Rutter et al., 2003). There is only one level of reliability available on this instrument.

Dependent Variables

Knowledge about Childhood Autism among Health Workers

Autism knowledge was measured using the *Knowledge about Childhood Autism among Health Workers* (*KCAHW*) questionnaire (Bakare, Ebigbo, Agamoh, & Menkiti, 2008). Permission for use of this instrument was granted by the authors via email in March of 2009 (Appendix D). The *KCAHW* (Appendix B) developed by Bakare and colleagues (2008) is a 19-item instrument that measures knowledge of the symptoms of autism in health care workers. Each correctly answered item may earn 1 point, for a total of 19 points, with higher scores reflecting a greater degree of knowledge. Item responses are multiple choice and include: A-Yes, B-No, and C-Don't know. Bakare and colleagues (2008) reported that the *KCAHW* demonstrated good internal consistency and reliability ($N = 50$, Crohnbach's Alpha = .97).

The instrument was originally developed for use with health care workers in a neuro-psychiatric hospital in Nigeria. Participants for the original reliability and validity testing included psychiatric nurses who had been employed for a minimum of 5 years working in general psychiatry nursing. All participants had obtained diplomas in general nursing and psychiatric nursing. In Nigeria, these health care workers were the most likely to handle cases of autism and autism spectrum disorders (Bakare et al., 2008). In the U.S., school psychologists are one of the professionals who fulfill this role and thus,

this instrument may be appropriate for use with this population. However, no research was available regarding use of the *KCAHW* with either school psychologists or an American sample.

The original *KCAHW* (Bakare et al., 2008) questionnaire contains 19 questions but was slightly modified for this study by omitting one question. The question omitted was "The onset of autism is usually in:" with answer choices including: neonatal age, infancy, and childhood. The correct answer indicated by the authors was childhood. Because this is a debatable answer and inconsistency can be found across research studies and experts, the current researcher omitted this question from the current study. This was also the only question that did not have a response of A-Yes, B-No, or C- Don't Know.

The modified *KCAHW* contained 18 items. Correct answers were awarded 1 point and incorrect answers awarded 0 points. The questionnaire allowed for scores ranging from 0 through 18 (Appendix A). The answer key for this measure was provided by the original researchers and agreed upon by autism experts (Appendix B).

Survey of Skills, Experience, Likelihood to Consult, and Need for Training

The *Survey of Skills, Experience, Likelihood to Consult, and Need for Training (SSELCNT;* Appendix A), is an unpublished survey that was developed by the researcher specifically for this project. The *SSELCNT* is survey of school psychologists' perceptions of their skills and experience, likelihood to consult, and need for training regarding in terms of the domains of autism diagnosis. The survey is divided into three sections to measure the areas of skills and experience, likelihood to consult, and need for training. Participants rated themselves on each section using a Likert scale with the options of: 1- Fully Unskilled and Inexperienced, 2- Mostly Unskilled and Inexperienced,

3- Somewhat Unskilled and Inexperienced, 4- Somewhat skilled and Experienced, 5- Mostly Skilled and Experienced, 6-Fully Skilled and Experienced (Appendix A).

Skills and experience. School psychologists were asked to rate their skills and experience level in identifying or diagnosing characteristics among the six different diagnostic domains of autism that should be considered to make an identification or diagnosis: social interaction, communication, repetitive or stereotyped behaviors, delays in overall development, differentiating among disorders on the spectrum, and differential diagnoses. As such, there were six questions on this section of the survey. **Likelihood to consult.** School psychologists were asked to rate their likelihood to consult with a supervisor or autism specialist (or autism team) for assistance with diagnosis or identification among the six different diagnostic domains of autism, which are often considered in making an identification or diagnosis (described above). Participants were also asked three additional questions regarding: whether they are required to consult, with whom they are likely to consult, and if they are likely to work alone or with a team upon receiving a referral. Those participants who reported that they work with a team were not administered the likelihood to consult items, because they would be consulting as part of this team.

Need for training. School psychologists were asked to rate their need for training with diagnosis or identification among the six different diagnostic domains of autism which should be considered to make an identification or diagnosis. This area also included six questions.

Pilot Study

A pilot study (Appendix C) was conducted from June 2009 – September 2009. This study was conducted to demonstrate reliability and validity of the instruments. Two groups were selected by the researcher; a non-expert group and an expert group. The non-expert group consisted of undergraduate students in their junior or senior year at the University of Northern Colorado enrolled in an educational psychology course. Therefore, these participants were expected to be familiar with autism, but not have the ability to diagnose autism. The expert group consisted of faculty, clinicians, and fellows currently employed by JFK Partners in the Medical School of the University of Colorado. These participants have worked on autism diagnostic teams. Therefore, these participants were expected to be extensively trained and highly skilled in the diagnosis of autism. A total of 58 participants completed the pilot survey; 36 from the non-expert group and 22 from the expert group. The participants completed the *Survey of Skills and Experience, Likelihood to Consult a specialist of supervisor, and Need for Training (SSELCNT), Autism Survey*, and the *Knowledge of Childhood Autism among Health Workers* (*KCAHW*). The demographic questionnaire was not administered, as the groups were chosen based on their experiences and the pilot was not conducted to analyze the diagnostic capability of these groups. Instead, the pilot was conducted to demonstrate that the instruments measuring the dependent variables would differentiate between those who are well trained to diagnose autism and those who are not.

The *SSELCNT* was divided and analyzed by skills and experience, likelihood to consult a specialist or supervisor, and need for training. The skills and experience based questions demonstrated Cronbach's Alpha of .975, implying high reliability within the

six skills and experience items for all participants. Further, the non-expert (NE) and expert (E) groups scored differently on the skills and experience items (t (56) = 8.37, p<.001; NE Group M= 2.48, SD = 1.20; E Group M= 5.05, SD = 1.01). The likelihood to consult questions demonstrated Cronbach's Alpha of .95 implying high reliability within the 6 likelihood to consult items. However, the non-expert and expert groups did not score differently on the likelihood to consult items (t (28.18) = -.117, p= .908; NE Group M= 4.81, SD = 1.46; E Group M= 4.85, SD = 0.59).

It was difficult to determine why these groups did not differ on this question. It is possible that both endorsed the likelihood to consult at high levels, but would do so for different reasons. For example, the experts may be part of an autism team where consultation is a part of team practice. The non-exerts may have endorsed consultation because they recognized their lack of training in the area of autism identification. Therefore, this question did not appear to differentiate between groups.

The need for training items demonstrated Cronbach's Alpha of .987 implying high reliability within the six items measuring need for training. Further, the non-expert (NE) and expert (E) groups scored differently on the need for training items (t (45.683) = 6.143, p< .001; NE Group M= 4.77, SD = 1.48; E Group M= 2.31, SD = 1.44).

Table 1

Reliability of Measures in Pilot Study

Measure	Chronbach's Alpha	Chronbach's Alpha Based on Standardized Items	N of items
SSELCNT Skills/Experience	.975	.976	6
SSELCNT Likelihood to Consult	.950	.951	6
SSELCNT Need for Training	.987	.987	6
KCAHW	.936	.937	18

Note. SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; KCAHW = Knowledge about Childhood Autism among Health Workers.

The *KCAHW* demonstrated Cronbach's Alpha of .936 (*M*= 10.94, SD= 5.74) (Table 1). Principal component rotated factor analysis pattern matrix of the *SSELCNT* resulted in 3 separate factors; skills and experience, likelihood to consult, and need for training (Table 2). A promax with Kaiser normalization method was utilized.

Table 2

Factor Analysis on SSELCNT in Pilot Study

Item in *SSELCNT*	Component 1	Component 2	Component 3
Need for Training 1	.829		
Need for Training 2	.860		
Need for Training 3	.965		
Need for Training 4	.987		
Need for Training 5	1.026		
Need for Training 6	.985		
Skills & Experience 1		1.024	
Skills & Experience 2		.989	
Skills & Experience 3		.975	
Skills & Experience 4		.892	
Skills & Experience 5		.725	
Skills & Experience 6		.786	
Likelihood Consult 1			.923
Likelihood Consult 2			.878
Likelihood Consult 3			.923
Likelihood Consult 4			.893
Likelihood Consult 5			.877
Likelihood Consult 6			.868

Note. SSELCNT = *Note.* SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey.

An independent samples T-test yielded a significant difference between the non-expert and expert groups (t (48.411) =-10.672, p< .001; NE Group M= 7.55, SD = 4.54; E Group M= 16.50, SD = 1.68). All statistical assumptions were met including independence, normality, and equal variances using Levine's test.

The pilot study (Appendix C) helped to form several new questions on the *SSELCNT* (Appendix A) regarding participant likelihood to consult with a specialist or supervisor. Because the original questions on the pilot were not found to differentiate between the non-expert and expert groups, the addition of several questions in the

proposed study is likely to aid in understanding the answers of participants and making the information more useful. The *Autism Survey* and the *KCAHW* were administered during the pilot study to test autism knowledge. Using both tests may be redundant and prevent participation by making the final instrument appear longer than participants would prefer. Therefore, the researcher chose to keep the test that had stronger reliability and more autism diagnosis focus; the *KCAHW*.

