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AN EVALUATION OF THE IMPACT OF THE DSM-IV-TR DIAGNOSTIC GROUP AND COGNITIVE ABILITY ON THE PRESENTATION OF AUTISM SPECTRUM DISORDER SYMPTOMS

by

Zachary Wroe Sussman

A thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Psychological and Quantitative Foundations
in the Graduate College of
The University of Iowa

December 2014

Thesis Supervisor: Associate Professor Megan Foley Nicpon

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Graduate College
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Iowa City, Iowa

CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the Ph.D. thesis of

Zachary Wroe Sussman

has been approved by the Examining Committee
for the thesis requirement for the Doctor of Philosophy
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My dissertation is dedicated to the family, friends, and mentors, without whom I would never have reached this point. First, I would like to thank Patricia Espe-Pfeifer, Joseph Barrash, and Robert Jones; each shaped my career and development as a pediatric neuropsychologist. Second, I would like to thank the students of my cohort, as well as Charles Birmingham, for their support during the challenges and trivialities of graduate school. Third, I would like to thank my loving family. My mother and father instilled within me a passion to learn and serve others. They are the foundation from which my passion and dedication as a professional is formed. Finally, and most importantly, I would like to acknowledge my incredible wife, Dr. Joleen Sussman. She was by my side during the most challenging moments of this process and her hope, love, and patience often kept me afloat. I love you, Jo, and you continue to amaze me every day.

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ABSTRACT

Autism Spectrum Disorder (Autism Spectrum Disorder) is a neurodevelopmental syndrome characterized by impairment to social communication adjoined by the presence of rigidity, restricted interests, and/or repetitive behaviors. Diagnosis of Autism Spectrum Disorder recently shifted from a series of pervasive developmental disorders recognized in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) to a single, comprehensive diagnosis in the 5th edition of the same manual (DSM-5; APA, 2013). To evaluate the appropriateness in this shift in diagnostic practice, the current study evaluates the consistency in symptom presentation amongst the previous DSM-IV-TR diagnoses. Additionally, this study identifies several novel considerations for Autism Spectrum Disorder symptom presentation in high ability youth. Thus, the current study addresses broad considerations for discrete versus continuous symptom presentation in Autism Spectrum Disorder, as well as contributes to the limited literature addressing Autism Spectrum Disorder symptom presentation features in high ability youth.

A review of literature on theory, conceptualization, and assessment of Autism Spectrum Disorder is provided, as well as a review of relevant literature for high ability youth diagnosed with Autism Spectrum Disorder. Progression of Autism Spectrum Disorder diagnosis is discussed, with emphasis upon the current debate regarding shifts from utilization of many diagnoses to a single, comprehensive diagnosis. Next, unique challenges associated with Autism Spectrum Disorder in high ability youth are identified, including current conceptualization, assessment, and treatment considerations. Due to identified gaps in consistent understanding of Autism Spectrum Disorder presentation, including Autism Spectrum Disorder in high ability youth, the author conducted two complementary studies. The first of these studies evaluated consistency in parent ratings on Autism Spectrum Disorder screening tools across previously used diagnostic labels (i.e., Autistic Disorder (AD), Asperger's Syndrome (AS), and Pervasive Developmental

Disorder, Not Otherwise Specified (PDD-NOS)) now subsumed under Autism Spectrum Disorder diagnostic criteria in the DSM-5. The second study analyzed Autism Spectrum Disorder symptoms reported by parents of high ability youth. Data collection for this latter study included a novel research measure intended for identifying symptoms associated with high ability Autism Spectrum Disorder. Items on this form were derived through a card sort of items included in current symptom screening tools completed by content area experts. Additionally, this novel research measure included an open-ended item for parents of high ability youth to report additional symptoms.

Results from the first study suggest that parents of children diagnosed with AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified do not differentially report symptoms on two current Autism Spectrum Disorder screening tools: (1) The Social Responsiveness Scale (SRS; Constantino & Gruber, 2005) and (2) the Autism Spectrum Screening Questionnaire (ASSQ; Ehlers, Gillberg, & Wing, 1999). Results from the second study provide evidence of parental perceptions of several nuances in symptom presentation associated with high ability youth with Autism Spectrum Disorder. Specifically, parents frequently endorsed impairment in development and maintenance of social relationships; however, insight into these weaknesses was not consistently reported as impaired. Additionally, restricted interests were acknowledged, with some parents identifying academic or pseudo-academic subjects as common areas of interest. The collective findings from these studies provide evidence of broad consistency in Autism Spectrum Disorder symptom presentation across previously used diagnoses, yet also unique symptom features for high ability youth. Implications for education, clinical practice, and research in both Autism Spectrum Disorder and twice-exceptionality are discussed.

PUBLIC ABSTRACT

Diagnosis of Autism Spectrum Disorder (ASD) recently shifted from a series of diagnoses to a single, comprehensive diagnosis. To evaluate the appropriateness in this shift, the current study evaluates the consistency in symptom presentation amongst the previous ASD diagnoses. Additionally, this study investigates ASD in high ability youth. Thus, the current study addresses discrete versus continuous symptom presentation in ASD, as well as ASD in high ability youth.

A review of literature on ASD and high ability youth is provided. Due to in understanding of ASD presentation, including ASD in high ability youth, the author conducted two complementary studies. The first of these studies evaluated parent ratings on ASD screening tools across previously used diagnostic labels now subsumed under ASD. The second study analyzed ASD symptoms reported by parents of high ability youth.

Results from the first study suggest that parents of children diagnosed with different previously used ASD diagnoses do not differentially report symptoms on two current ASD screening tools. Results from the second study provide evidence of parental perceptions of several nuances in symptom presentation for high ability youth with ASD. Specifically, parents frequently endorsed less impairment in insight into social weaknesses and common restricted interests of academic or pseudo-academic subjects. The collective findings from these studies provide evidence of broad consistency in Autism Spectrum Disorder symptom presentation across previously used diagnoses, yet also unique symptom features for high ability youth. Implications for education, clinical practice, and research in both Autism Spectrum Disorder and twice-exceptionality are discussed.

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CHAPTER 1

INTRODUCTION

The ability to socialize and connect to others through empathy and understanding is a defining feature of the human experience. As the great Mohandas Gandhi once stated, "interdependence is and ought to be as much the ideal of man as self-sufficiency. Man is a social being" (Gandhi, 2011, p.1). If this statement is true, what then does it mean for a person who has difficulty connecting to others? Would that person be any less ideal than a peer who easily converses with others and engages in social interactions? Unfortunately, the difficulty to socialize and connect to others is a common experience for children with Autism Spectrum Disorder (Autism Spectrum Disorder; Wing & Gould, 1979). According to the most recent United States census data and the Center for Disease Control (Baio, 2014), millions of individuals struggle with impairments associated with Autism Spectrum Disorder.

Most recent prevalence estimates suggest that 1 in 68 children and adolescents in the United States have Autism Spectrum Disorder, including one boy out of every 42 (Baio, 2014). The financial costs for families of children diagnosed with Autism Spectrum Disorder are substantial. Lord and Bishop (2010) reported that American and British families' lifetime costs of raising a child diagnosed with Autism Spectrum Disorder was 3 to 5 million US dollars more than typical costs for families of children without Autism Spectrum Disorder and Ganz (2007) proposed an estimate of 3.2 million US dollars primarily due to lost earnings and productivity. Regarding societal costs, Lord and Bishop (2010) estimated Autism Spectrum Disorder present over 90 billion dollars per year of economic impact while more moderate estimates (e.g., Ganz, 2007) projected costs of over 25 billion dollars per year. Clearly, Autism Spectrum Disorder

represents a broad-reaching and devastatingly costly mental health concern. Fortunately, the impact of Autism Spectrum Disorder has not gone unrecognized in the academic and clinical communities.

Outcomes for Autism Spectrum Disorder diagnoses have considerably improved over the past 50 years due to refinements in assessment, and treatment options (Goldstein & Ozonoff, 2009). Exposure to the "autism phenomena" is unavoidable to any American walking through a local library or watching a moderate amount of television news programming. However, the majority of the research contributing to such immense public and professional attention has focused on traditional presentations, akin to those identified by Leo Kanner and Hans Asperger during the mid-20th century (Asperger, 1949; Kanner, 1943). Unfortunately, while care for individuals with Autism Spectrum Disorder has improved, clarity regarding clinical definitions of Autism Spectrum Disorder has been lacking.

Terminology for Autism Spectrum Disorder originated as a reference to a "spectrum" of diagnoses (Wing & Gould, 1979) included in previously used versions of the Diagnostic and Statistical Manual of Mental Disorders, such as the recent 4th Edition (DSM-IV-TR; American Psychiatric Association, 2000). These diagnoses included Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified. The terminology of "spectrum" referred to the shared symptoms often seen across all 3 diagnoses. Revisions to the updated Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; American Psychiatric Association, 2013) collapsed these 3 diagnoses into a single diagnosis of Autism Spectrum Disorder. To reflect the heterogeneity of presentation, Autism Spectrum Disorder is now coded to

reflect the extent of impairment: Level 1 (Requiring Support), Level 2 (Requiring Substantial Support), and Level 3 (Requiring Very Substantial Support).

Within the DSM-5, Autism Spectrum Disorder symptom criteria were shifted from a 3-factor model (restricted and/or repetitive behaviors, socialization, communication) to a 2-factor model (restricted and/or repetitive behaviors, social communication). This change occurred in response to several studies investigating the factor structure of Autism Spectrum Disorder (Frazier et al., 2012; Mandy, Charman, & Skuse, 2011). Of note, concern has been expressed regarding the sensitivity and specificity of Autism Spectrum Disorder criteria due to the change in symptom categories (Worley & Matson, 2012). Changes from a cluster of diagnoses to a single Autism Spectrum Disorder diagnosis has produced considerable debate amongst health care providers and researchers active in the Autism Spectrum Disorder community (e.g., Lord et al., 2012; Matilla et al., 2011; Mayes, Black, & Tierney; Lord et al., 2012). Supporters for this shift to a single Autism Spectrum Disorder diagnosis (e.g., APA, 2011; Lord et al., 2012) discuss the lack of consistent agreement between the previous DSM-IV-TR diagnostic groups of Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified (Pervasive Developmental Disorder, Not Otherwise Specified). While clinicians consistently agreed upon a child having one of the three Autism Spectrum Disorder diagnoses within the DSM-IV-TR, there was lack of consistent agreement upon which label was appropriate (Matilla et al., 2011). In opposition to these changes are concerns about potential lack of sensitivity in recognizing some presentations of Autism Spectrum Disorder (Mayes, Black, & Tierney, 2013; Taheri & Perry, 2012; Worley & Matson, 2012), as well as the removal of Asperger's

Syndrome as a recognized diagnosis (Parry, 2013). As the DSM-5 has been in use for a very short duration, further exploration into the costs and benefits of these changes is necessary.

During development of the DSM-5, including publication of the proposed criteria for Autism Spectrum Disorder (APA, 2011), several studies investigated the sensitivity of these new diagnostic criteria. Early findings have included both support and criticism. Supportive arguments have emphasized improvement in the specificity of Autism Spectrum Disorder diagnoses with minimal reductions to sensitivity (Lord et al., 2012). Criticisms have been broad and included concerns such as a potential lack of reliable identification of high-functioning autism (Mayes et al., 2014; Young & Rodi, 2013).Discrepancies such as these understate the need for additional studies investigating the qualitative and qualitative symptom presentation across individuals diagnosed with Autism Spectrum Disorder. Such studies are particularly necessary in the evaluation of previously used DSM-IV-TR diagnostic groups in the context of a single, comprehensive diagnostic group within the DSM-5. Additionally, there is a significant gap in professional knowledge regarding the performance of these new criteria in individuals who are gifted but also present with substantial Autism Spectrum Disorder symptomology. While concern has been raised about the broad population of "high-functioning autism" (e.g., Young & Rodi, 2013), no current studies have addressed DSM-5 Autism Spectrum Disorder criteria as applied to gifted individuals.

Twice-exceptionality is defined as the presence of both giftedness and any disability recognized in IDEA (Reis, Baum, & Burke, 2014). Unfortunately, individuals within this group have received far less support in the form of identification and

treatment services, which are critical for providing an opportunity to thrive through adversity. Children who are both gifted/talented and have Autism Spectrum Disorder face a unique combination of challenges, such as the deficits in social communication and rigidity associated with Autism Spectrum Disorder, as well as difficulties identifying with same-age peers and lack of challenge in academic settings (Foley Nicpon, Doobay, & Assouline, 2010; Neihart, 2000). Identification of these individuals is challenging, in that giftedness may mask the Autism Spectrum Disorder difficulties, while Autism Spectrum Disorder symptoms may overshadow giftedness (Assouline, Foley Nicpon, & Huber, 2006; Assouline, Foley Nicpon, & Doobay, 2009; Morrison & Rizza, 2007). Furthermore, some behaviors can be associated both with Autism Spectrum Disorder and intellectual giftedness. For example, individuals who are either intellectually gifted or diagnosed with Autism Spectrum Disorder may frequently ask questions and demonstrate fascination with specific interests. This overlap further complicates dual-identification of giftedness and Autism Spectrum Disorder (Neihart, 2000).

To provide sensitive and specific evaluations, as well as effective interventions to individuals who are twice exceptional, further investigation into the presentation of twice-exceptionality is necessary. Similar to the need to understand quantitative and qualitative symptom features across all presentations of Autism Spectrum Disorder, there is a need for symptom clarity in the diagnosis and conceptualization of twice-exceptionality. Specifically, there is a need to better define features of twice-exceptional Autism Spectrum Disorder due to the potential challenges of giftedness overshadowing Autism Spectrum Disorder symptoms, Autism Spectrum Disorder symptoms

overshadowing giftedness, and behavioral characteristics categorized both as features of Autism Spectrum Disorder and giftedness.

Importance of Study

Assessment is the first step toward intervention (Sattler, 2008), and assessment relies on well-founded theory, thus it is vital that counseling psychologists improve their understanding of Autism Spectrum Disorder. While this study does not address the delivery of interventions, it contributes to improvement of services provided to individuals with Autism Spectrum Disorder through refinement of professional conceptualization of both broad Autism Spectrum Disorder and Autism Spectrum Disorder in high-ability youth. Specifically, investigation of Autism Spectrum Disorder evaluation must consider both the broad issues of discrete versus continuous presentations of Autism Spectrum Disorder (e.g., use of DSM-5 or DSM-IV-TR coding systems) as well as investigation into how we evaluate potential phenotypical variance within Autism Spectrum Disorder presentation, such as twice-exceptionality. Another collective contribution of these studies lies in the promotion of clinical considerations for counseling psychologists. Many counseling psychologists work with individuals across the lifespan and engage in assessment and evaluation as an aspect of clinical practice. Additionally, many counseling psychologists are employed in college settings, where they are likely to interact with higher ability individuals who may present with concerns consistent with Autism Spectrum Disorder or twice exceptionality. Thus, both studies enhance clinical awareness of counseling psychologists when working with Autism Spectrum Disorder referrals. Study 1 also addresses the balance between research and practice maintained in counseling psychology. Most counseling psychologists adhere to

a scientist-practitioner model of clinical practice; science informs practice and practice informs science. The balance of these two manifestations of psychology is imperative to ensure the validity and professionalism of clinical practice as well as to steer research into areas of clinical importance. In the case of assessment and evaluation, practice can only progress and evolve through ongoing studies addressing the features of Autism Spectrum Disorder. Counseling psychologists provide emphases on individual strengths and resilience, as well as individual empowerment, both of which deserve a place within the current, vibrant discussion of Autism Spectrum Disorder conceptualization (e.g., Lord et al., 2012).

Another important contribution of study 1 to counseling psychology lies within the field's commitment to developmental models. The field of autism evaluation was borne from the medical community and remains entrenched in the dogma of physicians and psychiatrists. While counseling psychologists reflect only a fraction of mental health providers for children and adolescents, their role should not be underestimated. As a field, counseling psychology recognizes the importance of developmental models, in addition to traditional medical models of practice. Sharing this perspective is important not only for the clients, many of whom have little to no experience with either psychology or medicine, but also with regards to maintaining balance within the body of autism literature. Investigations undertaken by counseling psychology inherently take on a developmental and multicultural perspective in contrast to the more prevalent medical and genetic articles.

Finally, this study adds to the clinical and academic discourse addressing conceptualization and diagnosis of Autism Spectrum Disorder. As previously mentioned,

studies have reported inconsistency amongst classification within the DSM-IV-TR (e.g., APA, 2011), as well as discrepancies in symptom presentation across DSM-IV-TR diagnoses (e.g., Matilla et al., 2011). However, there is a lack of research investigating quantitative symptom features across DSM-IV-TR groups on commonly used symptom screening measures. Thus, this study contributes to Autism Spectrum Disorder screening through addressing consistency amongst DSM-IV-TR codes; an evaluation of consistency in parent report across AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified provides specificity considerations for Autism Spectrum Disorder.

Study 2 addresses the importance of counseling psychology within the field of twice exceptionality. Investigation of unfamiliar phenomena, such as twice-exceptionality, presents a unique opportunity for counseling psychologists to integrate emphasis on individual strengths with consideration of weaknesses in need of support and empowerment. To provide these services to the twice-exceptional community, counseling psychologists should have a thorough understanding of the tools necessary for psychological evaluation, just as a physician must understand the chemical mechanisms underpinning a medication. Selection of screening tools for Autism Spectrum Disorder should be founded in familiarity with context-specific validity and reliability evidence for such tools. This study will provide such evidence for counseling psychologists working with children and adolescents who are twice-exceptional.

Finally, Study 2 also considers the role that counseling psychologists fill in empowering underserved populations. While intellectual disabilities have garnered public and academic attention for decades (Goldstein & Ozonoff, 2009), intellectual giftedness is rarely recognized as an aspect of diversity and receives far less funding and

academic interest (Colangelo, Assouline, & Gross, 2004; McCullum et al., 2013). Thus, we still have much to learn about the experiences and salient identity factors of twice-exceptional children and adolescents, a group deserving of the title "underserved population." Research addressing twice-exceptional children and adolescents will improve our understanding of the experiences and challenges they face.

Constructs

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) refers to a presentation consisting of communication difficulties, social impairment, and odd/unusual/eccentric behaviors (Wing & Gould, 1979). It is also the current diagnostic code within the DSM-5 that includes 2 core features of symptomology: (1) impairment in social communication and (2) presence of rigidity, restricted interests, and/or repetitive behaviors (APA, 2013). Prior to the publication of the DSM-5, Autism Spectrum Disorder referred to several pervasive developmental disorders with shared presenting symptoms within the DSM-IV-TR (APA, 2000). Recognition of common features associated with the previously used diagnoses was well supported by the psychological community (APA, 2011; APA, 2013; Lord et al., 2012; Volker & Lopata, 2008; Wing, 1997; Wolff, 2004). However, review of national samples and broad clinical practice demonstrated poor specificity between these diagnoses, despite agreement that a child presented with features of Autism Spectrum Disorder (Lord et al., 2012). The extent of similarity across these previously recognized diagnoses has been a topic of considerable debate (e.g., Lord et al., 2012).

To address these concerns of reliable diagnosis, the current psychiatric diagnostic manual (DSM-5; APA, 2013) collapsed all pervasive developmental diagnoses into a

single diagnosis, Autism Spectrum Disorder (ASD; APA, 2013). It is important to acknowledge that professional disputes over connections between diagnoses such as the DSM-IV-TR diagnoses of AD and AS co-exist with theoretical and clinical evidence supporting a continuum of functioning and impairment (e.g., Wolff, 2004). This continuum is the currently accepted diagnostic coding in both the DSM-5 (APA, 2013) and ICD-10 (World Health Organization, 2001). For this study, Autism Spectrum Disorder will refer to an individual diagnosed with Pervasive Developmental Disorder, Not Otherwise Specified, Asperger Syndrome, or Autistic Disorder as defined by the DSM-IV-TR criteria.

Twice-Exceptionality

In discussing findings from the National Commission of Twice Exceptional Students, Reis, Baum, and Berke (2014) provide the following definition of the twice exceptional learner: "Twice exceptional learners are students who demonstrate the potential for high achievement or creative productivity in one or more domains… and who manifest one or more disabilities as defined by federal or state eligibility criteria." Clearly, these non-specific terms include a wide variety of disabilities and talents/gifts. For this study, giftedness will be operationalized as superior intellectual functioning, as measured by a standardized measure of intelligence. In order for a subject to be identified as having intellectual functioning within the superior to very superior range, he or she must score well above the mean for their age group (Standard Score=120 and above; 91st percentile) in one or more of the following intellectual domains: Overall functioning, verbal reasoning, or non-verbal reasoning. For this study, the only intellectual measures

included are the Wechsler Adult Intellectual Scales, 4th Edition (WAIS-IV) and the Wechsler Intelligence Scales for Children, 4th Edition (WISC-IV).

Additionally, the only disability considered for this study is Autism Spectrum Disorder. No information was gathered for co-morbid diagnoses (e.g., concurrent diagnoses of Attention-Deficit/Hyperactivity Disorder, Specific Learning Disorder, etc.). While twice exceptional learners represent significant breadth in both areas of talent and disability (Reis, Baum, & Burke, 2014), this study has limited the operational definition to co-morbid intellectual giftedness and Autism Spectrum Disorder.

Current Study

Two studies were conducted to collectively address research questions investigating our understanding of Autism Spectrum Disorder presentation. Within the first study, the following research question was asked: What are the similarities and differences in parent symptom report across children diagnosed with DSM-IV-TR criteria of Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified? Thus, the first study evaluated the diagnostic shift within the DSM-5 (APA, 2013) to address the appropriateness of a single diagnostic code for Autism Spectrum Disorder. To evaluate this research question, parent ratings were analyzed on Autism Spectrum Disorder screening tools, resulting in comparisons between symptom report for Autistic Disorder (AD), Asperger's Syndrome (AS), and Pervasive Developmental Disorder, Not Otherwise Specified diagnoses. Thus, comparisons in this first study illustrate similarities and differences in parent perceptions of behavior presentation between children/adolescents with different diagnoses used in DSM-IV-TR coding (APA, 2000).

Within the second study, the following questions were addressed: (1) To what extent do currently recognized Autism Spectrum Disorder symptoms reflect the behavioral presentation of high ability students with Autism Spectrum Disorder? and (2) What additional behavioral challenges do parents of twice-exceptional children identify beyond those addressed in the combination of current Autism Spectrum Disorder screening tools? The second study involved parents of twice-exceptional children/adolescents responding to a questionnaire tapping into multiple content domains associated with Autism Spectrum Disorder. The general content areas for this questionnaire were developed through a content search of items in currently used Autism Spectrum Disorder screening tools. These content areas were then evaluated using a card sort technique completed by two Autism Spectrum Disorder content area experts, resulting in the development of a unique 20-item Likert-type research tool. Finally, an open-ended item was provided to parents of high ability students with Autism Spectrum Disorder to ascertain additional areas of content not addressed by the Likert-type questionnaire items.

The collective goal of these studies was to improve clinical understanding of Autism Spectrum Disorder. The first study contributes to current practice through evaluating the continuity versus categorical differences amongst previously utilized diagnostic criteria. The second study then evaluates unique symptom presentation considerations for high-ability youth. Both studies utilize parent perceptions of Autism Spectrum Disorder behaviors in youth to address these goals.

CHAPTER 2

LITERATURE REVIEW

Public and professional recognition of Autism Spectrum Disorder (ASD) has blossomed over the previous 60 to 70 years. The presentation of symptoms now associated with Autism Spectrum Disorder would have yielded a diagnosis of childhood schizophrenia during the mid-20th century (Goldstein & Ozonoff, 2009). Moving to the 21st century, federal, state, and private funding, in conjunction with considerable public interest, fuel research investigating diagnosis, etiology, prognosis, intervention, and policy regarding Autism Spectrum Disorder. Prior to the publication of the DSM-5 (APA, 2013), there were 3 distinct diagnoses included in the Spectrum Disorder label: Autistic Disorder (AD), Asperger's Syndrome (AS), and Pervasive Developmental Disorder, Not Otherwise Specified (Pervasive Developmental Disorder, Not Otherwise Specified; APA, 2000). Unfortunately, while clinicians often agreen on whether or not an individual met diagnostic criteria for one of these diagnoses, agreement upon the specific diagnostic label was inconsistent (APA, 2013; Lord et al., 2012). This inconsistency led to the development of a single Autism Spectrum Disorder within the DSM-5 (APA, 2013). The shift to a single diagnosis has sparked considerable debate over the necessity of specificity in Autism Spectrum Disorder diagnoses (e.g., Lord et. al., 2012), as well as concern over lack of sensitivity in identifying individuals with Autism Spectrum Disorder (e.g., Kulage, Smaldone, & Kohn, 2014; McPartland, Reichow, & Volkmar, 2012). Unfortunately, considerably less attention has been given to individuals who meet criteria for Autism Spectrum Disorder along with co-morbid strengths, such as intellectual giftedness (e.g., twice-exceptionality). Thus, identification and treatments are less informed for Autism Spectrum Disorder in high ability individuals.

This review will begin by focusing on conceptualization of Autism Spectrum Disorder within both medical and psychological contexts. Historical cultural trends and significant legal proceedings will be incorporated into this discussion to provide a comprehensive overview of the events and individuals that evolved autism evaluation to its current standing. Emphasis is provided for the ongoing debate for discrete versus continuous Autism Spectrum Disorder diagnostics. Next, the current policies, procedures, and tools used for Autism Spectrum Disorder diagnosis and evaluation will be analyzed. This section will additionally provide a brief review of comprehensive diagnostic tools, and current treatment models and interventions. Psychometric and clinical properties of current Autism Spectrum Disorder screening tools will be critiqued and discussed. Finally, a review of research investigating Autism Spectrum Disorder in high ability youth will be provided.

What is Autism Spectrum Disorder?

Autism Spectrum Disorder is a mental health disorder in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; APA, 2013). Diagnostic criteria for the disorder include difficulties in social interactions (e.g., impairment of nonverbal behaviors, lack of social reciprocity) and communication (e.g., impairment in sustaining conversation, stereotyped language), as well as rigidity, restricted interests, and/or repetitive or stereotyped behaviors (e.g., mannerisms or non-functional play). All individuals diagnosed with Autism Spectrum Disorder are recognized as needing supportive services and accommodations in several aspects of functioning (e.g., at home, in school, or in social situations). However, a coding system is provided within the DSM-5 to describe whether an individual "requires some support" (Level 1), "requires

substantial support" (Level 2), or "requires very substantial support" (Level 3; APA, 2013).

Presenting Concerns Associated with Autism Spectrum Disorder

Social Skills Deficits

Difficulty engaging in and understanding social interactions is a core feature of Autism Spectrum Disorder (Goldstein & Ozonoff, 2009). Possible symptoms in this area include lack of desire to seek connections with peers, failure to respond to vocal or visual attempts to gain attention, and avoidance of eye contact (Johnson & Myers, 2007). Another noted symptom is a lack of shared attention focusing on some environmental stimulus between two or more individuals, or joint attention (Charman, 2003; Sigman, Dijamco, Gratier, & Rozga, 2004). Similarly, Autism Spectrum Disorder presentation can be marked by a deficit in "theory of mind," or the ability to understand the thoughts or emotions of another individual (Baron-Cohen, Leslie, & Frith, 1985). This area of weakness can result in individuals with Autism Spectrum Disorder misjudging or misperceiving their environment, resulting in an increased likelihood of seemingly odd behaviors or comments. Due to these previously described difficulties, along with many other associated features of Autism Spectrum Disorder (e.g., communication impairments and odd/eccentric behaviors), both the quality and quantity of relationships often are diminished (Cash, 1999; Johnson & Myers, 2007).

Communication and Play Skills Deficits

Although speech impairment was considered a core feature of Autistic Disorder (APA, 2000), other diagnoses now categorized under Autism Spectrum Disorder have far less associated speech impairment (e.g., lack of language development delays in Asperger

Syndrome). Examples of these speech challenges include but are not limited to lack of speech, scripted speech (e.g., use of "stock" phrases regardless of conversation context), pop-up words (e.g., out-of-context speech that is overused for a brief period of time, then rapidly becomes extinct), and parroting (e.g., repetition of speech from others communicating with the individual with Autism Spectrum Disorder; Johnson & Myers, 2007). In conjunction with more language-based difficulties, studies have demonstrated a weakness in the use of expressive prosody (e.g., intonations and fluctuations in tone of speech (McCann, Peppé, Gibbon, O'Hare, & Rutherford, 2007). Additionally, regression of speech is seen in roughly 1 out of 4 children with Autism Spectrum Disorder between the 1st and 2nd year (Tuchman & Rapin, 1997). This regression can present as gradual or sudden and ranges from children ceasing all speech to reliance on previously mentioned speech characteristics (e.g., parroting, scripted speech, etc.). Children diagnosed with the previously utilized AS code often presented with only mild to moderate communication impairment, which has been described as very formal speech, which led to the term "little professor" (Johnson & Myers, 2007).

Symptoms including deficits in imaginative play or conversation are also associated with Autism Spectrum Disorder (APA, 2013). These symptoms may present as a difficulty associating imaginative features with tangible objects (e.g., pretending that a paper clip is a character in a story) or difficulty discussing topics of fantasy (e.g., pretending they are a pirate or a wizard). Perseverative play is also often associated with Autism Spectrum Disorder, that is, repetitive and non-functional repetition of a play behavior (Johnson & Myers, 2007).

Revision to Social and Communication Deficits

Social and communication deficits were accepted as 2 distinct sources of impairment in Autism Spectrum Disorder within the previous diagnostic manual, the DSM-IV-TR (APA, 2000). However, Lord et al. (2012) addressed the considerable symptom overlap present between social and communication impairments. Specifically, in the proposal for DSM-5 criteria for Autism Spectrum Disorder, it was stated, "Deficits in communication and social behaviors are inseparable and more accurately considered as a single set of symptoms with contextual and environmental specificities" (APA, 2010). It is important to note that concern has been expressed over reductions in sensitivity due to use of more stringent diagnostic criteria (e.g., Hazen, McDougle, & Volkmar, 2013). Kuhlane, Smaldone, and Kohn (2014) reported potential drops in identification of children previously diagnosed with Pervasive Developmental Disorder, Not Otherwise Specified and AD, while children diagnosed with AS were at less risk to not be diagnosed. For the purposes of this study and to promote adherence to current clinical practice, deficits in socialization and communication will be evaluated as a collective.

Restricted, Repetitive, and/or Rigid Behaviors

The final core area of Autism Spectrum Disorder skills deficits lies in restricted, repetitive, and/or rigid behaviors. Stereotyped behaviors have been associated with a variety of developmental disorders, those most often associated with Autism Spectrum Disorder include finger flicking, odd eye gaze, regular use of toe walking, and smelling/licking non-food items (Shea & Mesibov, 2009). Difficulty with changes in routines and intense interest in specific topics or objects are also considered symptoms of Autism Spectrum Disorder (Neihart, 2000). Alterations to activities such as preparation

for school or placing favorite objects in new locations can result in tantrum behaviors and "shutting down." Finally, children/adolescents with Autism Spectrum Disorder may present as either hyperactive or uncoordinated. High activity level associated with Autism Spectrum Disorder, in conjunction with symptoms of inconsistent attention and seeming distractibility in many settings, can often result in parent and/or clinician misperception of an attention-deficit (Shea & Mesibov, 2009). Of note, this behavior component of Autism Spectrum Disorder presentation may be moderated by intelligence (Matson, Dempsey, LoVullo, & Wilkins, 2008). Further, shifts in DSM-5 criteria allow for concurrent diagnoses of Autism Spectrum Disorder and Attention-Deficit/Hyperactivity Disorder (APA, 2013).

Etiology

The etiology of Autism Spectrum Disorder is nearly as broad as the heterogeneity of its presentation. At this time, medical and psychological research communities agree that Autism Spectrum Disorder is a biologically founded neurodevelopmental disorder marked by high genetic heritability (Bailey, Phillips, & Rutter, 1996; Hoffman, 2009; Institute of Medicine Immunization Safety Review Committee, 2004; Johnson & Myers, 2007). Neurogenetic disorders such as Fragile X syndrome, neurocutaneous disorders, Phenylketonuria, Fetal Alcohol Syndrome (FAS), Angelman syndrome, Rett syndrome, Smith-Lemli-Opitz syndrome have all been suggested as potentially causal factors for Autism Spectrum Disorder development (Johnson & Myers, 2007). Despite this genetic foundation, environmental factors have been demonstrated to impact the phenotype of Autism Spectrum Disorder. Advanced maternal and paternal age may increase risk of Autism Spectrum Disorder development (Croen et al., 2008), along with environmental

toxins during the prenatal, perinatal, and post-natal points of gestation and birth (Johnson & Myers, 2007). Despite popular belief about the risk of the Measles, Mumps, and Rubella (MMR) vaccine, an investigation by the Institute of Medicine suggested no causal link between the vaccine and Autism Spectrum Disorder (Institute of Medicine Immunization Safety Review Committee, 2004). In summary, Autism Spectrum Disorder is a biological disorder that may be altered by environmental factors. Autism Spectrum Disorder was not always such a concisely defined syndrome; the development of autism conceptualization will now be addressed.

History of Autism Spectrum Disorder Conceptualization

The history of Autism Spectrum Disorder diagnostics is brief, yet includes fascinating changes in recognition, conceptualization, assessment, and treatment. This review of literature will begin with a historical overview of Autism Spectrum Disorder. A brief introduction for autism will be provided, covering important historical figures and contextual elements. Second, the progression of autism evaluations and assessment will be reviewed. Finally, new directions for the 21st century in autism assessment will be considered, including recommendations from professional organizations.

The Changing Labels of Autism Spectrum Disorder

Features of Autism Spectrum Disorder have been identified as early as the late 18th century with the "feral child" raised by Jean Itard or the mid 19th century by Harold Maudley, a physician investigating childhood insanity (Goldstein & Ozonoff, 2009). During the early 20th century, Eugene Bleuler, a Swiss psychiatrist, became the first individual to truly study the disorder as a collection of symptoms, coining the term "autismus" (Bleuler, 1950). Bleuler's clinical research focused primarily on

schizophrenia, and he considered autism to be a form of childhood schizophrenia, where the individual is withdrawn into the internal state. In fact, the term autismus was created through combining Greek words for "self" and "action or state," meaning that individuals with autismus were drawn or involved within the self (Goldstein & Ozonoff, 2009).

Little progress was made during the early 20th century, and it was not until the mid-20th century that well disseminated academic literature was developed, beginning with the work of Leo Kanter. In 1943, Kanter developed the term "autism" as a shortened label for the diagnosis identified by Dr. Bleuler (Wolff, 2004). It is important to note that Kanter's credit for coining the term autism is contended in the academic literature. Feinstein (2010) credits Hans Asperger, the clinician for whom Asperger Syndrome was named, for using the term "autistic" as early as 1834. In his text, Feinstein questioned how Kanner, a prominent researcher in his era, could have identified foreign and domestic academic contributions to research on his autism, yet fail to recognize the work of Asperger, a fellow countryman. Although Kanner and Asperger did not collaborate, their collective works contributed heavily to initial understanding of Autism Spectrum Disorder. Mesibov and colleagues (2000) contend that Kanner argued against autism being a form of schizophrenia, yet the general consensus at the time was that the common features shared between autism and childhood schizophrenia were significant enough to consider a shared etiology. It was not until the 1970s and the rise in recognition of developmental disorders that autism truly broke off from psychotic disorders (Goldstein & Ozonoff, 2009).

One aspect of research conducted during this time span that has been widely disputed is the etiology of autism. Kanner's work spawned a general belief that autism

was created by cold, unloving parenting, resulting in the term "refrigerator mothers" (e.g., cold and non-loving caretakers of children; Goldstein & Ozonoff, 2009). Unfortunately, it was not until the 1960's that this belief was contended and disproven, largely in part due to significant interest in parent groups. Current literature has demonstrated average to above average warmth and involvement from parents of children with autism, in comparison with parents of non-autistic children (Feinstein, 2010).

The developmental disorder movement was shaped by recognition of many difficulties children may endure, including Rett's Syndrome and Childhood Disintegrative Disorder. Contextually, services for disabilities were becoming a national focus during this time period, including federal funding and public interest (Feinstein, 2010). Perhaps the defining moment in this movement was the passing of the Education for All Handicapped Children Act (EAHCA) in 1970, which was renamed the Individuals with Disabilities Act in 1990. Significant conceptualization changes in the mental health community became apparent in the Diagnostic and Statistical Manual, 3rd Edition (DSM-III), which split autism from childhood schizophrenia into the developmental disorders and disorders of early childhood (APA, 1980). By the time the revision to this manual (DSM-III-R) was published in 1987, full diagnostic criteria for autism were available, and by 1997, the 4th edition of the DSM (DSM-IV) included AS as a recognized diagnosis.

Conceptualization did not significantly change during the turn of the 21st century; however, the focus shifted to etiology, epidemiology, and prognosis of autism (Feinstein, 2010; Goldstein & Ozonoff, 2009). For example, notions of autism being the result of parenting have been rejected in favor of neurological hypotheses (e.g., Jiao et al., 2010).

Additionally, attention has been given to the prevention and early recognition of autism symptoms in home, hospital, and clinic settings (Johnson & Myers, 2007).

Autism Spectrum Disorder Diagnostic Changes in the DSM-5

Development of the DSM-5 resulted in a significant shift in conceptualization, most notably including the removal of Autistic Disorder, Asperger Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified, all of which are now subsumed under Autism Spectrum Disorder (APA, 2013). Rationale for this shift emphasized the lack of specificity amongst Autism Spectrum Disorder diagnoses (King, Veenstra-VanderWeele, & Lord, 2013). Additionally, the previously accepted 3 factor diagnostic manual, which included deficits in socialization, communication, and restricted/repetitive behaviors was collapsed into a 2-factor model: Social Communication and Restricted/Repetitive Behaviors. The rationale for this latter change was symptom overlap within the socialization and communication factors (King, et al., 2013), which is addressed through a parsimonious single symptom domain. Finally, to represent the heterogeneity of Autism Spectrum Disorder, a Level-based coding system was established. Within this system, Level 1 refers to an individual with clear impairments and need of "support", Level 2 refers in an individual in need of "moderate support", and Level 3 refers to an individual in need of "substantial support" (APA, 2013). The use of "support" in this context refers to the need for services and accommodations, such as behavioral therapy, speech and language therapy, occupational therapy, financial assistance, and educational assistance.