Procedures

Prior to any collection of data, the current study was approved by the University of Northern Colorado's Internal Review Board. The researcher then requested school psychology state associations to aid in the distribution of the survey internet link via an email or posting to the state association's website as described in the Participant section.

The following school psychology state associations agreed to assist the researcher in the distribution of the study information and internet link: California Association of School Psychologists, Idaho School Psychologists Association, Kentucky Association for Psychology in the Schools, Nebraska School Psychologist Association, Nevada Association of School Psychologists, New York Association of School Psychologists, North Carolina School Psychologist Association, Utah Association of School Psychologists, and Washington State Association of School Psychologists. The following state associations sent the study information via email: California, Kentucky, Nebraska, North Carolina, and Washington. California, Idaho, Nevada, New York, and Utah posted a description of the project and link to the study website on Survey Monkey on their websites. California did send the email and posted the information on their website.

State associations who did not respond or were not willing to readily do so (e.g, required payment, membership, or extensive paperwork) were not included in the study. The researcher is a member of the California Association of School Psychologists and the New York Association of School Psychologists; which ultimately allowed access to the target samples from each state as these privileges are not granted to nonmembers.

All members of the associations were provided an opportunity to view the information and link to the study website (for approximately 30 days) on the state association website or received emails from their respective associations (pending correct email addresses were kept on file). It cannot be determined if each member received the emails or saw the posted information on the websites. The researcher also utilized a volunteer sample of acquainted school psychologists who volunteered to participate in the study. The volunteer participants were sent the original Survey Monkey link and completed the survey anonymously.

The email sent by the associations and the website postings informed the participants that the study is about school psychologists and autism, and indicated that all participation was confidential, anonymous as no identifying information would be collected, and that all participants who completed surveys would be eligible to enter a drawing for one of four $25.00 Visa gift cards. No follow up emails could be sent as the researcher did not have control over the emails and the state associations agreed to send an email to members one time only.

Those who wished to participate were able to click on an internet hyperlink which routed them directly to the study on the Survey Monkey website. Informed consent had to be electronically provided by clicking on the button, which indicated understanding of

consent and agreement to participate in the study. If participants did not check the box, they were not able to continue or participate. No identifying information was collected. Therefore, all participants were asked to complete this survey only one time. Participants were also instructed to complete the survey independently; without the use of other people, the internet, books, or other materials. The entire survey can be found in Appendix A. Completion of the survey was expected to take approximately 10 minutes.

After completion of the survey, participants were redirected to a "Thank you" screen that allowed them to enter into the drawing for one of four $25.00 Visa gift cards. Participants who wished to enter the drawing had to provide their name, email address, and phone number. The information entered in the gift card drawing was not able to be matched to the participant's survey in any way. The gift card drawing took place after all data were collected and analyzed in May 2011. The gift card entry data were entered into SPSS and selected via the use of random selection by the statistical software. The four participants were notified via email of their winning status. After the winners confirmed their mailing addresses, the $25.00 Visa gift card was mailed to them via USPS regular mail.

Data collection took place from October 2010 until January 2011 upon which the survey on Survey Monkey was closed. All data were downloaded onto an external hard drive and flash drive that were both kept in a locked filing cabinet in a locked office of the researchers private home. All expenses relevant to the Survey Monkey website and the gift card drawing were paid exclusively by the researcher.

Data Analysis

Crohnbach's alpha was used to report reliability of the *KCAHW* and *SSELCNT* instruments. Additionally, factor analyses were utilized to evaluate the *KCAHW* and *SSELCNT* for internal consistency and factor loadings. In order to answer the research questions a review of descriptive statistics, comparisons of means, reporting of frequencies, standard simultaneous entry multiple linear regression, Pearson correlations, and Independent sample T-tests were conducted. All inferential statistical analyses were conducted with a significance level of .05. Effect sizes were calculated by using Cohen's *d*. All statistical procedures were conducted using the Statistical Package for the Social Sciences, IBM Premium GradPack Version 19.0.

Results

Demographics and Descriptive Data

The purpose of this study was to explore the relationships between school psychologist characteristics and diagnostic capability to identify autism. For the purposes of this study, "Diagnostic capability" included four variables: knowledge of autism, perceived skills and experience in diagnosing or identifying autism, perceived likelihood to consult others when diagnosing or identifying autism, and perceived need for training regarding autism diagnosis or identification of autism. This chapter discusses the descriptive statistics of the study sample and the results pertaining to the predictive characteristics of school psychologists as related to knowledge, skills and experience, likelihood to consult, and need for training in terms of autism diagnosis/identification.

Sample

The target population of the study was practicing school psychologists with varying degrees, experiences, and specialized training. A total of 346 participants began the survey on Survey Monkey and agreed to the participant informed consent, however, only 246 participants completed the survey. Incomplete surveys were eliminated using listwise exclusion and all reported data is based on the 246 participants who completed the survey. The sample is described in terms of demographic characteristics and professional practices related to autism.

Representativeness of the current sample. It appears that the current sample may have a higher than expected number of school psychologists who have a special interest area in autism or particular or extensive experiences in autism. Though 346 people opened the survey on SurveyMonkey, only 246 completed the entire survey. Of the 100 original participants who did not complete the study, 82 stopped the survey during the autism knowledge instrument. Perhaps these participants did not think the study applied to them or did not have a large amount of experience in the area of autism; thus making them feel it was not necessary to complete the survey. Although it is not possible to determine the cause of this, the representativeness of the sample should be considered carefully.

Demographic Characteristics

The demographic characteristics of the sample were analyzed using simple descriptive statistics. The variables included: degree level, years of experience, primary work setting, primary population with whom practitioner works, number of hours of autism specified training received in the past 5 years, *ADOS* and *ADI-R* reliable status,

number of children diagnosed or identified as having autism per year, and autism assessment, identification, or diagnostic team membership.

Degree level. The sample consisted of 204 non-doctoral level school psychologists which comprised 82.9% of the sample and 42 doctoral level school psychologists which comprised 17.1% of the sample. The sample was slightly different from the nationwide demographics of practicing school psychologists as put forth by Charvat and the National Association of School Psychologists (Charvat, 2008). His survey found that 24.5% of practicing school psychologists held doctoral degrees.

Years of experience. Total years of experience working as a school psychologist reported by the sample resulted in a mean of 10.62, median of 8.50 (*SD* = 8.585, *N*=246), and was found to be positively skewed, as participants tended to have fewer years of experience than the national average (X=14 years) (Curtis et al., 2008).

Primary work setting. The majority of the sample reported their primary work setting to be public school (91.5%, *n*= 225), followed by private school (2.8%, *n*=7), private practice (1.2%, *n*=3), hospital (0.4%, *n*=1), and other (4.1%, *n*=10). Those who chose "other" were able to enter their work setting and reported: half-time in private-practice and half-time in a public special education school, charter-schools, center-based BOCES, Federal School on a military base, preschool agency, private preschool agency, therapeutic private preschool, public alternative school, university, and internship placement. The current findings represent a slightly higher number of school psychologists working in public schools than the national average, 83.9% (Charvat, 2008).

Primary population worked with as a school psychologist. Participants in the sample also reported that the primary population with whom they worked included 67.9% (*n*=167) with the elementary school population, 21.5% (*n*=53) with the secondary school population, and 10.6% (*n*=26) with the early childhood population.

Number of hours of autism specified training received in the past 5 years. Participants were asked to report the average total number of autism specified training hours that they had received in the past 5 years. These training options included in-services, attending professional presentations within conventions or conferences, and fellowships, externships, internship rotations, post-doctoral positions, or university level courses specific to autism. The mean number of hours was reported to be 45.46 (SD=57.85, N=246). The data suggested that participants received a wide-range of autism specified training hours, but that the there was a great deal of variation among the sample, ranging from 0 (*n*=8) hours to 360 hours (*n*=1). There were two modes in the sample, 10 hours (*n*=11) and 20 hours (*n*=11), and the data were positively skewed. Therefore, much of the sample reported smaller amounts of autism specific training and a small amount of the sample reported a substantially higher amount of training.

***ADOS* and *ADI-R* reliable status.** Of the sample, only 18.7% (*n*=46) reported that they were *ADOS* Clinician Reliable. Further, 7.7% (*n*=19) of the sample reported that they were *ADOS* Research Reliable. Lastly, 8.5% (*n*=21) of the sample reported being *ADI-R* Research Reliable. Because participants were able to select both of the *ADOS* options; clinician reliable and research reliable; additional frequencies were analyzed to determine how many participants reported both clinician and research reliability on the *ADOS*. Of the 19 participants who reported *ADOS* research reliability,

12 of them also indicated *ADOS* clinician reliability. Thus, 53 participants (21.5%) reported they were either clinician or research reliable on the ADOS.