Considerable debate has persisted regarding the previously discussed combination of socialization and communication impairments into a single diagnostic factor (e.g.,

Stewart & Austin, 2009). Results from a national study assessing teacher, parent, and self-reported symptoms of Autism Spectrum Disorder through an exploratory factor analysis of the Autism Spectrum Rating Scales (ASRS; Goldstein & Naglieri, 2010) further support a single social communication factor. Similar evidence was provided through confirmatory factor analysis of the Social Responsiveness Scale, 2nd Edition (SRS-2; Constantino, 2013). In contrast, investigation of collateral reporting on the Gilliam Asperger's Rating Scale (GARS) supports discrepant reporting of socialization and communication symptoms (LeCavelier, 2005). While neither the 2 nor 3 factor model of Autism Spectrum Disorder is universally accepted at this time, the shift to a 2-factor diagnostic criteria model in the current DSM-5 (APA, 2013) bears clear influence on current clinical and research trends. As this 2-factor models of Autism Spectrum Disorder has clearly shaped the direction of practice and research, further investigation into the appropriateness of this model for all presentations of Autism Spectrum Disorder is necessary.

Concern regarding potential lack of identifying children previously diagnosed with AS has also been recognized (Kulage, Smaldone, & Kohn, 2014; McPartland, Reichow, & Volkmar, 2012). Contrary findings have been presented, which suggest only mild reduction in sensitivity that is justified through dramatic specificity improvement (e.g., Kim et al., 2014; Lord et al., 2012). Despite this conjecture on the tangent of Autism Spectrum Disorder identification, only time and further empirical investigation of Autism Spectrum Disorder-associated impairments will dictate the appropriateness of the new DSM-5 criteria.

History of Identifying and Diagnosing Autism Spectrum Disorder

Origins of Autism Spectrum Disorder Conceptualization

Early evaluations of autism, akin to early conceptualizations of autism, consisted solely of the judgment and observations of a small group of clinicians, all of whom practiced medicine through the mid-20th century (Feinstein, 2010). As with any psychological diagnosis in its infancy, evaluations were conducted primarily for research and proliferation of knowledge rather than treatment planning and psychoeducation (Goldstein & Ozonoff, 2009). In reviewing the literature, there is a lack of information regarding identification of Autism Spectrum Disorder before Eugene Bleuler's research in the early 20th century. One could reasonably assume that assessments of developmental disabilities or psychopathology would not focus on autistic features or recognize these symptoms when present. Further, the lack of a solid conceptualization meant that clinical formulations at this time lacked theoretical foundations.

Autism Spectrum Disorder in the era of Bleuler, Asperger, and Kanter

Unfortunately, early evaluations of autism conducted by Eugene Bleuler during the early 20th century have little documentation. However, the evaluation nonetheless grew under his era due to the formation of features that could hang together under a single diagnosis. Although Bleuler's "autismus" was spawned out of schizophrenia research, it was the first time features of Autism Spectrum Disorder, as we now understand it, were evaluated not as descriptions of another presenting concern, but of the previously utilized Autistic Disorder (e.g., DSM-IV-TR; APA, 2000). Similar faults of data collection over clinical treatment could probably be made about the work of Leo

Kanner and Hans Asperger, given that they were researchers by primary appointment and clinicians second (Feinstein, 2010).

Despite the lack of clinical tools other than the clinician's observations and judgment, the depth and intent of these subjective elements were now more informed. Evaluations during the mid-20th century emphasized 2 core features: speech and behavior (Klin, Saulnier, Tsatsanis, & Volkmar, 2005). In the case of a clean audiology report, speech was assessed through report or observation of echolalia (parroting or repeating of language), and/or limited, abnormal language. The second feature, behaviors, was evaluated through observation or report of stereotyped, repetitive, or eccentric behaviors. Documentation of what qualified in these categories includes classic autistic behaviors, such as hand flapping and rigid, non-functional gestures (Goldstein & Ozonoff, 2009). Because these features are more consistent with children with greater impairment (e.g., Level 2 or 3 in the DSM-5 or AD in the DSM-IV-TR), as opposed to conditions with less impairment on the autism spectrum (Gillberg, 1998; Wolff, 2004), it is possible that children now diagnosed with Autism Spectrum Disorder Level 1, or previously diagnosed with AS or High-Functioning Autism (HFA), would have failed to be identified as having Autism Spectrum Disorder.

It is important to note that some early screening tools were produced during the 1950s and 1960s; however, these tools solely focused on AD, as AS was not broadly recognized until the 1970s. Feinstein (2010) indicated that a checklist produced by C. G. Polan and B. L. Spencer in 1959 may be the first quantitative assessment tool developed for Autism Spectrum Disorder, serving as a prototype for all later screening tools. The questionnaire consisted of 30 items assessing five symptoms then associated with autism:

(a) social detachment, (b) language deviance, (c) disintegrative motor activities, (d) obsessiveness and "disruptive nervousness," and (e) "family nervousness." By combining his long-standing interest in accurate and reliable personality assessment (Rimland, 1962a; Rimland, 1962b) in conjunction with a budding interest in autism, Bernard Rimland published the Autism Checklist, Form E-2 in 1964. This form is available in the public domain and is still widely used in current studies (e.g., Jarusiewicz, 2002). Unfortunately, no normative updates have been made to this tool; thus, its use in these current studies may yield inaccurate findings due to the datedness of the standardization sample. Feinstein (2010) also recognized the work of Bertram Ruttenburg, who developed the first developmental screening tool for autism in 1966, the Behavior Rating Instrument for Autistic and Atypical Children (BRIAAC). Unlike the two previously mentioned behavioral checklists, the BRIAAC used developmental scales of observation, relying more heavily on clinician judgment. Procedures such as these are predecessors to tools such as the Autism Diagnostic Observation Schedules (ADOS; Lord, Rutter, Goode, Heemsbergen, & et al., 1989). The only other autism evaluation tool worth mention from this time period was is the Creak Committee diagnostic questionnaire, which was revised from an original 1961 version to a streamlined 54-item questionnaire in 1969 (Clancy, Dugdale, & Rendle-Short, 1969). The goal of this tool was to differentiate autism from disabilities such as mental retardation, deafness, and Cerebral Palsy.

Identifying Autism Spectrum Disorder within the Education for All Handicapped Children Act (EAHCA)

A similar rapid evolution in evaluation procedures for autism developed alongside the advancement in conceptualization and recognition during the 1970s. The passing of

EAHCA led to increased funding for evaluations as well as support from the public and federal agencies (Feinstein, 2010; Goldstein & Ozonoff, 2009). Furthermore, the presence of formal diagnostic criteria in the DSM-III and DSM-III-R (APA, 1980; APA, 1987) allowed space for specific procedures to identify the presence or lack of presence of the criteria. Feinstein (2010) recognized the inclusion of 3 important changes to the previous model assessing only behavior and language. First, cognitive evaluations were now considered standard practice to rule out the presence of an intellectual disability (e.g., mental retardation) or other form of cognitive impairment. Second, broad socialization was assessed; this key change followed in concert with the new diagnostic criteria of impaired social functions (DSM-III-R; APA, 1987). It is important to note that acknowledgement of individuals on the autism spectrum experiencing social impairment was not novel. Kanner in 1943, and Asperger in 1968, had discussed significant social impairment; however, their description of social impairment was under the context of the behavior and language delays causing difficulty, rather than lack of social reciprocity and theory of mind. Of note, Asperger's discussion of social impairment as a factor of autism may have actually precluded the work of Kanner (Feinstein, 2010). The third major change to these evaluations was the incorporation of historical information and development as central themes for the etiology of autism. The shift to focusing on the developmental process of these individuals can be drawn directly to the disability recognition movement of the 1970s.

It is also important to identify the different components that were introduced during this time period in comparison to previous evaluations. First, evaluators now included psychologists, social workers, and school psychologists alongside the physicians

who had been conducting these evaluations prior to the Individuals with Disabilities Act (Goldstein & Ozonoff, 2009; Johnson & Myers, 2007). Second, these alterations shifted the focus from piecemeal, subjectively founded evaluations, to data driven, comprehensive assessments. The judgment of the clinician was supplemented with objective measures of intellectual ability, as well as a broad increase in the use of screening tools to determine the need for an evaluation. Screening tools filled an important role in preventing needless costs for parents of children without Autism Spectrum Disorder, but presenting with Autism Spectrum Disorder features. For children identified at risk for Autism Spectrum Disorder impairment through screening and surveillance, the comprehensive evaluation model has been the standard and considered best practice for autism evaluations since the beginning of the 21st century (Feinstein, 2010).

The post-EAHCA climate for autism evaluation saw the incorporation of systematic observations schedules (Feinstein, 2010). These tools allowed a clinician to supplement clinical judgment of observed behaviors with normative comparisons. First among these tools was the Handicap, Behavior, & Skills (HBS) Schedule, which developed a systematic method for collecting behavioral observations (Wing & Gould, 1978). A few years later, the Behavior Observation Scale (BOS) was developed (Freeman, Ritvo, & Schroth, 1984). In addition to systematically collecting observed behaviors, this tool was used both for diagnosis and response to intervention. However, the HBS and BOS were soon overshadowed by a more popular observation system. In 1989, the current gold-standard autism diagnostic tool was created: the ADOS (Lord et al., 1989), which has since been revised to the ADOS-2 (Lord et al., 2012). The ADOS-2

provides objective, normative, diagnostic data, which helped establish confidence in the validity and reliability of autism evaluations in the eyes of the public and other professionals. The ADOS-2 will be described in greater detail within the upcoming "Current Trends in Autism Research" section.

Wing and Gould would later publish the Diagnostic Interview for Social and Communication Disorders (DISCO; Wing, Leekam, Libby, Gould, & Larcombe, 2002), a currently used observation schedule. In contrast to the ADOS-2, the DISCO does not aim to diagnose Autism Spectrum Disorder, but rather combines an individual's advantages, problems, and skills; thus, its use in primarily as a stepping stone to intervention and benchmark for improvement.

Along with these more comprehensive measres came an explosion of screening tools, scholarly articles, books, and professional presentations addressing the evaluation of autism (Feinstein, 2010). Some screening tools of particular note developed during this time include the Autism Behavior Checklist (ABS; Krug, Arick, & Almond, 1980), Child Autism Rating Scale (CARS; Schopler, Reichler, DeVellis, & Daly, 1980), and the Checklist for Autism in Toddlers (CHAT and Q-CHAT; Allison et al., 2008; Baron-Cohen, Allen, & Gillberg, 1992). Federal funding and public interest had expanded the practice of evaluating autism from a purely scholarly pursuit to a financially lucrative practice.

Autism Spectrum Disorder in the 21st Century

Perhaps the most significant change in autism evaluation during the 21st century has been the emphasis on prevention and early recognition (Feinstein, 2010; Goldstein & Ozonoff, 2009; Wolff, 2004). For example, organizations such as the American Academy

of Neurology and the Child Neurology Society have developed recommendations for the screening process, as well as specific recommendations for genetic testing/screening. Organizations such as the American Association of Pediatrics have provided specific guidelines for the steps and procedures of autism spectrum evaluations (Johnson & Myers, 2007). The following are examples of contributions from these guidelines: (a) Surveillance and screening algorithm to evaluate appropriate developmental markers and need of a comprehensive evaluation; (b) elements that must be included for an evaluation to be considered comprehensive; and (c) review of the clinical features and psychometric properties of well-published and documented autism spectrum screening tools. Of note, the recommendations and considerations produced by these organizations are targeted for physicians; however, the ideals and standards of practice are transferable to all mental health professionals.

As we look beyond the infancy of the 21st century, what changes can be anticipated for autism evaluations? One could reasonably predict that the prevention focus will increase as parents undergo genetic testing. Additionally, some evidence exists supporting the use of Magnetic Resonance Imaging (MRI) to identify lack of brain development in the left hemisphere at age 2-3, which is commonly associated with impairments associated with autism (Jiao et al., 2010). Beyond improvements in how reliably and accurately we can predict autism, significant changes to evaluation will only take place following improved conceptualization and theoretical understanding of autism. With each publication of a diagnostic or screening tool, the professional community enriches its understanding of how to effectively recognize autism.

Summary of Autism Conceptualization over the Past 100 Years

Initial conceptualizations of Autism Spectrum Disorder, specifically the term "autism," painted an image of a psychotic disorder of childhood with pronounced delays in language combined with odd or eccentric behaviors. However, as clinicians such as Leo Kanter and Hans Asperger gained interest in features of autism, acknowledgement of its unique presentation became common in the academic literature (Feinstein, 2010; Goldstein & Ozonoff, 2009). Considerable research, evaluation, and treatment growth occurred alongside improved federal funding and public interest with the passing of the Individuals with Disability Act. Furthermore, during this time period, autism was acknowledged to be a developmental disorder and became a recognized clinical diagnosis in the DSM-III.

Evaluation of Autism Spectrum Disorder was limited to subjective observations and interpretations from physicians until the mid-20th century (Goldstein & Ozonoff, 2009). Along with the conceptualization and research contributions of Asperger and Kanter, came improvement of evaluations to include general social impairment considerations. By the 1970's, Autism Spectrum Disorder was recognized as a developmental, neurological disability. Additionally, evaluations became increasingly comprehensive, as well as inclusive of past concerns to adjoin assessment of present symptoms. Current trends have emphasized prevention and screening of autism, as well as improvement of the current screening and diagnostic tools available (Johnson & Myers, 2007). Additionally, numerous professional organizations have produced statements and resources for accurate and reliable evaluations of autism.

Although Autism Spectrum Disorder is a relatively new syndrome, meaning that it has only become acknowledged by the professional and public arenas since the mid to late 20th century, the focus it has received has been considerable. So long as the current funding and interest sustain, it is likely that improvements will continue to how we evaluate autism. Hopefully, the expansion of Autism Spectrum Disorder evaluations from purely the task of physicians to a practice of a wide variety of mental health professionals will continue. The unique contributions of each of these fields (e.g., nursing, psychology, social work, medicine) can create models of assessment that consider a wide variety of clinical features.

Current Trends in Autism Research

Identifying Autism Spectrum Disorder

Beyond the previously mentioned shift to prevention and screening of Autism Spectrum Disorder, few alterations have been made to assessment procedures over the past decade. The evaluation should be conducted by a qualified medical or mental health professional with sufficient familiarity with Autism Spectrum Disorder presentation (Johnson & Myers, 2007). It is also critical to consider cultural development when evaluating for a syndrome that is characterized by weaknesses in interacting with others (Harris, Barton, & Albert, 2014). Data from this evaluation should incorporate pertinent information regarding the developmental, medical, behavioral, and social history of the child. Information should not be gathered from a single source; parents, teachers, primary care physicians, and previous evaluations should all contribute to the assessment.

The first step should always be screening, beginning at age 12 to 18 months and continuing through the beginning of elementary school (Johnson & Myers, 2007).

Hoffman (2009) proposed a 3 stage evaluative model for Autism Spectrum Disorder, including a distinction in the screening process to differentiate between broad screening for all children and more specific screening for Autism Spectrum Disorder symptoms in children who have demonstrated some behaviors consistent with diagnostic criteria. The former is labeled "Level 1 Screening" and recommended by the authors to take place in primary care visits with a physician. Unfortunately, few details were provided regarding the types of criteria or level of specificity for this screening. The latter is labeled "Level 2 Screening" and is intended to differentiate Autism Spectrum Disorder symptoms from other behavioral/affective disturbances (e.g., Bipolar Disorder, Attention-Deficit/Hyperactivity Disorder, Language Disorder, etc.; APA, 2013). The third stage in Hoffman's model is a diagnostic, comprehensive evaluation, results of which could yield or disconfirm a diagnosis.

As previously mentioned, the ADOS-2 (Lord et al., 2012) is considered the gold standard diagnostic tool for a comprehensive evaluation. The ADOS-2 uses an interactive play interview paradigm intended to elicit behaviors consistent with Autism Spectrum Disorder. Multiple modules are available for this paradigm; each of these modules varies in activities and questions that are suited to the appropriate verbal abilities and maturity of the client being tested. Scores from the ADOS-2 may be combined with results from the latest revision to the ADI (ADI-R; Lord, Rutter, & Le Couteur, 1994) to assist in diagnosis. Both the ADOS-2 and the ADI-R utilize quantitative scoring to draw normative comparisons with a standardization sample; however, qualitative observations, parent reports, and clinician remarks are available on the protocols.

Although the ADOS-2 is widely recognized as the best available tool to assist clinicians in diagnosing Autism Spectrum Disorder, it is not without limitations regarding cost and time demands. Juneja, Sharma, and Mukherjee (2010) identified the weaknesses of this tool for use with clients in poverty or of low socio-economic status. Specifically, the authors reported problematic over-identification of Autism Spectrum Disorder in low-SES families. For children or adolescents from these groups presenting with minimal Autism Spectrum Disorder features, comprehensive evaluation utilizing the ADOS-2 and ADI-R without sufficient support from alternate sources of evidence (e.g., screening tools) is not feasible with regards to cost and time for client. Additionally, it is important to recognize the cost of training professionals in use of this tool (Juneja, Sharma, & Mukherjee, 2010). Thus, the authors asserted the importance of accurate screening to avoid unnecessary and potentially devastating costs for families of low income and clinics that serve such families.

Alternative Approaches

In addition to the currently described model of Autism Spectrum Disorder assessment, clinicians and researchers have proposed alternative approaches. Warren, Stone, and Humberd (2009) support a brief assessment model for Autism Spectrum Disorder in contrast to comprehensive evaluations. This model essentially consists of cautious screening to develop a diagnosis, as no formal diagnostic tools are used to assist clinicians. The authors indicate that the drastic improvement in prognosis following early intervention, suggests that recognition and intervention for all potential Autism Spectrum Disorder cases is favorable to conservative diagnoses formed when the case has overwhelming evidence. This argument asserts that false positive diagnoses (incorrect

identification of an Autism Spectrum Disorder when no Autism Spectrum Disorder is present) are preferable to false negative diagnoses (failure to identify an Autism Spectrum Disorder when an Autism Spectrum Disorder is present). While this approach boasts merits of improvement of outcome for individuals who would have failed to be recognized without close scrutiny, limitations must be recognized, such as increased cost associated with unnecessary treatment implementation and potential for psycho-social strain for false positive cases.

Screening and Surveillance

The American Association of Pediatrics (AAP) has produced guidelines for conducting Autism Spectrum Disorder evaluations (Johnson & Myers, 2007). The AAP guidelines include etiology, prognosis, and presenting feature information in addition to evaluation-based recommendations. With regards to the Autism Spectrum Disorder assessment and evaluation process, these guidelines provide a useful algorithm, which highlights the role of screening tools within the entirety of investigating Autism Spectrum Disorder concerns. The algorithm begins at pediatric preventative care visits between ages 12 to 24 months. The AAP bypasses the need for a screening tool if two or more of the following scenarios are present: parental concern for Autism Spectrum Disorder, physician concern for Autism Spectrum Disorder, other caregiver concern for Autism Spectrum Disorder, and/or sibling with Autism Spectrum Disorder diagnosis. However, if only one of these “flags” is raised, use of a screening tool is recommended prior to conducting a comprehensive evaluation. Additionally, the AAP recommends that all children have a parent/caregiver/physician complete an Autism Spectrum Disorder screening tool during an 18-24 month preventative care checkup. The algorithm then

feeds positive (likelihood of Autism Spectrum Disorder) results from screening tools into a comprehensive evaluation procedure (Johnson & Myers, 2007). Thus, the role of Autism Spectrum Disorder screening tools is three-fold: (1) a gateway function to avoid unnecessary cost from referring all children to comprehensive evaluations, (2) a source of confirmatory/discriminatory evidence for previously cited Autism Spectrum Disorder concerns, and (3) a step in the general surveillance process for all children.

Parent, Teacher, and Self-Response Characteristics on Symptom Screening Measures

It is important to consider the source of data gathered from any source. For symptom screening measures, respondents can either be clinicians, teachers, parents, or the patients themselves. Analyses of respondent tendencies have supported similar ratings of symptoms between parents and teachers (e.g., Achenbach, McConaughy, & Howell, 1987); however, self-report ratings tend to yield less significant symptom report. When comparing teacher and parent report tendencies, teachers may report less intensity of symptoms in adolescent populations when compared with parent report (Youngstrom, Loeber, & Stouthamer-Loeber, 2000).

It is important to note that parent response has been demonstrated to better correspond with clinician ratings than any other respondent group (e.g., teachers or self-report; Youngstrom, Findling, & Calabrese, 2003). Thus, when considering objective frequency and intensity of symptoms on a screening measure, parent response is likely to provide a reliable estimate of symptoms, when compared with teacher and self-report formats. However, clinicans often desire ratings of behavior in several domains to evaluate similarities and differences at home and at school. Thus, normative information

for forms is often split between parent and teacher groups (e.g., Constantino, 2013; Posserud et al., 2005).

For symptom report in youth with Autism Spectrum Disorder, agreement between respondent groups has been poor. In contrast to findings for findings inclusive of many diagnoses (e.g., Achenbach, McConaughy, & Howell, 1987), parent and teacher ratings for youth with Autism Spectrum Disorder are often discrepant with regards to adaptive functioning, as well as symptom intensity (Szatmari, Archer, Fisman, & Streiner, 1994). To identify the group most accurately responding, consistency with clinician report should be considered. Posserud and colleagues (2005) found that youth with Autism Spectrum Disorder tend to under-report symptoms when compared with clinical judgment by health care providers. In contrast, parent report is generally consistent with clinician ratings (Posserud et al., 2005). Overall, these studies support use of parent report as a methodology for evaluating Autism Spectrum Disorder symptoms in youth.

Current Screening Tools for Autism Spectrum Disorder

Clinicians working with children and adolescents currently have a wide array of screening tools for Autism Spectrum Disorder available at their disposal. However, the vast majority of these tools were developed with intended use of screening for DSM-IV-TR diagnoses (e.g., Autistic Disorder, Asperger Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified) rather than the more broad symptom presentation of Autism Spectrum Disorder in the DSM-5. Additionally, few studies exist which provide comparisons between these measures. Norris and LeCavelier (2010) conducted a review of 5 commonly used Autism Spectrum Disorder screening tools. Unfortunately, this review was published to provide evidence in support of the Social Communication

Questionnaire (SCQ; Rutter, Bailey, & Lord, 1999) being used to screen within the DSM-IV-TR diagnostic framework. Thus, this review is confounded by a notable bias in that it solely emphasizes benefits of using the SCQ. Despite this limitation, a contribution of this review is the application of Receiver Operating Characteristics (ROC) of Autism Spectrum Disorder screening tools. An ROC can be used to simultaneously evaluate the sensitivity (likelihood of correctly identifying a concern) and specificity (likelihood of correctly discerning between the intended area of concern and alternate possibilities; e.g., avoiding misidentification of Autism Spectrum Disorder in children with ADHD). No industry or professional standards exist for either sensitivity or specificity in screening tools, although recommended values of 70-80% correct identification of Autism Spectrum Disorder (sensitivity) and 80% correct identification of non-Autism Spectrum Disorder (specificity) have been proposed (Glascoe, 2005).

The widely published measures developed in line with previously used DSM-IV-TR diagnoses will now be analyzed. The rationale for including a wide list of screening measures is to provide an overview of the current brief objective measurement of Autism Spectrum Disorder. The reason for including measures intended for use with previous diagnostic systems (e.g., DSM-IV-TR; APA, 2000) is to address the lack of symptom screening tools developed with consideration of use with Autism Spectrum Disorder as conceptualized in the DSM-5. A description of each of the following measures will contain: (a) the name of the measure; (a) standardization and norming information; (c) and psychometric properties, such as reliability, validity, specificity, and sensitivity indices. The goal of this review is to explore the breadth of Autism Spectrum Disorder

presentations addressed in existing symptom screening tools, as well as to consider if any of these tools are appropriate for use in the new DSM-5 model.

Autism Spectrum Rating Scales

The Autism Spectrum Rating Scales (ASRS) is intended to identify Autism Spectrum Disorder features in children aged 2 through 18 (S. Goldstein & Naglieri, 2010). There are 4 forms available for the ASRS in both English and Spanish: (1) parent form for children age 2-5, (2) teacher form for children age 2-5, (3) parent form for children/adolescents age 6-18, and (4) teacher form for children/adolescents age 6-18. Completers of a form answer 70 items judging behaviors for younger children and 71 items judging behaviors for older children/adolescents; all items are scored on a 5-point Likert-type scale. The screened behaviors are classified into 6 domains: (1) socialization, (2) communication, (3) stereotypical behaviors, (4) behavioral rigidity, (5) sensory sensitivity, and (6) self-regulation. Items are scored and transformed onto scales intended to determine confidence ratings of the presence of an Autism Spectrum Disorder, adherence to DSM-IV-TR criteria, and treatment monitoring (Simek & Wahlberg, 2010). Reliability properties are provided through evidence of internal consistency (α=.70 to .97, ranging across all scales, forms, and languages), test-retest stability (R = .70 to .92 across parent to teacher ratings, as well as reports of consistent scores across times), and inter-rater reliability (r=.73 to .92 for parents; r=.59-.73 for teachers). Content validity evidence is provided through comparisons of the 6 behavioral domains to DSM-IV-TR criteria, as well as ADOS and ADI-R scores (S. Goldstein & Naglieri, 2010). Criterion-related validity evidence is provided through compartitive scores for children/adolescents with Autism Spectrum Disorder versus ADHD; results of these studies suggest that the

ASRS discriminates effectively between Autism Spectrum Disorder and ADHD. Construct validity evidence is provided through factor analyses (Simek & Wahlberg, 2010), results of which suggest that the ASRS can be split into a two factor model (communication/socialization, and behaviors/regulation).

Child Autism Rating Scale, 2nd Edition

The Child Autism Rating Scales, (CARS) is intended to identify young children with an Autism Spectrum Disorder (E. Schopler et al., 1980). A caregiver or clinician observes and rates behaviors of the child on 15 equally weighted items derived from the DSM-III-R, as well as theoretical research and alternative classification systems. The CARS is supported by moderate reliability data, such as internal consistency (α=.94), inter-rater reliability (r=.71), and one-year test-retest (r=.88). Validity evidence includes moderate to strong concurrent correlation coefficients with classroom observations, parent interviews, and case history reviews. Unfortunately, this data was collected over 30 years ago and is questionable for use with current administrations.

A revised version of the CARS, the Child Autism Rating Scales, 2nd Edition (CARS-2), was recently published (E. Schopler, van Bourgondien, Wellman, & Love, 2010). The authors boasted increased applicability for children with average or above average general cognitive functioning, stronger verbal skills, and more subtle social and behavioral challenges. Item development was based on 15 categories derived from five diagnostic systems, including the DSM-IV and multiple professional autism research organizations. A high-functioning form can be used for children of at least six years and with a measured IQ of 80 or higher. Scores from the CARS2 are compared to a clinical sample of 1,034 individuals with autism spectrum disorders, while CARS2-HF scores are

compared with a sample of 994 children. The CARS2-HF sample represents appropriate age, gender, and geographic diversity, yet includes co-morbid diagnoses of ADHD and specific learning disorders as well as Autism Spectrum Disorder. Reliability support is provided through inter-rater reliability (median r=.73), and a total Standard Error of Measurement (SEM) of .73. Validity evidence is provided through moderate item-total correlations and a brief factor analysis suggesting a 3-factor model.

Gilliam Autism Rating Scale, 2nd Edition

The Gilliam Autism Rating Scale, 2nd Edition (GARS-2) is the revised version of a behavior rating scale originally published in 1995, this newer version incorporates U.S. 2000 census data (Gilliam, 2006). The purpose of this measure is to differentiate individuals aged 3-22 with autism from those with other behavioral difficulties. The GARS-2 consists of 42 items divided among three subscales (i.e., Stereotyped Behaviors, Communication, and Social Interaction), based on the diagnostic criteria in the DSM-IV-TR (APA, 2000). Each item is scored on a 4-point Likert-type scale, based on the frequency with which a behavior occurs. The sum of these scores is transformed into a standard score corresponding to a hierarchical confidence rating for a diagnosis of autism: "Unlikely", "Possibly", or "Very Likely." The GARS-2 also contains a parent interview form consisting of 25 yes/no questions focusing on delays and abnormal functioning in social interactions, language development, and social communication, and 11 diagnostic yes/no questions completed by the clinician to assist in diagnosis. Sampling was conducted on a U.S. nationwide group of 1,107 individuals aged 3-22 who are diagnosed with autism. Secondary normative data was collected from individuals with disabilities other than autism or individuals not diagnosed with a disability; however, this

data is only used for validity scales. Reliability support includes strong internal consistency coefficients for the three scales; substantial validity support is established through content-related validity (e.g., item discrimination coefficients), as well as criterion-related and construct-related validity (see Fairbank, 2007). Despite minimal evidence supporting use with the previously used HFA diagnosis, No information is reported regarding GARS-2 use for screening of high-ability individuals diagnosed with Autism Spectrum Disorder. Additionally, a reviewer of the GARS-2 in a recent edition of the Mental Measurement Yearbok (MMY) suggested that the GARS-2 items are not specific to autism. Specifically, interpretations should be based on screening for general developmental disorders, as opposed to Autism Spectrum Disorder (Garro, 2007).

Rimland Autism Research Institute Diagnostic Checklist Form E-2

The Rimland Autism Research Institute Diagnostic Checklist Form E-2 (ARI E-2 or Rimland) was originally developed to assist in the diagnosis of Kanner's syndrome, the precursor to Autistic Disorder; however, the measure is now used to assist in identifying Autism Spectrum Disorder in children ages three to five (B. Rimland, 1971). The ARI E-2 consists of 109 questions covering development from infancy through age five and parental characteristics. Item types vary from selected response, such as dichotomous yes/no symptom identification or Likert-type frequency selections, to constructed response, open-ended responses. At this time, sampling, reliability, and validity data were unavailable, although the authors reported that the measure has been used with over 40,000 children in 60 countries and has been translated into multiple languages. The ARI reports that interpretive information provided in the test report includes diagnostic data and treatment recommendations (Autism Research Institute,

2008). Due to the lack of available purpose and psychometric data, use of the ARI E-2 for individuals with high-ability Autism Spectrum Disorder may be inappropriate. Additionally, the datedness of this measure is problematic for its item pool, content validity support, and normative sample.

Autism Treatment Evaluation Checklist

The purpose of the Autism Treatment Evaluation Checklist (ATEC), developed by Rimland and Edelson (1999), was to monitor intervention progress for individuals with autism spectrum disorders. The measure consists of 77 items on four subscales based on the DSM-III diagnostic criteria for Autistic Disorder. The first three subscales (speech, language, and communication; sociability; sensory and cognitive awareness) are scored on a three-point Likert-type scale based on frequency while the 4th subscale (health, physical, and behavior problems) is scored on a four-point Likert-type scale based on intensity (E. Rimland & Edelson, 1999). Interpretations are made at the subscale level, comparing totaled raw scores to the normative sample. In a 2005 report by the Autism Research Institute (Autism Research Institute, 2005), strong split-half reliability for the ATEC was reported ($\alpha = .92$), as well as moderate application validity due to its use in numerous treatment trials. Although limited psychometric data is available, the authors have not reported any sampling, reliability, or effectiveness, suggests that its use for screening with any individuals on the autism spectrum may be inappropriate. Furthermore, this measure was intended for research purposes and is not supported for clinical use in a natural setting.

Gilliam Asperger's Disorder Scale

The Gilliam Asperger's Disorder Scale (GADS) is a 2003 update to a measure developed in 2001 intended to assist in accurate diagnoses of Asperger's Syndrome (AS) for individuals aged 3-22 (Gilliam, 2001; Gilliam, 2003). The scale consists of 32 items on 4 subscales (e.g., Social Interaction, Restricted Patterns, Cognitive Patterns, and Pragmatic Skills) and a parent interview form. Subscale scores are transformed into standard scores and compared to the normative sample, resulting in an Asperger's Disorder Quotient (ADQ) used to identify the likelihood of an AS diagnosis. Sampling consisted of a nationally representative group and international group (i.e., Mexico, Great Britain, Canada, Australia, and 'other countries'), totaling 371 participants aged 3-22. An original pool of 70 items based on the DSM-IV-TR diagnostic criteria for Asperger Syndrome were created by the author, and final item selection was based on discrimination coefficients and item-subscale correlations. Reliability data, including internal consistency, inter-rater, and test-retest coefficients suggests moderate to strong reliability of scores (Gilliam, 2003). Validity support included criterion-based comparisons of the GADS with the Gilliam Autism Rating Scale (GARS) and comparisons of GADS scores for individuals with and without Asperger Syndrome. The lack of inclusion of Autism Spectrum Disorder other than AS suggests that this measure is not appropriate for full-spectrum screening of Autism Spectrum Disorder. At this time, there is minimal support for use of the GADS with Autism Spectrum Disorder due to: (1) lack of validity or reliability evidence for use with Autism Spectrum Disorder and (2) form development procedures consistent with use only for AS.

Krug Asperger's Disorder Index

The Krug Asperger's Disorder Index (KADI) is designed to differentiate the presence of Asperger Syndrome from High-Functioning Autism in youth and adolescents aged 6-21 (Krug & Arick, 2003). The measure is completed by parents, caregivers, teachers, or clinicians and consists of 32 items divided into an 11-item screening section and a follow-up 21-item section. Final scores are based out of 30 items (two of the screening items are not used); however, individual items receive differential weighting based on their demonstrated ability to differentiate between Asperger Syndrome and High-Functioning Autism. Total scores are summed and converted into raw scores, which are compared to an Asperger Syndrome normative sample. Sampling involved three groups (i.e., Asperger Syndrome, High-Functioning Autism, and no diagnosis) gathered from 32 states and 10 countries and resulted in discerning the final 32 items from an original pool of 106 items, these items are based on DSM-IV-TR diagnostic criteria and relevant research findings. Reliability support includes is internal consistency (split-half r = .89), two-week test-retest reliability (r=.98 for an Asperger Syndrome sample), and strong inter-rater agreements (Nellis, 2003). Validity support is provided by sensitivity and specificity indexes, as well as concurrent data for the KADI identifying individuals previously diagnosed with Asperger Syndrome. Unfortunately, by focusing on differentiating Asperger Syndrome from High-Functioning Autism, this measure is not appropriate for the current comprehensive Autism Spectrum Disorder diagnosis.

Social Responsiveness Scale

The Social Responsiveness Scale (SRS) is intended to screen for and assist treatment of youth aged 4-18 with disorders on the autism spectrum or other

developmental disabilities (Constantino & Gruber, 2005). The form consists of 65 items scored on a four-point Likert-type scale, yielding a total score and five subscale scores: social awareness, social cognition, social communication, social motivation, and autistic mannerisms. It is recommended that a parent or caregiver with familiarity and regular interactions with the child complete the form. Raw scores are converted to T-Scores in comparison with age and gender based norms; this T-Score is mapped onto a confidence rating scale, which includes a range for High-Functioning Autism. All items were created by the authors and reviewed by clinical experts (i.e., neuropsychologists, clinical psychologists, school psychologists) and other potential users of the test (i.e., parents of children with Autistic Disorder, Asperger Syndrome, or Pervasive Developmental Disorder, Not Otherwise Specified). The standardization process incorporated five nationally representative studies and involved 1,636 individuals from U.S. metropolitan cities, demographic differences between these samples were analyzed and no significant differences were found. Strong reliability evidence is provided through internal consistency coefficients (α = .93 to .97), inter-rater analyses (no significant differences through multiple t-tests), and test-retest (r=.85 for males, r=.77 for females) conducted at baseline and 17-month intervals by mothers (Conway, 2006). Validity support is provided through an evaluation of research studies comparing SRS scores to clinical interviews and scores from standardized diagnostic interviews (e.g., ADI-R, Rutter, Le Couteur, & Lord, 2003). The SRS has also received cross-cultural validity support for use in central Europe (Bölte, Poustka, & Constantino, 2008).

Social Responsiveness Scale, 2nd Edition

A new edition of the SRS was published in 2013: The Social Resonsiveness Scale, 2nd Edition (SRS-2; Constantino, 2013). This form and directions for completion are unchanged for children younger than 18; however, there are now 2 forms, one intended for use with preschoolers (age 30-54 months) or "school aged children" (age 4-18 years). Each form includes updated normative information and validity evidence. The SRS-2 additionally has a form for adults, as well as a self-report form. Results from confirmatory factor analysis of the SRS-2 supports the presence of the 5 subscales in the measure (e.g., social awareness, social cognition, social communication, social motivation, and autistic mannerisms); however, the strong intercorrelations between all factors except the autistic mannerisms factor supports the presence of 2 distinct factors (social communication impairments, and rigid/repetitive behaviors; Frazier et al., 2013).

Social Communication Questionnaire

The Social Communication Questionnaire (SCQ) was developed by Michael Rutter and Catherine Lord, two publishers for the ADI-R (Berument, Rutter, Lord, Pickles, & Bailey, 1999). Items were developed in accordance with the ADI-R algorithm; thus, items fall into the three diagnostic subscales of socialization, communication, and behaviors. Additionally, items make reference to behaviors seen in children with a mental age of 2 and a chronological age of 4; thus, the authors do not recommending the tool with children younger than these ages. No review panel was used to evaluate the items. It is important to note that evidence supporting the structure of the ADI-R cannot be translated to the SCQ, as the SCQ contains modified questions intended for easier readability for parents and teachers. Also of concern is the lack of a pilot study before the

form was published; however the initial publication of the measure contains data used for validation on a sample of 200 children and adolescents (Berument et al., 1999). Unfortunately, the large age range used in validating the SCQ (range=4 to 40 years) limits inferences that can be made solely regarding children and adolescents.