There are no national estimates on the percentage of school psychologists who are *ADOS* or *ADI-R* trained. The data indicated that very few practitioners have achieved this status, and may imply that they do not use these instruments a great deal or are not trained as recommended by the instrument authors. Notably, reliability certification is not required for the *ADOS* or *ADI-R*, but strongly recommended (Rutter et al., 2003; Lord et al., 1999).

Number of children diagnosed or identified as having autism per year. The average number of children diagnosed or identified per year was reported to be 3.88, and the sample resulted in a positively skewed distribution as a higher number of participants reported fewer children diagnosed (M=3.88, SD=6.876, N=246, *Range* = 0-75). Although some school psychologists cannot diagnose autism within the education setting by law, they are able to "identify" autism for the purpose of educational placement. Throughout the survey instrument, "diagnose" and "identify" were used together in order to allow these participants to contribute without confusion.

Autism team membership. Participants were asked whether or not they considered themselves to be a member of an autism assessment, identification, or diagnostic team. Of the total sample, 48% (n= 118) identified themselves as spending 0 hours working on an autism team and indicated they were not a member of a team. The remaining 48% (n=118) identified themselves as a team member and reported spending 1-10 hours per week in team related activities, 1.2% (n= 3) of participants reported spending 11-20 hours per week, 1.6% (4) of participants reported spending 21-30 hours

per week, and 1.2% (*n*= 3) of participants reported spending 31-40 hours per week working with the team.

Professional Practices Related to Autism

Only 81 (32.9%) participants reported that they were required to consult with a specialist or autism team when encountering an autism referral question. Further, participants reported that when presented with a referral requiring assessment of a student or child with symptomology suspected to be autism, they were most likely to: work on a team (*n*=209, 85%), work on their own (*n*=23, 9.3%), or refer the case to someone else (*n*=14, 5.7%). Those participants who reported that they were most likely to work on a team were not administered the survey questions regarding their likelihood of consulting with other professionals. Therefore, only 37 participants were asked to respond to these items. Therefore, the responses to the likelihood to consult scale were not analyzed due to the small sample size.

Preliminary Analyses

Preliminary analyses were completed with the data to determine the reliability and internal consistency of the measures. Additional factor analyses were completed to determine the internal consistency of the instruments. It was expected that each of the instruments were measuring one factor; as all of the individual scales/instruments in this study were intended to measure specific constructs.

Reliability and Validity of the *KCAHW*

Participant scores on the *KCAHW* yielded a mean of 15.47 (*N*= 246, *SD* = 1.99). Possible scores on the *KCAHW* ranged from 0 through 18 and the sample produced a range of 7-18. Although the overall sample scores were normally distributed (Skew = -

1.001, Kurtosis= 1.267), the psychometrics of the test did not reach the desired level of reliability (Cronbach's alpha = 0.606).

Further, a principal component rotated factor analysis pattern matrix with Promax rotation revealed 8 factors (Table 3), rather than the desired one factor. Additional analysis of the scree plot, based on eigenvalues, showed lack of a distinct elbow, further suggesting that the *KCAHW* is loading on multiple factors. Contrary to expectations, the knowledge test may be supplying information regarding 8 different factors rather than the intended one. Thus, all results utilizing the total score on the autism knowledge measure, *KCAHW*, should be interpreted with caution. Use of the *KCAHW* occurred in research questions 1, 4, 5, and 6.

Table 3

Pattern Matrix of the KCAHW

KCAHW	Pattern Matrix							
Item	1	2	3	4	5	6	7	8
7	.723							
5	.718							
6	.690							
8	.583							
4		.848						
13		.838						
14			.870					
15			.865					
10				.836				
12				.739				
17					.828			
18					.767			
2						.896		
3						.539		
16							.775	
9	.443						-.511	
1							.349	.769
11								-.626

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization
8 components extracted. Rotation Converged in 11 iterations.

Note. KCAHW = Knowledge of Childhood Autism among Healthcare Workers.

Reliability and Validity of the *SSELCNT*

Participant scores on the Skills and Experience portion of the *SSELCNT* yielded a mean of 25.92 (*N*= 246, *SD* = 5.60). Possible scores on this portion of the SSELCNT were 6 through 36 and the sample produced a range of 6 – 36. The overall scores for this sample were considered to be fairly normally distributed (Skew = -1.009, Kurtosis= 1.891, Table 4), and the psychometrics of the test were found to be reliable (Cronbach's alpha = 0.93). Further, principal component factor analysis pattern matrix revealed one factor, further suggesting that the Skills and Experience portion of the *SSELCNT* survey was internally consistent (Table 4).

Table 4

Component Matrix of Skills and Experience portion of SSELCNT

SSELCNT Skills and Experience Items	Component
SE Item 1- Social	.919
SE Item 3- Rep Behaviors	.905
SE Item 2- Communication	.876
SE Item 4- Development	.868
SE Item 5- Diff Diagnosis in Spectrum	.855
SE Item 6- Diff Diagnosis Out of Spectrum	.768

Extraction Method: Principal Component Analysis.
1 component extracted.

Note. SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; SE = Skills and Experience, Diff = Differential.

Participant scores on the Need for Training portion of the *SSELCNT* yielded a mean of 20.760 (*N*= 246, *SD* = 7.07). Possible scores on this portion of the *SSELCNT* were 6 through 36 and the sample produced a range of 6 – 36. The overall sample scores were normally distributed (Skew = 0.025, Kurtosis= -0.353, Table 5) and the psychometrics of the test were found to be reliable (Cronbach's alpha = 0.93). Further,

principal component factor analysis pattern matrix with revealed one factor, further suggesting that the Need for Training portion of the *SSELCNT* survey was internally consistent (Table 5).

Table 5

Component Matrix of Need for Training portion of SSELCNT

SSELCNT Need for Training Items	Component
NT Item 1- Social	.927
NT Item 3- Rep Behaviors	.918
NT Item 2- Communication	.879
NT Item 4- Development	.877
NT Item 5- Diff Diagnosis In Spectrum	.807
NT Item 6- Diff Diagnosis Out of Spectrum	.748

Extraction Method: Principal Component Analysis.
1 component extracted.

Note: SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; NT = Need for Training, Diff = Differential.

Participant scores on the Likelihood to Consult portion of the *SSELCNT* yielded a mean of 23.513 (N= 37, SD = 10.52). The overall sample scores were normally distributed (Skew = -0.131, Kurtosis= 1.526) and the test appeared to be reliable (Cronbach's alpha = 0.94). Further, principal component factor analysis pattern matrix revealed 1 factor, further suggesting that the likelihood to consult portion of the *SSELCNT* survey was internally consistent (Table 6).

Table 6

Component Matrix of Likelihood to Consult portion of SSELCNT

SSELCNT Likelihood to Consult Items	Component
LC Item 1- Social	.959

LC Item 3- Rep Behaviors	.959
LC Item 4- Development	.951
LC Item 5- Diff Diagnosis In Spectrum	.870
LC Item 6- Diff Diagnosis Out Spectrum	.783
LC Item 2- Communication	.739

Extraction Method: Principal Component Analysis.
1 component extracted.

Note. SSELCNT = Skills Experience, Likelihood to Consult, and Need for Training Survey; LC = Likelihood to Consult, Diff = Differential.

As noted, no further analysis occurred with this component of the measure because of the small sample size. Participants who reported that they would prefer to work within a team were not administered the Likelihood to Consult items. This is a potential weakness of the study, as working with a team was not defined clearly. This item could have been interpreted as working with an autism expert/diagnostic team or a general multidisciplinary team.

Although the *SSELCNT* measure was found to be an appropriate measure for the use of research question analyses, analysis of the *KCAHW* revealed low reliability and internal consistency.

Statistical Analyses of Research Questions

A variety of statistical procedures, such as multiple linear regression, Pearson correlation, independent samples *T*-tests and frequency analyses, were utilized in order to answer the research questions. The set of statistical assumptions for each analysis is discussed accordingly with each respective research question. The primary analysis is then discussed along with effect size, where applicable, and implications of the results.

Assumptions of research questions 1, 2, and 3. The first three research questions were answered by conducting a standard simultaneous entry multiple linear regression analysis. Assumptions of the multiple linear regression; including linearity of

the variables, normal distribution of the standardized residuals, and homogeneity of variances; were analyzed using scatterplots, histograms, and cumulative probability plots. The scatterplot of the regression standardized residuals predicted values and the studentized residuals revealed an equal spread, suggestion linearity of the variables. Observations of the histogram for the standardized residuals of the respective total scores; *KCAHW,* Skills and Experience, and Need for Training; revealed a reasonably normal distribution with several outliers, thus suggesting independence and normality of errors. The observed cumulative probability plot (normative P-P plot) of the regression standardized residuals also revealed the data to be normally distributed around zero, which suggested no problems with homoscedasticity. Additionally, multicollinearity was not present in the data as the model variables were not found to be highly correlated with one another. The correlation matrices for each of the first three research questions can be found in Appendix E. Therefore, the assumptions for the multiple linear regression analyses were met for research questions 1, 2, and 3.