The SCQ consists of two separate forms that can be completed by a teacher, parent, or caregiver; one form is for children under the age of 6 and the other is for children aged 6 years and older (Berument et al., 1999). Each form contains 40 items scored dichotomously ("yes" or "no"), yielding a score ranging from 0 to 39 (one item is not scored). Berument and colleagues suggest a cutoff score of 15 to differentiate Autism Spectrum Disorder from non-Autism Spectrum Disorder and a cutoff score of 22 to differentiate autistic disorder from other Autism Spectrum Disorders. Additional cut points have been recommended for use with different populations (Norris & Lecavalier, 2010). When used with younger subjects (age 2 to 4 years), a cut score of 11 has been recommended (Wiggins, Bakeman, Adamson, & Robins, 2007).

Using the validation sample, Berument and colleagues conducted a confirmatory factor analysis to determine the structure of the SCQ (Berument et al., 1999). Although the analysis supports a 4 factor model (socialization, communication, language, behaviors) that aligns well with the ADI-R, some concern is merited that no exploratory model was used for this analysis. Thus, there is no evidence provided to identify cross-factor loadings, should the proposed factor model not best fit the SCQ. Validity support is provided from 3 sources of evidence: sensitivity/specificity indices, concurrent validity, and discriminant validity. Sensitivity and specificity evidence is provided through indices for both individual items and the total scale; 33 of the 40 items perform well in

recognizing Autism Spectrum Disorder symptoms and discerning from other disorders, while 4 items were sensitive to Autism Spectrum Disorder, yet overlapped with non-Autism Spectrum Disorder concerns. Unfortunately, the authors chose to leave some of these poorly performing items in the final form of the tool, including 2 items that were not sensitive to Autism Spectrum Disorder, not specific from other concerns, and not related to the total score of the measure. Total score indices of sensitivity (.85) and specificity (.75) provide support for the SCQ identifying Autism Spectrum Disorder while not falsely identifying other disorders. Concurrent validity support is provided through strong correlation between ASQ scores and ADI-R scores (Berument et al., 1999).

The SCQ has been scrutinized by many studies beyond the initial validation evidence described above. In a sample of children aged 4 to 14 years, the cut score of 15 yielded a higher sensitivity index (.92) than reported by the test developers (Witwer & Lecavalier, 2007). Two clinicians conducted an evaluation of SCQ applicability to clinical settings with children and adolescents (Corsello et al., 2007). In this study, sensitivity indices (.71 to .78) and specificity indices (.71 to .84) were similar to those reported by the developers for differentiating Autism Spectrum Disorder from non-Autism Spectrum Disorder and autism from AS and Pervasive Developmental Disorder, Not Otherwise Specified. However, differentiation between autistic disorder and non-autistic disorder produced a very low sensitivity index (.45), leading the authors to conclude that the SCQ should only be used with children over the age of 7. Additional studies have recommended that the SCQ not be used with young children due to limited

sensitivity (Eaves, Wingert, Ho, & Mickelson, 2006; Snow & Lecavalier, 2008; Wiggins et al., 2007).

Revisions to the SCQ (Rutter, Bailey, & Lord, 2003) contributed to the use of 2 different forms. The first form is titled the "Current" version and is intended for children ages 4 to 5 years. The second form is consistent with the original publication of the SCQ and is a well-validated screening tool for Autism Spectrum Disorder when used with children over the age of 6 years old.

Autism-Spectrum Quotient

The Autism-Spectrum Quotient (AQ) is intended to measure autism spectrum indicators in adults with average intelligence (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). Following a self-administration format, the AQ contains 50 questions covering five areas: social skills, attention switching, attention to detail, communication, and imagination. Items are responded to on a 4-point Likert-type scale, but scored on a dichotomous 1/0 scale, with half of the items scoring 1 for a positive response and half of the items scoring 1 for a negative response; a cut score of 32 is used to determine the presence of High-Functioning Autism/Asperger Syndrome. Items were selected based on accordance with DSM-IV-TR diagnostic criteria, as well as relevant literature; final item development was based on the results of four pilot versions administered to British adults with High-Functioning Autism or Asperger Syndrome. Reliability support is provided by test-retest data (non-significant differences in test-retest administration of one pilot sample) and internal consistency data (Chronbach α range of .63 to .77 for the 5 scales). The authors assert item development based on research findings and diagnostic criteria support the content validity of the AQ. This measure

boasts multiple strengths for use by individuals with presenting with a profile consistent with previously used High-Functioning Autism criteria: (1) theoretical development rooted in identifying High-Functioning Autism/Asperger Syndrome as opposed to broad autistic traits, (2) notable validity and reliability support, and (3) sampling and normative information based on individuals with High-Functioning Autism. However, notable limitations include the following: (1) reliance on self-administration, which can lead towards response bias and inaccurate self-report; (2) sampling limitations (adult-only sample, all groups from United Kingdom, limited age data available, no cultural data available); and (3) lack of concurrent data to confirm findings from the AQ.

Autism Spectrum Screening Questionnaire

The Autism Spectrum Screening Questionnaire (ASSQ) is intended to identify potential autism spectrum symptoms in children of higher cognitive functioning aged 7 to 16 (Ehlers, Gillberg, & Wing, 1999). The ASSQ was developed and standardized in Europe and consists of 27 items scored on a 3-point Likert-type scale. Results from a factor analysis suggest that ASSQ items diverge into a three-factor model: social difficulties, tics/motor/Obsessive-Compulsive Disorder, and autistic style (Posserud et al., 2008; Posserud, Lundervold, & Gillberg, 2009). On the basis of optimizing specificity, the authors assert using cut scores of 19 for parents and 22 for teachers, ideally used in conjunction, to identify potential Autism Spectrum Disorder. However, Posserud et al. (2009) support ASSQ cut scores at or above 17 in identifying any disorder on the autism spectrum; notably, the sample for this study was limited in size and overrepresentation of boys (54 of 56 participants were boys). Ehlers, Gillberg, and Wing (1999) provide reliability support in the form of strong test-retest and inter-rater reliability coefficients.

Substantial sampling and validation studies have supported the use of this measure in identifying Autism Spectrum Disorder (e.g., Posserud et al., 2009); however, these have been exclusive to European samples. While the ASSQ maintains substantial validity and reliability support in identifying Autism Spectrum Disorder for high-functioning individuals, lack of geographically representative sample data and limited sampling numbers present barriers its application in the United States.

Summary of Measure Review

Consistent screening and surveillance of Autism Spectrum Disorder has been attributed to the increased rates of Autism Spectrum Disorder identification, and thus, improved outcomes for individuals with Autism Spectrum Disorder (Johnson & Myers, 2007). Symptom screening tools are an important contribution from the field of psychology in the process of screening and surveillance of Autism Spectrum Disorder. The previously discussed measures represent decades of research into both the specific features associated with Autism Spectrum Disorder, as well as the frequency and/or intensity of such symptoms. The purpose of providing a comprehensive review of these widely used measures is to demonstrate the breadth of presentations and range of specific diagnoses that have been addressed. Unfortunately, a notable limitation exists within all of these tools in that they developed in a diagnostic model (DSM-IV-TR; APA, 2000) that has since been replaced. Some of these tools were developed with intent for use with previous diagnoses, such as AD (e.g., ARI E-2; Rimland, 1979), while others were intended for use to differentiate between diagnostic labels now subsumed under Autism Spectrum Disorder (e.g., KADI; Krug & Arick, 2003). Investigation into the performance of these measures in assessing broad presentations of Autism Spectrum

Disorder, such as all previous DSM-IV-TR diagnoses, is necessary to evaluate usefulness in the current DSM-5 system.

Two of the measures included in this review, the SRS (Constantino & Gruber, 2005) and the ASSQ (Ehlers, Gillberg, & Wing, 1999), include features which promote investigation for continued use with youth in the DSM-5 system. First, both measures were developed apart from specific diagnostic criteria in the DSM-IV-TR (APA, 2000) or another diagnostic system. Thus, items included on these measures instead reflect broad symptoms associated with Autism Spectrum Disorder. Second, these measures were developed and normed with youth samples reflecting a broad age range. The SRS is appropriate for youth aged 4-18 (Constantino & Gruber, 2005) and the ASSQ is appropriate for youth aged 6-17 (Ehlers, Gillberg, & Wing, 1999). Additionally, these measures were intended for use with youth, as opposed to the full lifespan, such as the SCQ (Berument et al., 1999); thus, their use is intended solely for screening of Autism Spectrum Disorder in youth.

Autism Spectrum Disorders in High Ability Youth

Autism and Intellectual Functioning

As previously discussed, Autism Spectrum Disorder is a heterogenous disturbance; presentation and impact on functioning can vary to extraordinary degrees between two individuals with the same diagnosis. While cognitive profiles alone have not been demonstrated to reflect an "autism profile" (Siegel, Minshew, & Goldstein, 1996), variability in Autism Spectrum Disorder presentations has been associated with level of cognitive functioning (Matson et al., 2008). For example, IQ scores appear to be positively associated with social functioning and maintenance of daily activities in

children and adolescents with Autism Spectrum Disorder (Schatz & Hamdan-Allen, 1995). However, the Schatz and Hamdan-Allen suggested that this relationship was weaker for children with Autism Spectrum Disorder than for children/adolescents without Autism Spectrum Disorder. The relationship between intelligence and Autism Spectrum Disorder led to terms used for referencing individuals with Autism Spectrum Disorder whose intellectual functioning was not impaired: High Functioning Autism (HFA; Bagatell, 2010). The broad group of higher functioning Autism Spectrum Disorder cases will now be explored followed by a review of studies investigating the upper end of this higher functioning cohort.

High-Functioning Autism

As previously indicated, HFA is a descriptive term referring to individuals with "average to above average intelligence, highly developed language skills, but significant social and behavioral concerns" (Bagatell, 2010, p.35). Baron-Cohen (2000) provided a similar description of HFA; the co-existence of average or above average cognitive abilities and a diagnosis of autism. Despite the apparent simplicity of this term, HFA has been challenging for clinicians with regard to identification, differential diagnosis, and treatment. Anxiety disorders, ADHD, non-verbal learning disorder, and other previously used Autism Spectrum Disorder diagnoses (e.g., AS) share considerable behavioral, emotional, and developmental features with HFA (Baron-Cohen, 2000; Bennett et al., 2008; Gillberg, 1998; Williams, Goldstein, Kojkowski, & Minshew, 2008). Considerable academic dissent occurred over considering HFA distinct or congruent with AS (Gillberg, 1998) prior to the current singular Autism Spectrum Disorder diagnosis. Additionally, some authors (e.g., Baron-Cohen, 2000) asserted that HFA represented a "disturbance" or

difficulty, falling short of the significant impairment needed to define a disorder. However, this perspective is largely founded on avoidance of stigmatization and prejudice targeting the HFA community rather than disagreement with the challenges this group faces on a day-to-day basis.

Hans Asperger is recognized as the first researcher to investigate individuals with features similar to autism bearing average to above average levels of intellectual functioning (Bleuler, 1950). However, as his work was not connected to Leo Kanner's work on autism and the current Autism Spectrum Disorder movement until after his death, Asperger's contributions in this area are largely tangential. The first academic publication discussing autistic features in individuals of average or above average intelligence came in the wake of EAHCA and increased focus on discerning the various presentations of Autism Spectrum Disorder (DeMyer, Hingtgen, & Jackson, 1981). Despite this late start, HFA has become a topic of significant academic interest over the last 30 years (Gillberg, 1998). Unfortunately, this expansion of empirical and theoretical knowledge is yet to be translated into broadly disseminated measurement and treatment practices. As indicated earlier, differential diagnoses present a challenge in accurately identifying HFA in comparison to other diagnoses with similar presentations.

HFA presentations can vary greatly due to the broad criteria of Autism Spectrum Disorder presentation with average to above average intellectual functioning. In order to include the full HFA cognitive functioning spectrum, measurement of the construct has been widely inclusive, often setting a minimum Intelligence Quotient (IQ) around 80 (Baron-Cohen, 2000; Gillberg, 1998; Krug et al., 1980; Lee, 2009). Unfortunately, the cognitive diversity of a sample this broad may hinder the identification of individuals

with higher cognitive functioning, such as children and adolescents who are twice-exceptional.

Prior to publication of the DSM-5, several studies investigated intellectual functioning discrepancies between HFA and AS. Results from a meta-analysis of these studies (Chiang, Tsai, Cheung, Brown, & Li, 2014) concluded that individuals with AS demonstrate higher verbal and non-verbal reasoning relative to individuals with HFA. Further, AS intellectual functioning profiles are characterized by relative strength in verbal reasoning and relative weakness in non-verbal reasoning, while HFA intellectual functioning profiles are characterized by equivalent verbal and non-verbal reasoning.

HFA seemingly correlates now with lower severity ratings of Autism Spectrum Disorder on the DSM-5 (e.g., Level 1; APA, 2013). While sensitivity studies have demonstrated high rates of accurate HFA identification within the DSM-5 (Mayes, Black, & Tierney, 2013), minimal consideration has been applied for the higher end of cognitive functioning within HFA (e.g., twice exceptional Autism Spectrum Disorder).

Twice-Exceptionality and Autism Spectrum Disorder

Twice-exceptionality refers to an individual who is identified as gifted or talented in one or more areas while possessing a learning, emotional, physical, sensory, or developmental delay, such as HFA (Assouline et al., 2006). It is important to note that while twice-exceptionality and high ability Autism Spectrum Disorder are synonymous terms in this project, HFA is equivalent to neither. This distinction is due to HFA referring only to the presence of Autism Spectrum Disorder in an individual with intellectual functioning above the "below average" range (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). An interesting aspect of twice-exceptionality

involving intellectual giftedness and Autism Spectrum Disorder lies in defining where giftedness ends and Autism Spectrum Disorder begins (Neihart, 2000). Neihart (2000) describes shared features between giftedness and AS as including: (1) verbal fluency and proficiency, (2) fascination with memorizing facts or elements of obscure information, (3) hypersensitivity to some sensory information, (4) specific areas of passion or interest, and (5) uneven skill development (e.g., cognitive abilities advance beyond social skills and maturity). Commonalities such as these can lead to misunderstanding and misidentification of strengths and difficulties experienced by both individuals with Autism Spectrum Disorder and individuals who are gifted. Despite this challenge, identification is imperative for twice-exceptional learners, as they require proper interventions to address both giftedness (e.g., appropriate challenge and support) and Autism Spectrum Disorder (e.g., social skills training, classroom accommodations, etc.).

Shared presentation between these individuals who are gifted and individuals with Autism Spectrum Disorder (Neihart 2000) creates a notable challenge in accurate identification of twice-exceptional individuals. Further, no published studies have been conducted to discern gifted and/or talented children with HFA or AS from a normative gifted-only sample. However, Neihart (2000) proposed several clinical observations to promote clinical distinction between these groups. First, overtly pragmatic use of language is often observed in children with Autism Spectrum Disorder, particularly those with AS, while children and adolescents who are gifted control more abstract uses of language. Second, children with Autism Spectrum Disorder often have difficulty taking the perspective of their peers and applying theory of mind (Perner, Frith, Leslie, & Leekam, 1989; E. Schopler & Mesibov, 1992), while children who are gifted only are

able to recognize the thoughts and motivations behind their peers' behaviors. Neihart (2000) identifies the fourth point of distinction as quality of humor. While gifted children may engage in socially reciprocal humor, twice-exceptional Autism Spectrum Disorder children/adolescents tend to rely more on word play rather than reciprocally founded humor. Fifth, facial expressions of children with Autism Spectrum Disorder have limited affect, while children who are gifted have a wider range of affective expression. Finally, individuals with Autism Spectrum Disorder tend to have difficulty coping with changes or adjustments to routines, while gifted children do not.

Psychosocial Characteristics of Twice-Exceptional Autism Spectrum Disorder

Children and adolescents identified as twice exceptional Autism Spectrum Disorder may experience psychosocial distress through both internalized states and externalized behaviors (Foley Nicpon et al., 2010). Parents and teachers reported significantly higher levels of atypical behavior, depression, and hyperactivity for high ability adolescents with Autism Spectrum Disorder in comparison to normative peers. Across children and adolescents, additional reported externalized behavior concerns included difficulty forming friendships and maintaining activities of daily living; these concerns are consistent with additional reviews of Autism Spectrum Disorder-specific concerns reported on the Behavioral Assessment Scale for Children (BASC; Kamphaus, Reynolds, Hatcher, & Kim, 2004). However, Reynolds and colleagues identify that many children and adolescents with Autism Spectrum Disorder may underreport significant stressors due to limitations in insight. Regarding internalized states, Neihart (2000) identified anxiety symptomology (e.g., phobias and panic attacks) as associated experiences of twice-exceptional Autism Spectrum Disorder children and adolescents, for

which medical interventions are often used in treatment. Cash (1999) also reported that many twice-exceptional youth report perceptions of rejection and criticism.

Fortunately, adolescents may adapt to the difficulties associated with Autism Spectrum Disorder over time. In a study of children and adolescents Autism Spectrum Disorder and verbal or non-verbal reasoning in the superior range of functioning, Foley Nicpon and colleagues (2010) indicated that high ability adolescents diagnosed with Autism Spectrum Disorder were reported to have a better ability to adapt to their environment and less social withdrawal in comparison to twice-exceptional Autism Spectrum Disorder children. Likely due to the pervasive nature of social skills impairment, withdrawal was acknowledged as the only area that did not improve over time. Intelligence Quotient (IQ) and verbal intelligence appear to be positively associated with improved outcomes and prognosis for individuals with Autism Spectrum Disorder (Venter, Lord, & Schopler, 1992). It is possible that high ability youth with Autism Spectrum Disorder have a good capacity to improve functioning over time with appropriate services and accommodations.

Evaluation of Twice-Exceptional Autism Spectrum Disorder

Neihart (2000) cites two important domains of evidence for appropriate identification of children/adolescents who are twice-exceptional with Autism Spectrum Disorder: (1) A thorough review of developmental history and (2) insight into motivations behind behaviors. Neihart recommends the participation of an interdisciplinary team in any twice-exceptional evaluation, as well as involvement of parents and use of diagnostic testing.

A case study review published by Assouline, Foley Nicpon, and Doobay (2009) addresses different profiles of giftedness varying with respect to social impairment. The authors define three ordinal categories of social impairment: (1) None to mild; (2) Moderate; and (3) Severe. The first category represents individuals who are solely gifted, yet also possess strong social skills resulting in positive adjustment and little need for intervention beyond the provision of appropriate academic challenge. In contrast, the second and third groups represent similar dilemmas to those posed by Neihart (2000). While both individuals in the case study demonstrated social impairment and exceptional intellectual abilities, degree of impairment and performances on diagnostic measures incorporated into a comprehensive evaluation were necessary to differentiate the two cases. Specifically, ADOS scores and reported adaptive functioning on behavioral report forms (e.g., Vineland Adaptive Behavior Scales) were required. The authors assert the need for comprehensive evaluation in order to effectively determine need for intervention. However, each individual experienced impairment and profound intellectual gifts; thus, this study demonstrates the challenge of establishing cutoffs for need of intervention.

A notable concern in the evaluation of Autism Spectrum Disorder in high ability youth lies in the lack of appropriate screening tools for this population. Measures such as the AQ (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001), ASSQ (Ehlers, Gillberg, & Wing, 1999), KADI (Krug & Arick, 2003), and SRS (Constantino & Gruber, 2005) are supported with reliability and validity evidence for use with HFA. However, given the low bounds of cognitive ability associated with HFA (e.g., low average intellectual functioning), use of these measures with gifted individuals requires further

inquiry. Unfortunately, to develop measures appropriate for screening Autism Spectrum Disorder in high ability youth, it is first important to clarify what symptoms fit in the content area of "High Ability Autism Spectrum Disorder." To address this need, research must be conducted into symptoms associated with Autism Spectrum Disorder in high ability youth.

Summary

While Autism Spectrum Disorder has been recognized is various forms for over a half century, there is a lack of agreement upon how to characterize its presentation. Currently, weaknesses in social communication adjoined by the presence of restricted interests, rigidity, and/or repetitive behaviors are recognized as the core symptom features of Autism Spectrum Disorder (APA, 2013). However, there is substantial disagreement upon the necessity of several unique diagnosis to address the entirety of the "autism spectrum" (e.g., Kulage, Smaldone, & Kohn, 2014; McPartland, Reichow, & Volkmar, 2012) versus the necessity to maximize sensitivity and specificity of Autism Spectrum Disorder diagnoses (e.g., APA, 2011; Lord et al., 2012). To address this debate, studies investigating the consistency of symptom presentation across DSM-IV-TR diagnoses are necessary. Support for a single diagnosis is provided through similar report of symptoms across these diagnoses, while support for a multiple diagnosis system is garnered through discrepant symptom reports.

Unfortunately, review of the available measures of Autism Spectrum Disorder demonstrates consistent limitations in their use within the current DSM-5 system. No measures were developed with intended use broadly across the spectrum of functioning and symptom presentation that is now utilized in the DSM-5 Autism Spectrum Disorder

diagnosis. Further, many of these tools have fundamental concerns regarding norming procedures and construct validity. Thus, further research is necessary to evaluate the performance of these measures in the context of appropriateness for use in the DSM-5 model.

Finally, developing research in twice-exceptionality (e.g., Foley-Nicpon et al., 2010) supports further inquiry into the potential unique features associated with Autism Spectrum Disorder in high ability youth. Regarding symptom screening for these individuals, few available tools were developed with any intention for use with HFA. The lack of consistent understanding of Autism Spectrum Disorder presentation at high levels of cognitive ability limits our ability to effectively screen for symptoms, and thus, provide effective interventions as needed.

Current Study

This project has two unique studies, which collectively address the research goal of evaluating presentation of symptoms amongst youth diagnosed with Autism Spectrum Disorder. The first study compares parent responses on symptom screening questionnaires to evaluate consistencies in presentation amongst previous DSM-IV-TR diagnoses (e.g., AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified). For this first study, parent report of symptoms was compared across children diagnosed with either AD, AS, or Pervasive Developmental Disorder, Not Otherwise Specified. The second study evaluates the extent to which currently recognized Autism Spectrum Disorder impairments reflect challenges faced by twice-exceptional children/adolescents. The second study required parents of twice-exceptional children to report to what extent general content areas of Autism Spectrum Disorder (including those

on screening tools and in research articles) reflect their children's specific difficulties. Parent responses were gathered on a novel research symptom report tool that was developed utilizing a card sort technique. Collectively, these two studies examine the accuracy of current conceptualization and evaluation practices within the psychological community for Autism Spectrum Disorder, including specific considerations for twice-exceptional children/adolescents. Both studies investigate Autism Spectrum Disorder symptoms through behavioral ratings provided by parents.

The goal of the first study is to provide mental health practitioners with a better understanding of the broad presentation of Autism Spectrum Disorder. Specifically, the first study aims to address the debate of continuous (e.g., single diagnosis) versus discrete (e.g., several diagnoses) symptom presentation in Autism Spectrum Disorder. The goal of the second study is to expand professional understanding of Autism Spectrum Disorder presentation in high ability youth. Few studies address Autism Spectrum Disorder presentation in twice-exceptional populations (e.g., Assouline, Foley Nicpon, and Doobay, 2009; Foley Nicpon, et al., 2010). Study 2 builds upon this foundation through two specific aims: (1) to assess consistency of broad Autism Spectrum Disorder symptoms in high ability youth, and (2) to ascertain additional symptoms of Autism Spectrum Disorder in high ability youth not recognized in current symptom screening tools. Thus, the summative goal of this research project is to improve mental health providers' knowledge and competence for Autism Spectrum Disorder screening both in a general context, as well as specifically for high ability youth.

Research Questions:

To address limitations in the literature regarding continuous versus discrete presentation within Autism Spectrum Disorder, as well as symptom presentation in high ability Autism Spectrum Disorder, the following research questions will be explored. The first research question is addressed in study 1, while the 2nd and 3rd research questions are addressed in study 2.

1. What are the similarities and differences in parent symptom report across children diagnosed with DSM-IV-TR criteria of Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified?

This research question is addressed through comparisons of responses on symptom screening tools provided by parents of youth diagnosed with either Autistic Disorder, Asperger's Syndrome, or Pervasive Developmental Disorder, Not Otherwise Specified.

2. To what extent do current Autism Spectrum Disorder impairment formulations reflect the behavioral presentation of high ability students with Autism Spectrum Disorder?

This research question is addressed through descriptive analyses of responses on a symptom report form completed by parents of high ability youth with Autism Spectrum Disorder.

3. What additional behavioral challenges do parents of twice-exceptional children identify beyond those addressed in the combination of reviewed Autism Spectrum Disorder screening tools?

This research question is addressed through descriptive review of responses to an open-ended behavioral question on a symptom report form completed by parents of high ability youth with Autism Spectrum Disorder.

CHAPTER 3

METHODOLOGY

The purpose of this chapter is to provide an overview of the method and research design applied for this study. First, participants and procedures used in the study will be discussed. Second, the experimental conditions used in the study will be described, followed by a description of the study measures, including a description of psychometric properties and intended uses. For the novel research measure included in this study, development procedures will be discussed. Finally, statistical analysis procedures will be described.

Participants and Procedures

Several samples of participants were recruited to address the research questions. Participant samples will be described in greater detail during the description of each study. For both studies, the only incentive offered to participants was the contribution to professional understanding of Autism Spectrum Disorder. No monetary or otherwise financially valuable incentive was offered to participants.

No children directly participated in this study; however, for children in study 2, Private Health Information (PHI) was used, such as intellectual ability and diagnoses received in a psychodiagnostic evaluation. The use of families that have already received comprehensive evaluations provides benefits as well as limitations to the sample. Benefits include increased awareness of their child's strengths and challenges, as well as knowledge of behaviors associated with Autism Spectrum Disorder and normative child development. Familiarity with Autism Spectrum Disorder can improve accuracy in reporting behaviors on the screening measures and questionnaire; however, the increased

awareness of such behaviors may also be a limitation. Most consumers of Autism Spectrum Disorder screening tools have limited understanding of the nature of their child's difficulties; thus, the sample represented a more informed population. A potential confound of having a more informed sample is a differential reporting style.

Study 1

Study 1 utilized a combined parent sample to evaluate the first research question. Inclusion criteria for these participants consisted of having a child diagnosed with Autistic Disorder (AD), Asperger Syndrome (AS), or Pervasive Developmental Disorder, Not Otherwise Specified (Pervasive Developmental Disorder, Not Otherwise Specified).Part of this combined sample included parents of children and adolescents who completed the SRS and ASSQ screening tools in a previous study (Sussman & Foley Nicpon, 2011). This prior study was completed in the process of developing an Autism Spectrum Disorder-screening tool intended for use with twice-exceptional children and adolescents (Behrens, et al., 2012; Foley Nicpon, Behrens, & Candler, 2013; Lyon, et al., 2012). Parents included in this prior study were recruited based off of participation in a psychological evaluation at the Belin-Blank Assessment and Counseling Clinic, which is a Midwestern, university-based assessment and counseling clinic. While there for the evaluation, parents signed a consent document agreeing to solicitation for future research studies at the clinic. An initial email request was sent (APPENDIX A), followed by a mailing packet including the study questionnaires, a cover letter, and informed consent documentation. This archival group contributed 23 participants to the study 1 sample.

Pervasive Developmental Disorder, Not Otherwise Specified

The second group included in the combined study 1 sample consisted of parents Autism Spectrum Disorder recruited through two Iowa City area email listserves: (1) "Iowa City Area Autism-Asperger Syndrome-PDD Family Group" and (2) "University of Iowa Autism Center." Membership to these listserves was voluntary, and many of the families were reported to have sought membership to remain active in the local Autism Spectrum Disorder community. A description of the study and methods for contacting the study coordinator were provided in a brief email to the listserve (APPENDIX B). For this subset of the combined study 1 parent sample, 24 potential participants responded to the initial email and 22 consented to be sent a mailing packet including the study materials and the current study informed consent document (APPENDIX C). Within the packet, a brief letter describing the study was provided (APPENDIX D), as well as the aforementioned study materials. All 22 of these novel data collection participants successfully completed and returned the study materials.

The final combined sample for study 1 included 45 participants: 23 archival data collection participants combined with 22 novel data collection participants. The combined participants in study 1 included 26 mothers, 6 fathers, and 13 combined dyads (e.g., mother and father); thus, mother response was over-represented in the current sample. See Table 1 for demographic information for the Study 1 parent sample.

Study 2

Study 2 included parents of twice-exceptional children and adolescents, who will now be referred to as Study 2 parent sample. These participants were recruited similarly to the archival sample used in study 1, in that potential participants were identified based upon participation in a psychological evaluation at the Belin-Blank Assessment and

Counseling Clinic. These potential participants agreed to solicitation for future research projects at the time of their psychological evaluation. Potential participants were identified based on their child having been diagnosed with AD, AS, or Pervasive Developmental Disorder, Not Otherwise Specified as defined in the DSM-IV-TR (APA, 2000). Additionally, children of these potential participants demonstrated superior intellectual functioning on a standardized intellectual measure (e.g., WISC-IV or WAIS-IV) as defined by a Verbal Comprehension or Perceptual Reasoning Index score within the Superior range (VCI or PRI > 120; Mean=100, SD=15). Identification of these families was made through review of the clinical archives at the Belin-Blank Center, including review of clinical documents for the families to determine eligibility for the study on the basis of intellectual ability and diagnosis.

A description of the study and methods for contacting the study coordinator were provided in a brief email sent to 43 potential study 2 participants (APPENDIX E). Of this sample, 21 parents (48.8% of all contacted potential participants) responded to the email and were sent the Twice-Exceptional Rating Form (APPENDIX G), informed consent document (APPENDIX D), and a cover letter (APPENDIX F); all study 2 participants sent these study materials completed and returned. The participants in study 2 included 13 mothers, 4 fathers, and 6 combined dyads (e.g., mother and father). As with study 1, mother response was over-represented in the sample. See Table 2 for demographic information for the study 2 sample.

The recruitment process for study 2 was identical to the recruitment process used for the archival data sample from study 1; thus, there are 17 participants (of the 21 total study 2 participants) who participated in both study 1 and study 2. While these

participants are included in both samples, no comparisons were made between the parent samples in study 1 and 2. Further, these samples were used to evaluate different research questions; thus, participant inclusion in each study was not judged to impair interpretation of results.

Descriptive analyses of the 17 participants included in both studies were conducted to ensure homogeneity across both study samples. For study 1, these overlapping participants did not differentially report symptoms on the Social Responsiveness Scale (m = 72.43, SD = 13.19) when compared to the total study 1 sample (m = 73.08, SD = 12.85). Similarly, these overlapping participants did not differentially report symptoms on the Autism Spectrum Screening Questionnaire (m = 23.58, SD = 7.96) when compared to the total study 1 sample (m = 22.85, SD = 8.03). For study 2, these overlapping participants provided similar overall responses on the Twice-Exceptional Rating Form (m = 39.87, SD = 14.36) when compared to the total study 2 sample (m = 38.30, SD = 15.01).

Measures

It would be idealistic, redundant, and unfeasible to attempt to incorporate all currently published screening tools for Autism Spectrum Disorder. Tools that have significant limitations within development, or a lack of reliability and validity evidence in this study were not selected for this study. The only measures considered for use in this study study were well-published screening tools for Autism Spectrum Disorder that are well supported for use with Autism Spectrum Disorder in a broad range of functioning (e.g., across DSM-IV-TR diagnoses, as well as the previously utilized term of HFA). Unfortunately, tools such as the Child Autism Rating Scale, 2nd Edition, High

Functioning Form (CARS-2-HF; Schopler et al., 2010) and the Autism Spectrum Quotient (ASQ; Baron-Cohen et al., 2001) cannot be used due to lack of alignment with the purpose of this study; the CARS-2-HF is a form for clinicians, while the ASQ is intended for use with older adolescents and adults with Autism Spectrum Disorder. An additional goal in the selection of measures for this study is to draw on a variety of perspectives on Autism Spectrum Disorder. Fortunately, each tool utilizes a unique conceptualization of what collection of behaviors defines Autism Spectrum Disorder.

For study 1, two existing Autism Spectrum Disorder screening tools met these criteria and were selected: (1) Social Responsiveness Scale; and (2) Autism Spectrum Screening Questionnaire. Although a brief description of each study measure has already been provided in the literature review, those selected will now be evaluated in greater depth. For each measure, the following information will be reviewed: (1) Test development procedures; (2) response and scoring formats; (3) technical properties; (4) studies investigating the measure; and (5) cause for inclusion in the current study. For study 2, a novel questionnaire, the Twice-Exceptional Rating Form, was developed to evaluate parent report of symptoms identified by content area experts.

Social Responsiveness Scale

The Social Responsiveness Scale (SRS) was initially titled the Social Reciprocity Scale, when the test publishers used the forms to research social deficits in pervasive developmental disorders during normal social interactions (Constantino & Gruber, 2005). Initial item development for the SRS involved item generation by the test publishers, based on clinical experience (Constantino & Gruber, 2005). Next, the publishers had a pool of experts review these items for fit into a broad constellation of Autism Spectrum

Disorder symptoms; experts included school psychologists, clinical child psychologists, neuropsychologists, neurologists, pediatricians, psychiatrists, special education teachers, and parents of children with a diagnosis on the autism spectrum (AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified). Unfortunately, the SRS manual suggests that the review process was systematic, but does not describe the item pool review procedures. Also of concern is the lack of mention of pilot studies for test forms or use of a review process to evaluate items and scales (Conway, 2006). However, research studies conducted by the publishers during development of the measure provide preliminary analyses of item and scale performances prior to use of the SRS with general clinicians (Constantino & Gruber, 2005).

The SRS contains two separate, but identical forms, for teachers and parents to complete. The only differentiation between these forms is the normative scaling used for comparison; there are no differences in item content or changes in item language. As previously discussed, each form consists of 65 items scored on a 4-point Likert-type scale; responses to items range from "not true" to "almost always true." Items vary in content across five subscales: social awareness, social cognition, social communication, social motivation, and autistic mannerisms. The authors attempted to produce a brief form of the SRS, but the reduction in items impaired specificity from similar disorders (Constantino, Przybeck, Friesen, & Todd, 2000). No exploratory or confirmatory factor analyses have been conducted to evaluate the appropriateness of differentiation across these scales. Furthermore, scores on these subscales have very high correlation indices with one another, suggesting a lack of differentiation between the items (Conway, 2006). Scores are converted into T-scores, resulting in scaled scores for each subscale, as well as

a total scale. For the total scale, interpretation is made on a continuum of social impairment. T-scores below 59 suggest mild Autism Spectrum Disorder symptoms or normal functioning, scores between 60 and 75 suggest moderate impairment (e.g., Pervasive Developmental Disorder, Not Otherwise Specified or Asperger's syndrome), and T-scores above 76 suggest severe social impairment (Constantino & Gruber, 2005). The authors suggest that each subscale can also be interpreted to assist in defining the nature of impairment; however, individual subscales are not intended for diagnostic use.

Validity evidence for the SRS is provided through numerous studies conducted by the publishers as well as outside researchers. Of note, a majority of the studies used to provide validity evidence for the SRS were conducted in large metropolitan cities (Conway, 2006). The SRS manual suggests that the collection of evidence from studies investigating the SRS demonstrate the existence of a single factor associated with autistic impairment (Constantino & Gruber, 2005). Comparison studies with the Autism Diagnostic Interview (ADI-R) provide concurrent validity evidence for the SRS through correlation coefficients (R=.65 to .94) between the two measures (Constantino et al., 2003). A study investigating social reciprocity's contribution to Autism Spectrum Disorder impairment provided specificity evidence for the SRS in differentiating pervasive developmental disorders from ADHD and anxiety disorders (Constantino et al., 2000). Reliability evidence for the SRS is provided from three types of evidence: internal consistency, construct stability (test-retest stability), and inter-rater agreement. All internal consistency evidence is provided through split-half coefficients, and was drawn from the previously discussed 2000 and 2003 studies by Constantino and colleagues, as well as additional studies. In a later review of these studies, Constantino and colleagues

(2005) further emphasized strong support for internal consistency of the measure (α=.94 for parents; α=.97 for teachers). Alpha coefficients from the 2000 study ranged from .96 to .97, again suggesting strong internal consistency. Of note, a later study produced subscale alpha coefficients ranging from .77 to .92 (Conway, 2006); thus, interpretations regarding subscales as unique constructs is likely not appropriate. Evidence for construct stability is gathered from a study of reciprocal social behavior in twins (Constantino, Hudziak, & Todd, 2003). Parents completed the measure, waited 17 months, and completed the form again, the resulting correlation coefficient for their scores was r=.85 for boys and r=.77 for girls (Constantino & Gruber, 2005); these scores are considered adequate support for reliability of scores over time (Conway, 2006). Inter-rater agreement evidence is provided through comparisons of mother report to father report (r=.91), as well as mother report to teacher report (r=.82).

In addition to the validation studies described above, outside (non-developer) studies have also investigated the SRS. Studies of diagnostic validity have provided moderate support for the SRS with regard to sensitivity and specificity (Norris & Lecavalier, 2010). When comparing the SRS to other Autism Spectrum Disorder screening tools with regards to sensitivity and specificity, Norris and LeCavelier found moderate support for use of the SRS, yet criticized its focus on social impairment. Use of the SRS with European patients has been supported from a cross-cultural validation study (Bölte et al., 2008).

Selection of the SRS was based on a number of factors. First, development followed multiple steps and reviewers, while item development is founded in the experiences of researchers. Thus, the unique definition of impairment for this measure is

a representation of non-clinicians, but clinical research experts. Second, technical properties and additional studies provide a large body of evidence supporting SRS use for "typical" Autism Spectrum Disorder screening. Finally, the SRS emphasizes social impairment. The SRS provides a unique perspective on Autism Spectrum Disorder, while garnering adequate psychometric and clinical support.