Bonferroni correction. Additionally, a Bonferroni correction was used for the first 3 research questions to control for Type I error. Because three multiple regression analyses were utilized the original *p* value of .05 was divided by 3; resulting in a new *p* value of .0166 (.05/3=.0166). Although some consider the Bonferroni correction to overly conservative and unnecessary, others conclude that it is preferred when trying to control for false-positive findings (Mundfrom, Perrett, Schaffer, Piccone, & Roozeboom, 2006).

Research Question #1

Q1. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of

> autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain autism knowledge, as demonstrated by the total scores on the *KCAHW*?

Multiple linear regression analysis revealed that the independent/predictor variables (degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*) predicted the dependent/criterion variable of autism knowledge (as demonstrated by the total scores on the *KCAHW*). The linear combination of predictor variables was significantly related to autism knowledge, $F(8, 237) = 2.899$, $p<.016$ (Table 7). The sample multiple correlation coefficient was .299 suggesting that that 9% (R^2= 0.089) of the variance in autism knowledge could be accounted for by the linear combination of degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*. Only one predictor in the model was significant. *ADOS* Clinician reliability accounted for 5% of the variability in autism knowledge scores ($-0.228^2 = 0.051$) while the other predictor variables only contributed an additional 4% combined (9% - 5% = 4%). This suggests that participants who were *ADOS* Clinician reliable scored higher on the autism knowledge measure *KCAHW*, as the categorical variables in the model were effect coded with a -1 value implying "yes" responses and 1 values implying "no" responses.

However, practical implications of the results are limited. According to Sink and Stroh (2006), adjusted R^2 can be considered an unbiased effect size of a multiple linear regression analysis. According to the model, adjusted R^2= .058, and is considered small. Therefore, although the results were found to be significant, implications for practical utilization should be carefully considered. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 7

Results of the Complete Model Multiple Linear Regression for RQ1

Model	Sum of Squares	df	Mean Square	*F* value	Sign.
Regression	86.568	8	10.821	2.899	.004*
Residual	884.672	237	3.733		
Total	971.240	245			

Note. df = degrees of freedom; Sign. = Significance (p).
*p < .016

Research Question #2

Q2. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain perceptions of skills and experience, as demonstrated on the skills and experience total score on the *SSELCNT* survey?

Multiple linear regression analysis revealed that the independent/predictor variables (degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on

the *ADI-R* predicted the dependent/criterion variable of perceived skills and experience (as demonstrated by the total skills and experience score on the *SSELCNT*). The linear combination of predictor variables was significantly related to perceived skills and experience, $F(8, 237) = 5.189$, $p<.016$ (Table 8). The sample multiple correlation coefficient was .386 suggesting that that 15% *(*R^2= 0.149) of the variance in perceived skills and experience could be accounted for by the linear combination of degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*. Three predictors in the model were significant. Number of Diagnoses/Identifications made per year accounted for 8% of the variability in perceived skills and experience (0.276^2 = 0.076), Years of Experience accounted for 3% of the variability in perceived skills and experience (0.174^2= 0.030), and Total Autism Training Hours accounted for 4% of the variability in perceived skills and experience (0.208^2 = 0.043). The other predictor variables contributed minimal amounts that were not significant. This suggests that participants who reported higher numbers of autism diagnoses, more years of experience, and higher total autism training hours also perceived their skills and experience in autism diagnosis to be higher as well.

Similar to the previous research question, the practical implications of these results are limited. As previously reported, adjusted R^2 can be considered an unbiased effect size and an adjusted R^2= .120, is considered small. Again, results with small effect sizes should be considered regarding the practical implications (Sink & Stroh, 2006).

Table 8

Results of the Complete Model Multiple Linear Regression for RQ2

Model	Sum of Squares	df	Mean Square	*F* value	Sign.
Regression	1147.674	8	143.459	5.189	.000*
Residual	6551.858	237	27.645		
Total	7699.533	245			

Note. Df = degrees of freedom; Sign. = Significance (p).
*p < .016

Research Question 3

Q3. Does degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), research reliability on the *Autism Diagnostic Observation Schedule* (*ADOS*), and/or research reliability on the *Autism Diagnostic Interview – Revised* (*ADI-R*) explain perceptions of need for training, as demonstrated on the need for training total score on the *SSELCNT* survey?

Multiple linear regression analysis revealed that the independent/predictor variables (degree level, experience, amount of autism specified training, amount of time spent as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R)* predicted the dependent/criterion variable of perceived need for training (as demonstrated by the total need for training scores on the *SSELCNT*). The linear combination of predictor variables was significantly related to perceived need for training, $F(8, 237) = 5.320$, $p<.016$ (Table 9). The sample multiple correlation coefficient was .390 suggesting that that 15% *(*R^2= 0.152) of the variance in perceived need for training could be accounted for by the linear combination of degree level, experience, amount of autism specified training, amount of time spent as a member of an

autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and/or research reliability on the *ADI-R*.

One predictor in the model was significant. Years of Experience accounted for 4% of the variability in perceived need for training ($-0.188^2 = 0.035$) and notably, represented a negative relationship. The other predictor variables explained an additional 11% of variability in perceived need for training; however, none were individually statistically significant. This suggests that participants who reported more years of experience perceived their need for training in autism diagnosis to be lower because there was a negative relationship between the variables. However, as with the previous research questions, the current results may be limited in regards to practical implications because the adjusted $R^2 = .124$ is considered small.

Table 9

Results of the Complete Model Multiple Linear Regression for RQ3

Model	Sum of Squares	df	Mean Square	*F* value	Sign.
Regression	1864.390	8	233.049	5.320	.000*
Residual	10382.459	237	43.808		
Total	12246.850	245			

Note. df = degrees of freedom; Sign. = Significance (p).
*p < .016

Research Question #4

Q4. Is autism knowledge, as measured by the *KCAHW*, correlated with perceptions of skills and experience as demonstrated by the total skills and experience score from the *SSELCNT* survey?

Research question 4 was analyzed conducting a Pearson correlation between autism knowledge score (total score on the *KCAHW*) and total skills and experience score

on the *SSELCNT* survey. Assumptions of the Pearson correlation were analyzed. Normality of the individual variables was assessed by examining the respective histograms. Both the *KCAHW* autism knowledge test and the skills and experience total scores were found to be normally distributed. Further, there was independence of observations for each variable.

The correlation between total autism knowledge scores on the *KCAHW* and total perceived skills and experience scores on the *SSELCNT* was significant $r(244) = .298$, $p<.05$ (Table 10, Table 11). However, the effect size of this relationship is considered to be small based on Cohen's *d* and suggested classification of effect sizes. Although participants with higher scores on the autism knowledge test tended to perceive their skills and experience to be higher as well, as demonstrated by the positive significant correlation, this relationship was small and has limited practical implications. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 10

Descriptive Statistics of the Variables in RQ 4

Variable	Mean	Std. Deviation	*N*
Total Autism Knowledge Score	15.4675	1.99104	246
Total Skills and Experience Score	25.9228	5.60595	246

Note. Std. = Standard

Table 11

Correlation Matrix of Autism Knowledge and Skills and Experience

	Autism Knowledge	Skills and Experience
Autism Knowledge		
Pearson Correlation	1	298*
Sig. (2-tailed)		.000
N	246	246
Skills and Experience		
Pearson Correlation	.298*	1
Sig. (2-tailed)		.000
N	246	246

Note. Sig = Significance.
*p < .05, two-tailed

Research Question 5

Q5. Is autism knowledge, as measured by the *KCAHW*, correlated with perceptions of need for training as demonstrated by the need for training total score from the *SSELCNT* survey?

Research question 5 was answered by conducting a Pearson correlation between autism knowledge score (total score on the *KCAHW*) and total need for training score on the *SSELCNT* survey. Assumptions of the Pearson correlation were analyzed. Normality of the individual variables was assessed by examining the respective histograms. Both the *KCAHW* autism knowledge test and the need for training total scores were found to be normally distributed. Further, there was independence of observations for each variable.

The correlation between total autism knowledge scores on the *KCAHW* and total perceived need for training scores on the *SSELCNT* was significant $r(244) = -.218$, $p<.05$ (Tables 12 and 13). However, the effect size of this relationship was considered to be small based on Cohen's *d* and suggested classification of effect sizes. Participants with higher scores on the autism knowledge test tended to perceive their need for training to

be lower, as demonstrated by the negative significant correlation. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 12

Descriptive Statistics of the Variables in RQ 5

Variable	Mean	Std. Deviation	N
Total Autism Knowledge Score	15.4675	1.99104	246
Total Need for Training Score	20.7602	7.07016	246

Note. Std. = Standard

Table 13

Correlation Matrix of Autism Knowledge and Need for Training

		Autism Knowledge	Need for Training
Autism Knowledge			
	Pearson Correlation	1	-.218*
	Sig. (2-tailed)		.001
	N	246	246
Need for Training			
	Pearson Correlation	-.218*	1
	Sig. (2-tailed)	.001	
	N	246	246

Note. Sig = Significance.
*$p < .05$, two-tailed.

Research Question #6

Q6. Do school psychologists who participate as members of an autism team display higher levels of autism knowledge as demonstrated by scores on the *KCAHW*, than those school psychologists who do not identify themselves as members of an autism team?

Research question 6 was answered by conducting an independent samples T test. The two independent samples consisted participants who reported being a member of an autism team (n = 128) and those who reported that they were not members of an autism team (n = 118). The test variable was autism knowledge as demonstrated on the total score of the *KCAHW*.

Assumptions of the Independent Samples T Test were analyzed including: normality, independence, and equality of variances. The test variable, autism knowledge total score on the *KCAHW*, was determined to be reasonably normal by examination of histograms. The test variable scores between each group are independent of one another, as it was only possible for each participant to be in one group. However, equal variances between the two groups on the test variable was not found, as Levene's Test for Equality of Variances was significant (F= 4.933, p= .027). Therefore, degrees of freedom were adjusted from 244 to 226.485, as appropriate, because equal variances could not be assumed. However, it should be noted that T tests are often found to be fairly robust, despite violations of assumptions and typically produce valid results without intervention (Glass & Hopkins, 1996).

The independent-samples t-test was significant, t(226.485)= -3.320, p <.05, d=.214 (Table 14), suggesting a difference between the groups. School psychologists who identified themselves as being part of an autism team scored higher (M= 15.86, SD= 1.75) on the autism knowledge test than participants who did not identify themselves as being part of an autism team (M= 15.03, SD= 2.14). The effect size of this finding was calculated by utilizing the equation for d, mean difference divided by SD pooled. The effect size calculation resulted in d=.214, which is considered a small effect size.

Consequently, the practical implications of this result should be considered with caution. Additionally, as previously discussed, the *KCAHW* demonstrated poor reliability and further caution should be demonstrated when utilizing these results.

Table 14

Autism Team Descriptive Statistics on Autism Knowledge Test

	Member of Team	N	Mean	Std. Deviation
Knowledge Score	No	118	15.0339	2.14409
	Yes	128	15.8672	1.75406

Note. Std. = Standard.

Research Question #7

Q7. What is the percentage of school psychologists who report themselves to be unskilled and inexperienced versus skilled and experienced as demonstrated by the mean scores on the skills/experience items of the *SSELCNT* survey?

Research question 7 was answered by conducting a frequency analysis on the dichotomized total scores of the skills/experience items of the *SSELCNT* survey. Because the possible scores on this portion of the *SSELCNT* were 6-36, the middle of the range was identified to be 21. The total scores were dichotomized, or put into two groups, by putting all participants with total scores of 21.0 and below into the unskilled and inexperienced group and all participants with total scores of about 21.0 into the skilled and experienced group. Frequency tables revealed that 86.6% (*n*=213) of the total sample perceived themselves skilled and experienced regarding autism diagnosis and 13.4% (*n*=33) of the total sample perceived themselves unskilled and inexperienced regarding autism diagnosis (Table 15).

Table 15

Skills and Experience Variable Recoded Dichotomously

	Frequency	Percent	Valid Percent
Unskilled and inexperienced	33	13.4	13.4
Skilled and Experienced	213	86.6	86.6
Total	246	100.0	100.0

Note. Original data recoded by dichotomizing to represent 2 groups.

Research Question #8

Q8. What is the percentage of school psychologists who report themselves to not need training versus in need of training as demonstrated by the mean scores on the need for training items of the *SSELCNT* survey?

Research question 8 was answered by conducting a frequency analysis on the dichotomized total scores of the need for training items of the *SSELCNT* survey. Because the possible scores on this portion of the *SSELCNT* were 6-36, the middle of the range was identified to be 21. The total scores were dichotomized, or put into two groups, by putting all participants with total scores of 21.0 and below into the no need for training group and all participants with total scores of about 21.0 into the need for training group. Frequency tables revealed that 51.6% (n=127) of the total sample perceived themselves as needing training regarding autism diagnosis (Table 16).

Table 16

Need for Training Variable Recoded Dichotomously

	Frequency	Percent	Valid Percent
No need for Training	119	48.4	48.4
Need for Training	127	51.6	51.6
Total	246	100.0	100.0

Note. Original data recoded by dichotomizing to represent 2 groups.

Post-Hoc Analyses

Additional post hoc analyses were conducted with the *KCAHW* to determine feasibility of use for future studies. Additional principal component rotated factor analysis pattern matrix with Promax rotation and 2 forced factors can be found in Table Appendix F. In conceptually analyzing the instrument, it appears that items 14 through 18 are more theoretical and research based instead of symptom descriptions; unlike the rest of the items. Although the pattern matrix of the forced 2 factor loadings revealed that items 14-18 did not load strongly with the first 13 items, they did not load strongly together either. Additionally, the first 14 items did not load strongly together on one factor and revealed lower than optimal factor loadings in this format. Several items loaded on both factors and one item did not load above .10 on any factors. Therefore, the post hoc analysis of the *KCAHW* did not reveal that symptomology questions would load similarly on one factor and theory/research based items on another factor. It seems that this instrument may contain questions important to autism; however, future use for the purpose of determining diagnostic capability should be carefully considered.

Summary

The preliminary analysis revealed low reliability on the autism knowledge instrument; the *KCAHW*. Therefore, all results utilizing the *KCAHW* should be interpreted with caution. However, the skills and experience, likelihood to consult, and need for training scales of the *SSELCNT* were found to be reliable and displayed adequate factor loadings via factor analysis. Multiple regression analyses revealed that *ADOS* clinician reliability was a significant predictor of autism knowledge, although other school psychologist characteristics, such as degree level, years of experience, and number of autism specific training hours were not found to predict autism knowledge.

Additionally, number of diagnoses/identifications made per year, years of experience, and specific autism training were found to be significant predictors of school psychologist perceived skills and experience in their ability to diagnose or identify autism. Although these variables are different than those found to predict autism knowledge, it appears that school psychologists who make a higher number of diagnoses/identifications of autism, have more years of experience as school psychologists, and have received more autism specific training perceived their skills and experience to be higher than those who have lower levels of these variables. Lastly, more years of experience was found to predict lower levels of perceived need for training. However, all of the multiple regression analyses resulted in small effect size; implying weak practical implications of the results.

Additional Pearson correlation analysis revealed that autism knowledge was positively correlated with perceived skills and experience but negatively correlated with perceived need for training. Further, school psychologists who scored higher on the

autism knowledge instrument also perceived their need for training to be lower than school psychologists who did not score as high on the knowledge instrument. Again, these results were found to have a small effect size and should be interpreted with caution, as there may be limitations in practical use. Additionally, these results utilized the autism knowledge instrument, *KCAHW*, which demonstrated poor reliability and should be interpreted with caution.

Discussion

Many have highlighted the need for research regarding the rising prevalence of Autism Spectrum Disorders (e.g., Liptak et al., 2006). Despite being difficult to identify and diagnose, the prevalence of autism is on the rise. Recent surveys show prevalence rates to be significantly higher than previously estimated (Fombonne, 2003). The current prevalence of autism and autism spectrum disorders appears to be approximately 3 to 4 times higher than was estimated 20 years ago (Fombonne, 2003). With this rate of increase it is inevitable that school psychologists will be responsible for identifying and program planning for students with autism.

One of the obvious questions is the degree to which practitioners are prepared to make accurate and efficient diagnoses of autism. Although autism specialists tend to agree on the defining characteristics of autism, research has discovered inconsistencies in actual diagnoses made, implying a possible misunderstanding of the diagnostic criteria (Kabot et al., 2003) and the identification of autism symptomology.

Approximately 24% of children receive an autism diagnosis after entering school (Wiggins et al., 2006). Therefore, diagnosis or identification is likely to be made by a school psychologist. In recent years, 95% of school psychologists have reported an

increase in referrals requesting autism assessment (Kohrt, 2004). The implications of such an increase are not yet known. However, it is widely accepted that children who receive targeted, early intervention specific to their autism deficits are more likely to be successful in the long-term; including academic achievement and independent living (Koegal et al., 2001). Conversely, undiagnosed children are unlikely to receive crucial intervention or services relevant to autism prior to diagnosis. Therefore, it is imperative that school psychologists are equipped to competently assess and identify autism in all children, especially those of early childhood age (Brock, et al., 2006).

School psychologists represent a wide variety of professionals; including doctoral and non-doctoral degrees, varying levels of experience, varying work settings and populations worked with (Curtis et al., 2002), and varying exposure to autism cases. Although school psychologists are trained in assessment and treatment of psychological disorders (Merrell et al., 2006), not all work on an autism diagnostic/identification team, receive specific training in autism, or have direct training in autism assessment tools such as the *ADOS* (Lord, et al., 1999) or *ADI-R* (Rutter et al., 2003.) Additionally, because of rising prevalence rates of children identified or diagnosed as having autism within the school environment, school psychologists are likely to be faced with autism identification and subsequent autism diagnosis questions (Wiggins et al., 2006; Noland & Gabriels, 2004).