Autism Spectrum Screening Questionnaire

The Autism Spectrum Screening Questionnaire (ASSQ) was developed in Europe with the intent of screening for Asperger's Syndrome in research studies (Ehlers et al., 1999). Test developers expanded its use to all Autism Spectrum Disorder following results from the validation study, which demonstrated good sensitivity and specificity for all Autism Spectrum Disorder (Ehlers & Gillberg, 1993). Item development was based on clinical expertise of the test developers as well as a review of relevant literature. Items are intended to also tap into the diagnostic criteria in both the DSM-IV and the International Classification of Disorders, 9th Edition (ICD-9; WHO, 1990). Preliminary drafts of the ASSQ were used with Swedish teachers, resulting in several drafts that were eventually translated into English by a contributing author. Additionally, the development sample of 1,401 children and adolescents aged 6 to 17 years old constitutes a substantial validation sample.

The ASSQ consists of 27 items across four scales: socialization, communication, behaviors, and associated conditions. Items are scored on a 3-point Likert-type scale, with responses ranging from "no" to "sometimes" to "yes" (Ehlers et al., 1999), yielding a score range of 0 to 54. The authors recommend using multiple cutoff scores, depending on the intended use of the measure. For high sensitivity and low specificity, parent cutoff

is 13 and teacher cutoff is 11. For more precise measures of specificity, a more moderate cutoff of 19 for parents and 22 for teachers is recommended. Should a user be exceptionally concerned about specificity, a cut score of 22 for parents and 24 for teachers is recommended, yet the authors caution the impact on sensitivity.

Reliability support is provided through test-retest evidence and inter-rater reliability indices. The ASSQ was demonstrated as maintaining consistency in score report over a 2-week timespan (r=.94; Ehlers et al., 1999). Support for inter-rater agreement between teachers and parents is more modest; the developers reported moderate correlations across all members of the validation sample as well as the Autism Spectrum Disorder-only sample (r=.66 to .77). Validity evidence is provided through divergent and convergent sources of evidence. Divergent and concurrent validity support is provided through correlation coefficients between the ASSQ and a measure of ADHD, results of this analysis suggest that the ASSQ discriminates Autism Spectrum Disorder from ADHD and LD at different points in the spectrum, including HFA and AS.

The first study published on the ASSQ, beyond the initial validation study in 1993, was conducted by the test developers in 1999 and has already been discussed (Ehlers et al., 1999). In a study of Finnish school children and outpatients, a cut score of 30 for the sum of parent and teacher forms, as well as teacher-only cut score of 22, were recommended (Mattila et al., 2009). The authors could not identify a reliable parent-only cut score and asserted the need to use both parent and teacher scores when screening for Autism Spectrum Disorder with the ASSQ. Additionally, a factor analysis of the ASSQ was conducted by Posserud et al. (1999), resulting in a 3 factor model: socialization, "autism associated problems," and autistic cognitive pattern. The socialization factor

accounted for the majority of predictive variance (Posserud et al., 2008). Unfortunately, no studies investigating ASSQ use in the United States could be found.

The ASSQ contributes to this study through its excellent development process. It is the only measure in this study to have undergone an item review process and pilot testing. Additionally, the ASSQ contributes the perspective of international psychology as well as the ICD-10 (WHO, 1994).

Twice-Exceptional Rating Form

To address research questions 2 and 3; a novel research measure was developed (APPENDIX G). This measure was developed with intent to provide quantitative descriptive statistical information regarding parent perceptions of symptoms. Additionally, this measure was developed to gather perceptions of Autism Spectrum Disorder symptoms in high ability youth that are not identified within current symptom screening tools.

Development of the Twice-Exceptional Rating Form

Item development for this measure began utilizing a card sort technique from content area experts. For this study, 2 content area experts were used. Content area expert 1 is a female, Caucasian, early career licensed psychologist at a Midwestern university-based assessment and counseling clinic. She was selected due to extensive clinical and research experience working with twice-exceptional students, including consistent contribution to twice-exceptional literature. She completed both graduate and post-doctoral training at a clinic specialized in twice-exceptionality. Content area expert 2 is a male, Caucasian, seasoned, licensed psychologist employed at a Midwestern children's hospital. He completed graduate training in both social work and psychology

at a large, Midwestern university. He was selected as a content area expert due to his substantial clinical experience in Autism Spectrum Disorder, including patients of varying cognitive ability. While this expert is not specialized in the evaluation or treatment of twice-exceptional Autism Spectrum Disorder, he is the director of a clinic that conducts high volume Autism Spectrum Disorder evaluations in children and adolescents. Thus, he was selected for clinical expertise in differentiating high cognitive ability Autism Spectrum Disorder apart from lower functioning children and adolescents.

A card sort technique was chosen over other construct evaluation methodologies (e.g., factor analysis or structural equation modeling) due to limited availability of content experts and limited sampling availability of twice-exceptional families. Lewis and Hepburn (2000) acknowledged card sort techniques as a qualitative measurement alternative to factor analysis for identifying various construct domains. Procedures for this study involved a multi-step card sort technique (Santos, 2006). First, the content area experts identified distinct content domains by placing individual cards into various piles. Content area experts were instructed to develop piles that represented symptoms associated with Autism Spectrum Disorder in high ability youth. This process required the content area expert to place the first card in the stack into the first pile, which then represented a content domain. For each subsequent card, the expert either placed the card into an existing pile, or created a new pile, if they perceived the card to not fit the category of any existing pile. When finished with the card stack, each pile represented a unique content domain as considered by the expert. Next, each content area expert reviewed each pile and was provided with the opportunity to either: (1) leave all cards in

a pile; (2) remove cards from one pile and place them into another; or (3) remove cards from a pile or multiple piles to create a new card pile.

To develop the cards used in this process, items from several symptom-screening questionnaires, including the SRS, ASSQ, Childhood Autism Rating Scale, 2nd Edition, High-Functioning Form (CARS-2-HF), and Autism Quotient (AQ), and Social Communication Questionnaire (SCQ) were transposed onto 149 index cards, which were randomized and given separately to the content area experts.

The individual card sorts of each content area expert will now be reviewed. For each expert's sort, pile descriptions developed by the author of this study, as well as the number of cards included within the pile are provided. Content area expert 1 sorted the cards the cards into 21 piles. The piles are as follows: Pile 1 (Sensory oversensitivity; 9 cards); Pile 2 (Involuntary movements; 7 cards); Pile 3 (Unusual emotional response or lack of emotional understanding and unusual reactions; 13 cards); Pile 4 (Odd or unusual quality of voice and speech; 6 cards); Pile 5 (Restricted range of facial expression; 5 cards); Pile 6 (Literal interpretation of conversations; 6 cards); Pile 7 (Lack of comprehension of whole picture or tendency to focus on parts; 10 cards); Pile 8 (Stereotypic Movements; 9 cards); Pile 9 (Resistant to changes in Routine; 9 cards); Pile 10 (Perseveration on restricted interests; 12 cards); Category 11 (Non-functional play; 4 cards); Pile 12 (Lack of awareness of social skills deficits; 9 cards); Pile 13 (Avoidance of social interactions; 8 cards); Pile 14 (Poor quality of social relationships; 9 cards); Pile 15 (Limited expressive/receptive language; 7 cards); Pile 16 (Poor awareness of appropriate social communication or inappropriate comments; 11 cards); Pile 17 (Odd Vocal Quality; 3 cards); Pile 18 (Lack of imaginative play; 7 cards); Pile 19 (Poor

coordination; 6 cards); Pile 20 (“Little professor” behaviors and speech; 5 cards); Pile 21 (Upset/overwhelmed by social situations; 7 cards). Content area expert 1 produced 21 total piles with a 3 to 13 range of cards-per-pile.

Content area expert 2 sorted the cards into 22 piles. The piles are as follows: Pile 1 (Difficulty engaging in imaginative play; 7 cards); Pile 2 (Poor quality of social interactions for both peers and adults combined, as well as lack of relationships; 13 cards); Pile 3 (Disliked by peers, recognition of desire to fit in, teased; 5 cards); Pile 4 (Lack of awareness of social skills weaknesses; 9 cards); Pile 5 (Underdeveloped social skills; 3 cards); Pile 6 (Unusual physical appearance, such as poor gaze, eye contact, posture; 8 cards); Pile 7 (Overattention to details, lack of awareness of “big picture; ” 10 cards); Pile 8 (Low control over emotions, poor emotional maturity; 6 cards); Pile 9 (Stereotypic movements; 9 cards); Pile 10 (Poor coordination; 6 cards); Pile 11 (Overwhelmed by social interactions; 8 cards); Pile 12 (Poor hygiene; 1 card); Pile 12 (Poor organization/disorganized; 3 cards); Pile 13 (Resistant to changes in routine; 10 cards); Pile 14 (Perseveration on restricted interests; 14 cards); Pile 15 (Sensory oversensitivity; 7 cards); Pile 16 (Non-functional play; 4 cards); Pile 17 (Restricted range of facial expression; 6 cards); Pile 17 (Limited expressive and receptive language (5 cards); Pile 18 (Overly mature/serious language; 5 cards); Pile 19 (Odd vocal quality; 2 cards); Pile 20 (Literal interpretation of conversations; 5 cards); Pile 21 (Inappropriate questions/comments in conversation; 8 cards); Pile 22 (Does not understand jokes; 3 cards). Content area expert 2 produced 22 piles with a range of 1 to 13 cards-per-pile.

The individual sorts of the content area experts were then evaluated side-by-side for consideration of content domain agreement. Of the 43 total piles produced by the

content area experts, 40 represented thematic overlap and were combined into 20 piles of agreed content (100% agreement between card sorters), while 3 piles were not agreed upon: Content area expert 1 pile 3 (Disliked by peers/teased), and content area expert 2 pile 12 (Poor hygiene) and pile 22 (Does not understand jokes).

The remaining 20 piles were transposed into statements, representing individual content areas as symptoms of Autism Spectrum Disorder. These statements were all written by the study author; there were no reviews of language or content by additional parties. Statements were developed with the goal of representing the content domain in a high-readability single sentence that would reflect a potential behavior observed by a parent. Each of these statements was developed with unique language to the Twice-Exceptional Rating Form. No statements were transposed from existing Autism Spectrum Disorder screening tools.

The final content domains used for the Twice-Exceptional Rating Form were as follows: (1) Lack of imaginative play (14 cards); (2) Sensory oversensitivity (16 cards); (3) Odd/unusual movements (13 cards); (4) Difficulty regulating emotions (19 cards); (5) unusual speech/language (10 cards); (6) Lack of facial expressions (11 cards); (7) Quick to upset in social situations (15 cards); (8) Lack of awareness of "big picture" (15 cards); (9) Difficulty with changes in routine (19 cards); (10) Restricted interests (26 cards); (11) Non-functional play (8 cards); (12) Poor social awareness (20 cards); (13) Social avoidance (21 cards); (14) Limited social relationships (22 cards); (15) Communication deficits (12 cards); (16) Poor social engagement (14 cards); (17) Rigidity (23 cards); (18) Unsatisfied with social relationships (12 cards); (19) "Little professor" behaviors (10 cards); and (20) Inappropriate questions/comments (19 cards).

The final version of the Twice-Exceptional Rating Form was sent to participants in study 2 and included a randomized order of the 20 transposed statements, as well as basic demographic questions. Additionally, a 2-part open-ended question at the end of the form, which provided opportunity for parents to report additional symptoms not identified on the form. The first part of this questions asked, "Does your child have any additional challenges related to socialization, communication, or unusual behaviors?" If a participant indicated that there were additional challenges, they were prompted to provide examples of this additional symptomology. Responses from this open-ended question were utilized to address Study 2 Research Question 2.

The purpose of this questionnaire was to elicit feedback from parents of twice-exceptional children/adolescents for the current content domains used for conceptualization and evaluation of Autism Spectrum Disorder. This measure was not developed with the intention of clinical applications. It is not supported in identification of Autism Spectrum Disorder, giftedness, or twice-exceptionality. Further, test development for this measure is not consistent with the procedures used in developing the twice-exceptional screening measure in development (Behrens, et al., 2012; Foley Nicpon, Behrens, & Candler, 2013; Lyon, et al., 2012). Development of the form used in the current study included several processes consistent with test development theory (DeVellis, 2012); however, several important elements were not included. First, this measure was not evaluated for content, construct, or concurrent validity evidence in use as a clinical screening tool. Second, items on this test were not piloted prior to use. This limitation was necessary due to the minimal sampling capabilities of the study and the

necessity to include a maximum size sample of potential participants in the study 2 sample.

Statistical Analysis

Analyses for study 1 can be divided into the following categories: (a) descriptive statistics and (b) comparison between Pervasive Developmental Disorder, Not Otherwise SpecifiedPervasive Developmental Disorder, Not Otherwise Specified, Asperger Syndrome, and Autistic Disorder diagnostic groups on the SRS and ASSQ. For study 1, the following descriptive statistics are provided: (a) frequencies of diagnoses, (b) frequencies of child gender, and (d) frequencies, mean, standard deviation, and range for child age. Analysis for comparisons between the diagnostic groups was conducted using a split-plot ANOVA design. This design was selected to Autism Spectrum Disorderaddress diagnostic group comparisons while maintaining a repeated measures design. This design was also selected due to allowance for between group comparisons (diagnostic groups), as well as within group comparisons (screening tool).

Analyses for study 2 can be divided into the following categories: (a) descriptive statistics and (b) discussion of open-ended responses. For study 2 parent sample, the following descriptive statistics are provided: (a) frequencies of diagnoses, (b) mean, standard deviations, and ranges for intelligence scales, (c) frequencies, mean, standard deviation, and range for child age, and (d) frequencies, mean, standard deviation, and range for child grade. Analysis for the questionnaire items will include descriptive statistics in the form of means and standard deviations for each item, as well as descriptions of responses for the open-ended exploratory item.

As previously stated, the research question for study 1 is:

Research Question 1: What are the similarities and differences in parent symptom report across children diagnosed with DSM-IV-TR criteria of Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified?

Hypothesis 1: Total scores on the ASSQ and SRS will be statistically discrepant between youth diagnosed with AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified.

Autism Spectrum DisorderThe research questions for study 2 are:

Research Question 2 (Study 2 Research Question 1): To what extent do currently recognized Autism Spectrum Disorder symptoms reflect the behavioral presentation of high ability students with Autism Spectrum Disorder?

Research Question 3 (Study 2 Research Question 2): What additional behavioral challenges do parents of twice-exceptional children identify beyond those addressed in the combination of reviewed Autism Spectrum Disorder screening tools?

CHAPTER 4

RESULTS

The purpose of this chapter is to summarize the statistical analyses employed in evaluating the research questions and hypotheses provided in this study. First, descriptive statistics and correlations for the study measures are provided. Next, the analyses for the research question 1 will be provided. Finally, this chapter will address research questions 2 and 3.

Descriptive Statistics and Correlations for Measures

Table 3 shows the means, standard deviations, ranges, and Cronbach's alphas of the study measures. Previous studies reported Cronbach's alphas for the SRS ranging from (α = .77-.97; Constantino, et. al., 2005; Conway, 2006). Internal consistency analysis for the study 1 parent sample revealed a Cronbach's alpha below this range (α = .69). Previous studies reported Cronbach's alphas for the ASSQ ranging from (α = .86-.89; Posserud et. al., 2008). Internal consistency analysis for the current study again revealed lower internal consistency (α = .73). Review of samples used in studies assessing the internal reliability of the SRS (e.g., Conway, 2006) and the ASSQ (e.g., Posserud et al., 2008) reveal more homogenous diagnostic samples the participants included in study 1. Specifically, Conway (2006) included no participants diagnosed with Autistic Disorder and Posserud and colleagues (2008) included a sample with a substantial overrepresentation of individuals diagnosed with Asperger Syndrome and Pervasive Developmental Disorder, Not Otherwise Specified. Thus, the lower ratings of internal consistency in the current measure may reflect increased heterogeneity of the diagnostic sample.

As a novel tool designed for this study, the Twice-Exceptional Rating Form has no previously published data supporting reliability or validity or use for twice-exceptional students. It is possible that this measure incorporates several distinct constructs represented by groups of items; however, the limited response pool provided in this study does not support statistical investigation (e.g., structural equation modeling or factor analysis) of content domains. It is also important to consider that items were intended for individual review, with no consideration to overall score on the form. Table 4 shows the range, mean, mode, and standard deviation of the individual items included on the Twice-Exceptional Rating Form.

Research Questions

Study 1 Research Question

The first research question asked what are the similarities and differences in parent symptom report across for youth diagnosed with DSM-IV-TR criteria of Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified? This question was addressed through a split-plot ANOVA of parent responses on current Autism Spectrum Disorder symptom screening questionnaires (e.g., ASSQ and SRS).

The hypothesis for research question 1 predicted that total scores on the ASSQ and SRS would be statistically discrepant across parent responsesPervasive Developmental Disorder, Not Otherwise Specified. Autism Spectrum DisorderAutism Spectrum DisorderPervasive Developmental Disorder, Not Otherwise SpecifiedResults from the split-plot ANOVA indicated that parent report of Autism Spectrum Disorder symptoms did not significantly differ across the SRS and ASSQ based on diagnosis (F (2,

79) = 1.53; p = 0.23). Due to the lack of an interaction effect, main effects for the ASSQ and SRS were analyzed. Results indicated that parent responses on the SRS did not significantly differ between parents of children/adolescents diagnosed with AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified (F (1, 42) = 2.02; p = 0.16). Thus, parent responses on the Social Responsiveness Scale were not discrepant based on youth diagnosis of Autistic Disorder (m = 74.57; SD = 12.86), Asperger Syndrome (m = 71.60; SD = 15.17), or Pervasive Developmental Disorder, Not Otherwise Specified (m = 73.10; SD = 10.78). Similarly, results indicated that parent responses on the ASSQ did not significantly differ between parents of children diagnosed with AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified (F (1, 42) = 2.17; p = 0.15). Thus, parent responses on the Autism Spectrum Screening Questionnaire were not discrepant based on youth diagnosis of Autistic Disorder (m = 24.28; SD = 7.13), Asperger Syndrome (m = 23.80; SD = 6.91), or Pervasive Developmental Disorder, Not Otherwise Specified (m = 21.40; SD = 9.39). Therefore, the null hypothesis cannot be rejected and contrary to hypothesis 1, ASSQ and SRS scores were not discrepant between parents of children diagnosed with AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified.

Study 2 Research Question 1

The second research question asked which currently recognized Autism Spectrum Disorder symptoms reflect the behavioral presentation of high ability students with Autism Spectrum Disorder. This research question was addressed through review of parent responses to likert-type items included on the Twice-Exceptional Rating Form. As

an exploratory research question, no hypothesis was provided regarding expectations of parent responses.

See Table 3 for descriptive statistics of individual items provided in the Twice-Exceptional Rating Form. The range of total score across individual parents (range =13-72) suggests that report of symptoms varied both in regards to quantity and frequency. Total score metrics were computed (Mean = 38.30, Standard Deviation = 15.01); however, no interpretation of total scores were made due to test development objectives of investigation of individual symptom responses, rather than global impairment.