The current study expanded on the research regarding the exploration of predictive school psychologist characteristics regarding autism knowledge, perceived skills and experience to diagnose or identify autism, and perceived need for training in terms of autism diagnosis or identification. Additionally, the current study aimed to

examine the relationships between demonstrated autism knowledge and perceived skills and experience and need for training in autism diagnosis or identification. Moreover, autism diagnostic/identification team membership status was compared to autism knowledge and school psychologist perceptions of skills/experience and need for training was surveyed.

Autism knowledge was measured using the *KCAHW* questionnaire, which was (Bakare et al., 2008) originally developed for use with health care workers in a neuro-psychiatric hospital in Nigeria. Although this instrument was piloted to interpret appropriate use with those who are and are not familiar with autism in the United States and deemed appropriate for use in the current study, it ultimately resulted in poor reliability and internal consistency in the current study. It is possible that the *KCAHW* contained questions that were too basic or rote regarding autism knowledge for the current population.

The average scores on the *KCAHW* were found to be high (M = 15.47 out of 18 possible points) and seemed to indicate that participating school psychologists were well versed in autism knowledge as measured by this instrument. The high mean score on the *KCAHW* also likely contributed to the low reliability of the instrument. Additionally, it should be noted that the mean autism knowledge score of the current sample is comparable to the mean score of the expert group on the pilot study (M = 16.50), and it appeared that the current sample contained a high number of school psychologists who were very familiar with autism.

Although it has not been established exactly which autism criteria cause school psychologists difficulty in diagnosis or identification, it has been determined that there is

difficulty in determining diagnosis and identification (Kabot et al., 2003). Therefore, there continues to be a missing gap in the literature regarding the cause of difficulty. Perhaps, this instrument did not contain questions about the diagnostic criteria that pose the most difficulty or perhaps, the problem does not lie with knowledge of autism. It could also be hypothesized that possessing a high level of knowledge does not ensure application of the knowledge for diagnostic or identification purposes. However, it does seem that the issues regarding diagnostic difficulty to diagnose or identify autism may not solely lie within the realm of knowledge.

Several school psychologist characteristics were found to be predictive of autism knowledge, perceptions of skills and experience to diagnose or identify autism, or perceptions of need for training in terms of autism diagnosis or identification. Relationships between demonstrated autism knowledge and perceptions of skills and experience and need for training were also present. Differences in knowledge between school psychologists who are members of autism diagnostic/identification teams were also found. Because half of the total sample reported that they were members of autism teams, post-hoc analysis of this group will be discussed. Lastly, the survey of perceptions of skills and experience and need for training revealed interesting results. Although all of the findings resulted in small effect sizes, the results may imply useful considerations in regards to school psychologist needs and the training of current and future school psychologists.

Overall Model Prediction of Autism Knowledge

The overall model consisted of degree level, years of experience working as a school psychologist, amount of autism specified training, amount of time spent

participating as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and research reliability on the *ADI-R*. Of the variables examined, the total model explained only 9% of the variability in autism knowledge scores. *ADOS* clinician reliability was found to be the only significant predictor variable and accounted for 5% of the variability in autism knowledge scores.

Although the effect size is small, those who choose to complete *ADOS* Clinician training tend to receive more in-depth training in terms of autism symptomology and the appropriate way to observe and challenge children regarding communication, social interaction, and repetitive/stereo typed behaviors in order to evaluate this symptomology. Although this study cannot determine the direct cause, those who seek *ADOS* clinician reliability certification may be more interested and knowledgeable initially. Further, the *KCAHW* inquires about a variety of autism diagnostic criteria and associated features, which are directly tested in the *ADOS* (Lord et al., 1999). Enduring extensive training to become *ADOS* clinician reliable is likely to teach school psychologists about specific diagnostic criteria in such depth that they are better equipped to demonstrate higher knowledge.

The University of Michigan Autism & Communications Disorders Center (http://www.umaccweb.com/education/index.html) provides the commonly recognized training and certification on the *ADOS* and *ADI-R*. The trainings have many components and participants must demonstrate a high level of knowledge of the instruments and autism characteristics to receive clinician or research reliable certification. The trainings utilize direct teaching, modeling, video, direct practice of knowledge and skills, and

feedback. To obtain *ADOS* clinician reliability, one must attend the clinician training workshops (2 days), demonstrate standardized administration of all modules, and demonstrate inter-rater reliability of 80% agreement regarding independently scored administrations of the test with the University of Michigan or other designate site able conduct the trainings. To obtain *ADOS* research reliability, one must attend the clinician and research reliability workshops (2 days and 2 ½ days; respectively), demonstrate standardized administration of all modules, and demonstrate inter-rater reliability of 85% agreement regarding independently scored administrations of the test with the University of Michigan or other designate site able conduct the trainings. These are the reliability standards put forth by The University of Michigan Autism & Communications Disorders Center (http://www.umaccweb.com/education/index.html). Therefore, *ADOS* research reliability is considered an even higher level of training; but was not found to be a significant predictor in the analysis in the current study.

ADOS research reliability requires a professional to attend the same trainings as clinician reliable practitioners, but also complete a higher level of inter-rater reliability and additional research reliable trainings. There were very few participants who reported that they were *ADOS* research reliable (n=19) compared with clinician reliable (n=46), and 12 of these individuals endorsed both areas. Consequently, significance was unlikely to be found due to the small number of participants who were *ADOS* research reliable in the sample. Therefore, within the current study, it cannot really be known if *ADI-R* research reliability is predictive of autism knowledge due to the small sample of participants who did have this characteristic. However, it can be determined that *ADOS*

research reliability is less common than clinician reliability, perhaps because of the additional requirements and difficulty of attainment.

Expanding on past research, the *ADOS* trainings are unique in that they are typically intense 2-day workshops utilizing direct teaching, practice, modeling, and either live or video examples. Additionally, those who complete clinician reliability trainings must practice administration, demonstrate administration skills and scoring, and receive feedback. Implications of this finding may not necessarily have to do with the *ADOS* instrument per se, but perhaps the nature in which clinicians are trained. Previous medical research has found that intensive multi-day workshops increase knowledge and skills among practitioners (Fritsche, Neumayer, Kunz, Greenhalgh, & Falck-Ytter, 2002). Opportunities to apply skills and knowledge after receiving intensive teaching has been found as a preferred method among nursing students, as this led to positive graduation outcomes and was reportedly favored by the students (Kemsley, McClauland, Feiganbaum, & Riegle, 2011). Conceivably, school psychologist in-trainings and workshops constructed to deliver knowledge and advance skills may benefit from practice opportunities and feedback after delivery of an intensive multi-day training.

According to previous literature, it is important to note that autism assessment includes more than the assessment of autism symptomology (Brock et al., 2006). Comprehensive assessment includes the examination of all areas of development; intellectual, academic achievement, speech/language/communication, physical, behavioral, social/emotional, developmental history, and adaptive functioning (Brock et al., 2006; Chawarska et al., 2008). In addition, an ample understanding of typical and atypical development is crucial in distinguishing between appropriate and inappropriate

behavior. In addition to the many tools utilized for the overall assessment, a comprehensive model of autism symptomology assessment set forth by Bradley-Johnson and colleagues (2008), includes records review and interviews, rating scales, and direct assessment. Notably, recent research has highlighted the ADOS to be the only direct testing instrument for autism symptomology (Bradley-Johnson et al., 2008). Building on this research, the current study revealed that only 18.7% of the sample reported being *ADOS* clinician reliable and 7.7% *ADOS* research reliable. Collectively, about one fifth of the total sample was reliable, in some form, on the *ADOS* instrument. Importantly, this does not imply that the rest of the sample does not use the *ADOS* for assessment purposes, as though clinician and research reliability is strongly recommended, it is not required for use. Retrospectively, it would have been helpful to know the frequencies of clinicians who use the *ADOS* for assessment purposes when trying to make a diagnosis or identification and this may be an area for future research. Additionally, if not utilizing this instrument, it would also be helpful to know how clinicians are directly examining the diagnostic or identification criteria of autism.

Overall Model Prediction of Perceived Skills and Experience

The overall model of degree level, years of experience working as a school psychologist, amount of autism specified training, amount of time spent participating as a member of an autism team per week, number of autism cases per year, clinical reliability on the *ADOS*, research reliability on the *ADOS*, and research reliability on the *ADI-R* was found to significantly explain school psychologist perceptions of skills and experience; and explained 15% of the variability in perceived skills and experience. However, only three predictors in the model were found to be significant; number of autism cases per

year, years of experience working as a school psychologist, and total autism specified training hours in the past 5 years.

Although there is limited research regarding school psychologists' knowledge of autism or skills and experience regarding autism diagnosis, other studies have shown that educators and parents can be successful in working with children with autism when they are directly taught about autism and then supplied access to a consultant (Ruble & Dalrymple, 2002). This is congruent with the current study findings in that autism specific training was found to be a significant predictor of perceived skills and experience. Although it cannot be determined if perceived skills and experience is related to actual skills and knowledge, those who received specific training in autism tended to rate their skills and experience to diagnose or identify autism as higher than those who had not received this training. It appears that direct exposure and experience with children who have autism may be instrumental to school psychologist's skills and experience to diagnose or identify this disorder. Conversely, one could hypothesize that those with high levels of skills and experience may be more likely to be referred such cases, resulting in more cases diagnosed per year.

Additionally, the current study found that those who have more experience as a school psychologist seemed more likely to perceive their skills and experience to diagnose or identify autism as higher as well. Previous research has found that overall experience working with children who are developing typically and who have developmental delays and disorders; and exposure to direct cases are crucial in the development of clinical skills to provide accurate assessment (Chawarska et al., 2008). Though the effect size for this analysis was small, it is important to recognize that more

experience, higher numbers of autism cases, and more autism specific training may help school psychologists to perceive their skills and experience in autism cases as higher, or more advanced.

Because 25.2% (*n*=62) of school psychologists reported that they had zero autism cases per year and 48% (*n*= 118) reported zero autism specific training hours received in the last 5 years, it could be recommended that future research ascertain what types of experiences and trainings would be most beneficial to school psychologists. Employers of school psychologists may wish to provide professional development opportunities regarding autism specific training to broaden the experiences and exposure of their employees, and thus, increase school psychologist skills. Perhaps employers may wish to mandate several hours of professional development every 3 years in regards to knowledge of autism assessment and identification. With specific training and exposure to cases, school psychologists may feel better equipped, in terms of skills and experience, to diagnose or identify a child as having autism when faced with such a case. Although it is difficult to provide the experience of working on autism cases if the opportunity does not exist, the current findings may suggest trainings to include real children. Recent research has found that the use of technology such as webcams and videos have been found to be successful in training psychologists regarding psychotherapy techniques (Manring, Greenberg, Gregory, & Gallinger, 2011). Utilization of the same approach, in terms of autism assessment, may allow for the substitution of real life experiences via videos. Alternatively, employers may wish to have school psychologists "rotate" as an apprentice with the autism team for a period of time.

Overall Model prediction of perceived Need for Training

Although the overall model explained 15% of the variability in perceived need for training, only one individual predictor was found to be significant; years of experience working as a school psychologist accounted for 4% of the variability in perceived need for training. The negative relationship suggested that those with more years of experience reported less perceived need for training in terms of autism diagnosis and identification. Though the effect size was considered to be small, this may imply that those school psychologists with more years of experience feel that they do not need training in autism diagnosis because they have, perhaps, been challenged with numerous autism cases many times throughout their career.

One may assume that school psychologists with more years of experience may have had the opportunity to attend a great deal of autism specific training, however, this was not found to be the case in the current study; as autism specific training in the past 5 years was not found to be a significant predictor of perceived need for training. Although it could be argued that school psychologists with more years of experience could have received training more than 5 years ago, the literature and research on autism is ever-changing and it is beneficial to receive training periodically to stay up to date with current findings (Charman, 2010). However, the training that is provided may be delivered at a basic level and not meet the needs of more specialized groups. Additionally, trainings are often delivered in a traditional classroom structure and do not allow for real life or video exposure to children with autism, an approach that was previously found successful in teaching new skills to psychologists (Manring et al., 2011).

Autism Knowledge, Perceived Skills and Experience, and Need for Training

The current study found a positive relationship between autism knowledge and skills and experience in autism diagnosis. Although the effect size of this finding was considered to be small, school psychologists who perceived their skills and experience more highly than those who did not also scored higher on the autism knowledge instrument. The autism knowledge instrument contained statements about social, communication, and repetitive/stereotyped behavior symptomology in addition to associated features of autism. Those who scored highly on this instrument demonstrated that they knew many of the diagnostic criteria and associated features of autism. Consistent with other literature, school psychologists appear to be fairly accurate in their self-assessments (Miller & Jome, 2010).

The current study also found a negative relationship between autism knowledge and need for training; suggesting that school psychologists who scored higher on autism knowledge reported less perceived need for training. This finding has important implications because many school psychologists self-select the workshops, trainings, and continuing education unit courses that they attend. Therefore, those who have a high level of autism knowledge in terms of diagnosis may choose to attend other professional development trainings that are geared toward their needs.

These findings expand on previous literature suggesting that psychologists be informed and encouraged to self-assess (Kaslow et al., 2007). More specifically, it has been recommended that psychologists be encouraged to assess their own skills and subsequent need for additional training or education (Kaslow et al., 2007). The current findings show that autism knowledge scores were positively correlated with school

psychologist's perceptions of skills and experience. Additionally, higher autism knowledge scores were negatively correlated with need for training. This finding is consistent with the ideal that as ethical professionals, school psychologists should be aware of their level of competence. In terms of the current study, implications that school psychologists may be accurately self-assessing are critical to autism diagnosis/identification. However, these findings do not necessarily imply that school psychologists who have lower autism knowledge and perceive their need for training to be high; will in response, actually seek and receive training.

Autism Knowledge and Autism Team Membership

School psychologists who reported themselves to be members of an autism team were found to score higher on the autism knowledge test than those school psychologists who did not report themselves to be team members. It is difficult to ascertain if team membership contributes to autism knowledge in any way, however the current study sample seemed to represent a high percentage (52%) of school psychologist who were on autism teams. It is likely that autism team members undergo more autism specific training and have more exposure to autism cases than non-team members. Many autism diagnostic teams are provided with additional trainings and professional development opportunities that their counterparts are not offered (Chawarska et al., 2008).

Post-hoc analysis of autism team membership. Additional analyses were performed on this group specifically and revealed that of the 128 participants who identified themselves as an autism assessment, identification, or diagnostic team member, 32 reported having *ADOS* Clinician Reliability, 14 reported having *ADOS* Research Reliability, and 14 reported having *ADI-R* Research Reliability. Compared with the total

sample; 46 *ADOS* Clinician Reliable, 19 *ADOS* Research Reliable, 21 *ADI-R* Research Reliable; it seems that most of those who reported reliability on these instruments tended to be part of autism teams. Of those who reported being on autism teams, in higher perceived skills and experience ($M = 27.25$) than the total sample ($M = 25.92$) and slightly lower perceived need for training ($M = 19.59$) than the total sample ($M = 20.760$). This may be because those who reported being on autism teams also reported higher numbers of autism specified training hours received in the past 5 years ($M = 55.73$) when compared with the total sample ($M = 45.46$). This additional training likely contributed to knowledge, skills and experience, and need for additional training.

Expanding on previous research, it is important to distinguish the difference between a multidisciplinary team and a specialty autism diagnostic/identification team (McClure, MacKay, Mamdani, & McCaughney, 2010). In the current study, approximately 52% of participants identified as participating as a member of an autism assessment, identification, or diagnostic team. Typically, school psychologists' work within a special education team to determine which special education category would be most appropriate for all students being assessed (Merrell et al., 2006; Noland & Gabriels, 2004). Often the special education teams consist of the school psychologist, speech/language pathologist, occupational therapist, administrator, regular education teacher, special education teacher, and parents of the child. Although autism diagnostic teams may consist of the same team members by occupational title, these teams often solely focus on the diagnosis or identification of autism (McClure et al., 2010). Further, autism diagnostic teams often undergo extensive training regarding autism, development, differential diagnosis, and delivery of diagnosis. Therefore, although school

psychologists may be working within a multi-disciplinary team to make an autism diagnosis, a regular multidisciplinary team is qualitatively different than an autism diagnostic team and may not result in the same accuracy and knowledge in diagnosis as working with a specialized autism team.

However, McClure and colleagues (2010) intensively trained regular multi-disciplinary teams and then compared them with the already-established autism specialty diagnostic team in the UK. They reported using a 5-day intensive training including the following 5 components: collecting comprehensive clinical history specific to autism, clinical assessment and use of the *ADOS*, determining diagnosis based on diagnostic criteria, delivery of results, and writing of reports. Results revealed that the newly trained teams did not differ from the already established team after both teams completed diagnosis on the same children.

McClure and colleagues (2010) utilized the multi-day intensive training method found effective by previous research (Fritsche et al., 2002). Additionally, this research also utilized the comprehensive assessment components established as appropriate in autism assessment (Bradley-Johnson et al., 2008). Although approximately half (48%) of the current study participants did not identify themselves as working as a member of an autism assessment, identification, or diagnostic team, it appears that with the correct training, these individuals could quickly become ready to do so.

School Psychologist Perceptions of Skills and Need for Training

It is interesting that much of the sample reported being skilled (86.6%), yet more than half (51.6%) of the sample reported needing training. School psychologists may be aware that the literature and research on autism is always growing, and that they may

benefit from receiving recurring training to keep their skills and knowledge up to date (Charman, 2010). Further, the *ADOS* and *ADI-R* are becoming more widely used over time (Lord et al., 1999; Rutter et al., 2003), and school psychologists who have not received formal training on the "gold standard" autism assessment tools (Filipek et al., 1999, p. 460) may wish to do so.

Expanding on the previous literature implying that autism diagnosis/identification be addressed in autism teams (Filipek et al., 1999), the current sample may have indicated a need for training in order to allow them to participate as members of such teams. Previous research has indicated that training regular multi-disciplinary teams to act as specialized autism diagnostic/identification teams can be highly effective (McClure et al., 2010) with the use of an intensive multi-day training approach (Fritsche et al., 2002). Additionally as previously discussed, other professionals indicate they prefer an intensive multi-day training approach (Kemsley et al., 2011).

Implications of the Study

The current findings suggest the importance of further professional development targeted toward school psychologist needs, which in turn, may have long-term implications for the prognosis of children who school psychologists evaluate. The current sample found a large percentage of school psychologists who reported little or no recent training specific to autism diagnosis. Providing opportunities for professional development may essentially, allow for the growth of knowledge and skills and subsequently, lead to earlier diagnosis and better intervention (Brock et al., 2006).

Although this finding appears as though a many school psychologists need to be trained, it is possible to approach autism diagnosis or identification with an autism team.

The current study found those on autism teams to have more training and experience in autism diagnosis/identification. This finding has positive implications, as those who have more training and perceive themselves to be skilled and experienced are those school psychologists that seem to diagnose/identify autism on a regular basis. The use of an autism diagnostic or identification team may be an efficient way to approach autism training and autism diagnosis/identification concerns. An autism diagnostic or identification team will only require a small group of school psychologists to be trained so extensively. Many researchers agree that a team approach should be utilized in the diagnosis of autism (Lord et al., 1999; Rutter et al., 2003).

Access to an autism diagnostic/identification team may allow school psychologists to provide diagnoses or identifications of children who have autism more effectively and at an earlier age. Although it may not be practical to train all school psychologists to be part of such teams, previous research has found the development and trainings of such teams to be successful by directly teaching over an intensive multi-day format (McClure et al., 2010), utilizing video training, and incorporating a similar autism assessment model put forth by Bradley-Johnson and colleagues (2008).

Implications of Diagnosis/Identification

Ultimately, intense training has shown success in resulting in accurate diagnosis of autism (Mcclure et al, 2010). Importantly, without a diagnosis or identification, children affected by autism are unlikely to receive any intervention (Brock et al., 2006). Children who receive targeted, early intervention specific to their autism deficits are more likely to be successful in the long-term; including academic achievement and independent living (Koegal et al., 2001). Therefore, early and accurate diagnosis by a

well-trained school psychologist may have a positive long-term impact for children and their families (Brock et al., 2006; Chawarska, 2008).

Many parents respond negatively and emotionally when receiving a diagnosis of autism (Nissenbaum, Tollefson, & Reese, 2002). Negative responses include denial, getting upset, misperceiving the diagnosis, and ignoring the professionals by becoming distracted. Some parents get angry and frustrated with the team of professionals or with most people around them (Nissenbaum et al., 2002). Much of the negative response to the diagnosis is justified given the challenges of raising a child with autism. However, some of the negative response to a diagnosis of autism may be associated with the expected and/or feared social challenges. Many parents report feeling stigmatized by their child's disorder via judgment and isolation (Gray, 1993). The stigma placed upon the child and the family of a child with autism can come from many places including oneself, family, friends, school personnel, and complete strangers. This stigma may present social challenges to parents regarding their individualism, home and family life, community settings, and school settings (Gray, 1993). Therefore, before putting a child and family into such a position of difficulty, one should be certain that the supplied diagnosis is accurate.

Limitations

As previously discussed, those who chose to complete the survey may represent individuals who were particularly interested or experienced in the area of autism and again, generalizability of the findings to all school psychologists is questionable. Given the high percentage of individuals with ADOS training and who were members on autism teams, it seems likely that this was the case.

The present study also collected data via an online survey website. Therefore, it cannot be known if participants solicited outside help when completing the autism knowledge test. Participants also self-reported regarding their levels of training, certification status, perceived skills and experience, likelihood to consult, and need for training. As with most measures of self-report, there is no way to know if the information they provided is correct or their perceptions were accurate.

Participants who reported that they would prefer to work within a team were not administered the likelihood to consult items. This is a potential weakness of the study, as working with a team was not defined clearly. This item may have been interpreted as working with an autism expert/diagnostic team or a general multidisciplinary team.

Because of the nature of the study, there is also no way to suggest causality. Therefore, the current study was limited to examine relationships. The results cannot be used to make determinations regarding causes of outcomes. Lastly, the autism knowledge instrument was found to have poor reliability and internal consistency, and therefore is a significant limitation within the study.

Suggestions for Further Research

The current findings suggest that some school psychologist report needing additional training in terms of autism diagnosis or identification. Therefore, it may be useful to provide supplementary trainings including the opportunity to interact with real children with autism. Because experience with actual cases was reported in conjunction with higher levels of skills and experience, it may be useful to provide experiences to school psychologists who have little contact with children with autism. It would be useful to distinguish if real-life experiences; including an inexperienced school

psychologist on the autism diagnostic team with experienced members, could be useful to the inexperienced school psychologist in building skills, knowledge, and providing a guided opportunity to diagnose or identify autism. Subsequently, it may be practical to then ascertain what types of experiences will provide students and employees with the most useful and cost-effective experiences as well.

Notably, there continues to be a gap in the literature regarding the cause of difficulty of diagnosis. Future research would add usefulness to the field by identifying the most difficult diagnostic criteria to learn and assess. As it seems that the issues regarding diagnostic difficulty to not solely lie within the realm of knowledge.

It would also be helpful to have a better understanding of the different instruments that clinicians are using in making their diagnosis, especially as related to the *ADOS* and ADI-R. If these are the "gold standard" it would be interesting to know the degree to which they are being used and whether the individuals who are using them are appropriately trained.

Future research would be helpful in focusing on autism diagnostic/identification teams regarding the types of training and practices that are associated with efficient and accurate diagnosis. Additionally, future research would be helpful regarding autism diagnosis or identification in regards to school psychologists and the school system environment.

Because many professionals consider autism a very debilitating diagnosis it is essential that professionals are confident in providing families with an accurate diagnosis of autism and sensitive delivery of such a conclusion (Nissenbaum et al., 2002). In medical and clinical settings, it is typical for parents to be provided with a great deal of

information along with the diagnosis. Many diagnostic meetings or conversations include delivering the diagnosis and providing the parents information about the disorder, their child, treatments and therapies, prognosis, follow-up evaluations, family/home implications, and school implications (Nissenbaum et al., 2002). However, not all children and families have easy access to such services. Although it is unclear if school psychologists working within school systems create a similar supportive environment, with professional development training they should certainly be able to do so (Nissenbaum et al., 2002). Specifically, school psychologists who are carefully trained to provide a sensitive delivery of diagnosis or identification may be able to provide clear information about autism and nurturing and safe environment for the family.

Intervention planning often immediately follows the delivery of a diagnosis of autism. Efficiently planned interventions targeting all areas of autism characteristics and development have shown to be ideal when implemented as early as possible. However, some intervention plans may be inefficient if social and play goals are not addressed (Koegel et al., 2001.) Research has found that children identified as having autism in the public schools tend to have individualized education plans that did not address developing functional play or social skills (Koegel et al., 2001). Although intervention recommendations provided by private sources include social and play goals, it is difficult to determine if these recommendations are appropriately applied given the nature of the setting. However, the school setting is quite different and it is essential that school psychologists address the social and play deficits of diagnosed children. The school environment provides a unique opportunity for professionals to monitor intervention and track progress, as other private environments (i.e. clinics, hospitals, etc.) may not provide

because attendance is not legally mandated or as frequent as attending school. Therefore, school psychologists may have a unique opportunity to influence treatment plans, implementation, and progress monitoring. Future research addressing appropriate intervention development, implementation, and progress monitoring may allow for better prognosis for children.

School psychologists are an integral part of diagnosing or identifying autism and making recommendations for effective classroom environment, teaching strategies, and additional services important to children with autism and their families. With the provision of targeted education and professional development, school psychologists may be better equipped to diagnosis or identify autism more efficiently, in turn resulting in earlier recommendations for the child, earlier provision of intervention, and potentially more favorable outcomes in terms of meeting goals.

Conclusion

School psychologists are an integral part of diagnosing or identifying autism and making recommendations for effective classroom environment, teaching strategies, and additional services important to children with autism and their families. School psychologists who work on autism teams seem best prepared to provide autism diagnoses/identifications. With the provision of targeted education and professional development, school psychologists may be better equipped to provide diagnosis or identify autism more efficiently, and in turn implement earlier intervention for children and their families. With early accurate diagnosis and targeted intervention, it is likely that individuals with autism will experience more favorable outcomes in meeting life-

long goals. Providing diagnoses/identifications in an autism team format may be the first integral step toward progress for those with autism.

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