Of the 20 items on the questionnaire, 5 items had a mean score indicating occurrence of "Often" or greater in frequency. These items included: (4) Has difficulty with emotions in comparison to his/her peers (e.g., more OR less of an emotional response to peer situations); (10) Is very dedicated to several specific interests or hobbies, and may tend to get "stuck" thinking or talking about these interests; (14) Has fewer or less quality relationships with peers in comparison to most of his/her peers; (15) Has difficulty communicating with peers and/or family (this includes comprehension and expression); and (16) Has difficulty understanding appropriate methods of socializing with peers. Review of items also revealed that 5 of the 20 items were reported as occurring only less frequently than "sometimes." These items included: (1) Has difficulty engaging in imaginative play; (3) Has unusual or odd movements (e.g., flaps his/her hands or repeats simple movements many times); (11) Plays with only parts of objects or toys, rather than using them as they were intended; (13) Avoids social interactions with peers; and (17) Has very little understanding of conversations (e.g., tends to miss subtle subtext in conversations). It is important to note that these symptoms

reported as occurring less frequently are predominantly associated with lower functioning individuals with Autism Spectrum Disorder (Matson, Dempsey, LoVullo, & Wilkins, 2008).

Study 2 Research Question 2

The third research question asked what additional behavioral challenges parents of twice-exceptional children identify beyond those addressed in the combination of current Autism Spectrum Disorder screening tools. Of the 21 Twice—Exceptional Rating Forms completed in study 2, 5 forms included responses to the open-ended question. Parent responses included: (1) "Everyone feels like they are walking on eggshells;" (2) "Doesn't seem to understand how other kids want to play;" (3) "[child] plays best when she chooses how to play; (4) "[child] has a wonderful memory. [He] remembers everything from a book I read to [him] 3 years ago; and (5) "Wonderful at science, always the best in [his] class."

Review of these responses provides several possible interpretations. Parent response (1) can be interpreted to support the presence of emotion dysregulation, as well as possible externalizing behavior problems. Parent responses (2) and (3) provide evidence for rigidity in preferred interactions and activities, as well as social skills deficits. Parent responses (4) and (5) demonstrate parental perceptions of strengths associated with twice-exceptionality, such as good academic achievement and memory skills.

Overall, review of parent responses supports the presence of many broad symptoms associated with Autism Spectrum Disorder. However, consideration of open-ended statements from parents underlies the importance of considering strengths, as well

as weaknesses when conceptualizing twice-exceptional students. Diagnostic criteria in the DSM-5 (APA, 2013) address only the behavioral and functional deficits associated with Autism Spectrum Disorder, while twice-exceptionality presentation inherently incorporates demonstration of notable talents and strengths.

Summary

To summarize the overall results, reports on Autism Spectrum Disorder symptoms as defined by the ASSQ and SRS, did not differ between parents of youth diagnosed with AD, AS, or Pervasive Developmental Disorder, Not Otherwise Specified. Thus, results from study 1 provide evidence in support of the diagnostic coding shift to a single Autism Spectrum Disorder diagnostic label. However, review of parent-reported symptoms in study 2 suggests potential for mild phenotypical characteristics associated with Autism Spectrum Disorder in high ability youth. While these included social relationship deficits, rigidity, and communication weaknesses, parents did not consistently endorse the presence of other Autism Spectrum Disorder symptoms, such as repetitive movements, lack of social interest, social pragmatics deficits, or lack of imaginative play. Of note, these less consistently endorsed symptoms are often associated with lower functioning Autism Spectrum Disorder (Matson, Dempsey, LoVullo, & Wilkins, 2008). Finally, through open responses in study 2, parents reported children demonstrating good academic achievement and rote memorization skills.

CHAPTER 5

DISCUSSION

The purpose of this chapter is to discuss the findings of this study and provide comparisons and points of contrast from the existent literature. First, a discussion of findings from this study's research questions are provided, followed by explanations of the results. Finally, limitations, and future directions, and implications for research, clinical practice, and education will be outlined.

This project incorporated three research questions in support of a central goal: further our understanding of symptom presentation in Autism Spectrum Disorder (Autism Spectrum Disorder). The first study's research question addressed the appropriateness of the recent shift from multiple diagnoses associated with Autism Spectrum Disorder to the single diagnosis included in the DSM-5 (APA, 2013). This research question was evaluated through investigation of the performance of current Autism Spectrum Disorder symptom screening questionnaires when used with youth diagnosed with Autistic Disorder (AD), Asperger's Syndrome (AS), and Pervasive Developmental Disorder, Not Otherwise Specified (Pervasive Developmental Disorder, Not Otherwise Specified). The second study incorporated two related research questions. The first of these questions addressed the applicability of currently recognized Autism Spectrum Disorder symptoms when applied to high ability youth. Finally, the second research question in the second study considered additional novel symptoms of Autism Spectrum Disorder in high ability youth not recognized in current symptom screening tools.

Possible Explanations for Results

Study 1

Study 1 hypothesized that total scores on the ASSQ and SRS would be statistically discrepant between youth diagnosed with Autistic Disorder, Asperger Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified. No statistically meaningful differences existed for parent responses on commonly used symptom screening questionnaires between diagnostic groups. There are several interpretations for this finding. First, it is possible that there are no meaningful differences in Autism Spectrum Disorder symptom presentation across the previously used DSM-IV-TR diagnoses. This interpretation contributes to the wealth of literature supporting the use of single diagnostic label of Autism Spectrum Disorder, as opposed to various individual diagnoses (e.g., American Psychiatric Association, 2010; American Psychiatric Association, 2013; Lord et al., 2012; Lord & Bishop, 2010). While Autism Spectrum Disorder is recognized for substantial heterogeneity in individual presentation, understanding of within group commonalities of presentation is important for both clinical awareness and potential treatment outcomes. It is important to note that the lack of statistically meaningful differences between AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified samples in this study does not equate to a lack of any meaningful differences between these previous diagnostic groups. For example, Esienmajer and colleagues (1997) discussed improved verbal intellectual functioning in individuals with AS relative to individuals with AD. Additionally, Szatmari and colleagues (1995) reported an increasing hierarchy in language development and adaptive functioning from AD, through AS, to Pervasive Developmental Disorder, Not Otherwise

Specified. Thus, lack of difference in reported symptom intensity and frequency only reflects one component of the holistic functioning across all presentations of Autism Spectrum Disorder.

A second interpretation of these results is that meaningful differences in SRS or ASSQ ratings may exist between AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified; however, the limited sample size included in this study did not detect the discrepancy. This is a plausible interpretation, particularly given conceptualization of the "autism spectrum" as a hierarchy of functional impairment where the previously used diagnoses of AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified reflect descending impairment (e.g., Hazen, McDougle, & Volkmar, 2013; Lee, 2009). However, while theoretical assumption of a difference between these groups may persist due to this study limitation, there is no meaningful evidence provided in the current study to support a finite barrier in symptom presentation between AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified. Thus, results of study 1 contrast categorical differences in presentation between Pervasive Developmental Disorder, Not Otherwise Specified, AS, and AD and instead provide support for a uniform diagnosis of Autism Spectrum Disorder (e.g., APA, 2013; Lord et al., 2012).

Overall, findings from study 1 support the use of a single Autism Spectrum Disorder diagnosis, in opposition to use of several distinct diagnoses; thus, findings align with the diagnostic shifts in the DSM-5 (APA, 2013). Given the breadth in Autism Spectrum Disorder symptom presentation, this finding provides important support for commonalities in challenges faced by individuals with Autism Spectrum Disorder.

Intervention planning and treatment models should be tailored for each individual with Autism Spectrum Disorder, yet the commonalities in symptom interference demonstrated in this study supports generalizability of interventions previously intended for use with distinct DSM-IV-TR diagnoses.

Study 2

Through responses on the Twice-Exceptional Rating Form, parents reported frequent occurrence of several symptoms associated with Autism Spectrum Disorder. Of note, social insight and lack of reciprocal communication were less frequently identified as problematic, although challenges developing and maintaining friendships was reported as an area of consistent difficulty. This finding is consistent with previous literature proposing that twice-exceptional students with Autism Spectrum Disorder may have less prominent social deficits than children diagnosed with Autism Spectrum Disorder, but not identified as gifted (Neihart, 2000). Unfortunately, this diminished weakness may enhance values and perceptions of difficulty "fitting in" with peers and contribute to challenges with psychosocial adjustment (Foley Nicpon, Doobay, & Assouline, 2010; Foley Nicpon, Rickels, Assouline, & Richards, 2012). Further, in responses to the open-ended question, one parent reported that their child "doesn't seem to understand how other kids want to play," while another stated that "[she] plays best when [she] chooses how to play." To better understand these challenges, consideration should be given to the quality of communication in high ability youth with Autism Spectrum Disorder. While broad deficits in communication are recognized as less significant for high ability youth (Neihart, 2000), it is possible that more specific deficits, such as understanding and use of social pragmatics in speech, continue to represent a challenge.

Deficits within the restricted and repetitive behavior domain of symptoms for twice-exceptional children similarly reflected deviations from traditional symptoms. Foremost, parents did not endorse children or adolescents engaging in repetitive play. Rather, fixated interest on specific topics was reported as the most common area of difficulty. This finding is consistent with previous literature, in that many twice-exceptional children become fixated on academic or pseudo-academic topics (e.g., science, mathematics, history, etc.; Assouline, Foley Nicpon, & Huber, 2006). Preoccupation in these fact-based topics could be expected given the rote memorization strengths identified in children with Autism Spectrum Disorder (Boucher & Bowler, 2008), as well as preference for "black-and-white" adherence to rules (e.g., Lord, et. al., 2010). While children of average or below average intellectual ability may become fixated on topics such as television or cartoon characters, it is possible that high ability youth with Autism Spectrum Disorder are more likely to exhibit intellectually driven interests.

Results from study 2 present an interesting theory: intellectual functions may mediate the manifestation of Autism Spectrum Disorder symptoms. While differences in symptom presentation are well documented across individuals with Autism Spectrum Disorder (APA, 2011; APA, 2013; Kulage, Smaldone, & Kohn, 2014; Lord et al., 2012; McPartland, Reichow, & Volkmar, 2012), there has been no consistent reference of causal factors that contribute to this heterogeneity. Given the lack of differences across symptom report for youth diagnosed with Pervasive Developmental Disorder, Not Otherwise Specified, AS, and AD in study 1, it is important to consider alternative hypotheses, such as the contribution of intellectual ability.

Overall, parent responses in study 1 endorse use of the DSM-5 single diagnosis model for Autism Spectrum Disorder (APA, 2013), while parent responses in study 2 suggest that there may be nuances unique to gifted student presentation within each symptom factor. Within the social communication domain, weaknesses are best defined by impairment in development and maintenance of social relationships; however, insight into these weaknesses was not consistently reported as impaired. While restricted interests were acknowledged, individual parent report suggested the presence of academic or pseudo-academic subjects as common areas of interest.

Strengths and Limitations

The present study has a number of notable strengths. First, this study addresses broad commonalities and differences in individuals with Autism Spectrum Disorder, as well as more specific features associated with high ability youth. Thus, this study contributes both to general understanding of Autism Spectrum Disorder, as well as appreciation for differences in presentation based off ability. It is possible that the spectrum of functioning associated with Autism Spectrum Disorder is fundamentally related to cognitive or intellectual functioning. Second, the multi-modal research design provided a rich collection of data that incorporated (1) comparisons between DSM-IV-TR diagnostic groups on objective symptom rating tools, (2) characteristics of high ability youth with Autism Spectrum Disorder in regards to existent broad Autism Spectrum Disorder symptoms, as well as (3) unique additive qualitative information for high ability youth with Autism Spectrum Disorder. This is the only known study that includes both objective comparisons for broad Autism Spectrum Disorder presentation and novel data addressing the clinical presentation of Autism Spectrum Disorder in an

underrepresented sub-population: gifted children and adolescents. Third, this study emphasizes parent perception of symptom presentation. Given the importance of parent support of children/adolescents diagnosed with Autism Spectrum Disorder (Neumeister, Yssel, & Burley, 2013), it is critical that clinician perception accurately incorporate the perceptions of parents. Further, parents are often the first identifiers of developmental abnormalities, resulting in clinical evaluation and professional identification of Autism Spectrum Disorder (De Giacomo & Fombonne, 1998).

The current study represents an important stepping-stone in our understanding of Autism Spectrum Disorder in high ability youth. While it does not provide authoritative findings that describe the population, it opens windows into several areas that require further inquiry (e.g., features of social communication and restricted and repetitive behavior deficits). Some of these questions are being addressed through ongoing research projects, such as the development of a symptom screening questionnaire for children and adolescents who are twice-exceptional (e.g., Behrens, et al., 2012; Foley Nicpon, Behrens, & Candler, 2013; Lyon, et al., 2012).

However, this study is restricted through several limitations. First, both studies included low sample size of participants. For study 1, low sample size may have contributed to the lack of statistically meaningful difference between the Pervasive Developmental Disorder, Not Otherwise Specified, AS, and AD groups. The low prevalence of high ability youth with Autism Spectrum Disorder also presented a significant challenge to data collection in study 2. The limited sample size for this latter study also inhibited the amount of additional symptoms reported by parents. Thus, it is possible that there are notable clinical features not identified in this study of Autism

Spectrum Disorder in high ability youth due to a lack of sufficient families included in the sample.

A second overarching limitation across both studies lies in the timing of administration of symptom screening tools. Symptom screening questionnaires are intended for use at the onset of diagnostics, as opposed to providing confirmation of diagnostic impressions by clinicians. The current studies were restricted in that all participants had already received diagnoses prior to completing these forms, which may have led towards a confirmation biased response pattern (Müller, & Furniss, 2013). Given the high frequency of Autism Spectrum Disorder symptoms reported by the study 1 parent sample, it is possible that parent responses reflected exaggerated perceptions of symptoms. This response tendency bears similarity to the tendency of patients to over-report psychiatric symptoms within inpatient treatment (e.g., Patel, et. al., 2011). Specifically, symptom over report is a trend potentially due to increased awareness of diagnosis.

The third overarching issue with samples used in both studies is the lack of data addressing diversity in family socio-economic status (e.g., family income, parental education), geographic location, and ethnicity/race. Further, variability in Autism Spectrum Disorder presentation and prevalence across different cultural groups may further manifest differently across cognitive ability (Bornstein & Hendricks, 2013). Given that archival data collection from the study 1 parent sample, as well as all data collection in from study 2 for this project took place at a clinic in a high-SES Midwest city, including high frequency of post-graduate families, there are possible financial and educational biases in parent report. Generalization of results from this study to

populations that represent any of the following is cautioned against: (1) low education; (2) low SES; (3) geographical locations outside of the Midwest.

A fourth limitation within both studies is the lack of demographic information for the respondents to these forms (e.g., parents of children diagnosed with Autism Spectrum Disorder). This limitation hinders both the ease of replication of the current study, as well as generalization of its findings. Future studies should include demographic features of parent respondents such as ethnicity, age, gender, geographic location, and family income. Such data could provide important considerations for the relationship between parent factors and features of Autism Spectrum Disorder.

For study 1, lack of data regarding co-morbid diagnoses presents a barrier to interpreting the clinical presentation of AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified. This limitation is notable given the high frequency of co-morbid diagnoses in individuals diagnosed with a pervasive developmental disorder (de Bruin, et al., 2006), as well as the impact of co-morbid diagnosis on functioning for individuals with Autism Spectrum Disorder (Tye, et al., 2014).

For study 2, lack of pilot testing in the development of the Twice-Exceptional Rating Form presents a notable limitation. Lack of a pilot test presents several challenges to accurate and consistent interpretations (DeVellis, 2012). First, reliability and performance of items and scales is not known prior to use with study populations. Thus, data collected from individual items may influence interpretations that are not consistent with the intended area of interest. Second, wording of items and presentation of the form should be evaluated for appropriateness in use by research populations prior to

administration. Lack of pilot test data may have contributed to items on the form being misinterpreted by the study sample.

A second limitation specific to study 2 lies in the breadth of content area expert input. This study incorporated 2 health care providers from 2 different health care organizations, both of whom have extensive experience working with higher-functioning Autism Spectrum Disorder. However, holistic interpretations of clinical opinion would require inclusion of many more providers from more diverse clinical settings. Given the disparity within cultural, psychological, medical, and educational definitions of Autism Spectrum Disorder, future studies would benefit from including greater representation of breadth in content area expert opinion.

A third limitation unique to study 2 lies in the development of the Twice Exceptional Rating Form. During the card sort procedure, content area experts were instructed to sort all cards included in the 149 card set. Unfortunately, some of these cards included symptoms of Autism Spectrum Disorder that the experts may not have associated with high ability youth. Thus, it is possible that several of the piles constructed by the experts and rated by the parents in study 2 do not reflect symptoms associated with Autism Spectrum Disorder in high ability youth. This was likely contributory to the low parent endorsement Twice Exceptional Rating Form items (1) Has difficulty engaging in imaginative play; (3) Has unusual or odd movements (e.g., flaps his/her hands or repeats simple movements many times); (11) Plays with only parts of objects or toys, rather than using them as they were intended; (13) Avoids social interactions with peers; and/or (17) Has very little understanding of conversations (e.g., tends to miss subtle subtext in conversations).

Research Implications

Collectively, these studies underlie the need for additional research investigating similarities and differences in symptom presentation amongst individuals with Autism Spectrum Disorder. This study provides evidence both of symptom consistency in a broad sample, as well as possible symptom heterogeneity in a specific sub-population. Future studies should continue to assess core symptoms of Autism Spectrum Disorder in broad, inclusive samples, as well as specific considerations for Autism Spectrum Disorder presentation in less represented groups.

Study 1 contributes to the vibrant debate regarding appropriateness of the new DSM-5 diagnostic criteria. Specifically, lack of statistical difference between AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified groups supports the shift to a single Autism Spectrum Disorder diagnosis within the DSM-5. While study 1 supports a continuous model of symptom severity in Autism Spectrum Disorder (e.g., APA, 2011), further investigation into potential meaningful categorical differences is necessary at this time. For example, the DSM-5 categorizes individuals diagnosed with Autism Spectrum Disorder as Level 1, Level 2, or Level 3; however, no current studies address whether these severity markers represent meaningful differences in either symptom severity or functional impairment.

Limitations within the procedure for study 1 also provide various opportunities for further research investigating these findings. Future studies should continue to investigate any meaningful differences between the Pervasive Developmental Disorder, Not Otherwise Specified, AD, and AS populations through larger and more diverse samples. Important axes of diversity that should be considered for future samples include

age of individuals diagnosed with Autism Spectrum Disorder, cultural identity, social class issues, and geographic location. Additionally, future studies could incorporate co-morbid diagnoses to more accurately reflect the comprehensive presentation of Autism Spectrum Disorder.

The parent report paradigm for study 1 was selected due to the significant knowledge that parents possess about their children, as well as a necessary data collection means due to the intended use of the included study measures. However, future studies would benefit from including patient or even teacher report of symptoms either in contrast or in addition to parent and clinician report. It is possible that while parent perception of symptomology does not suggest categorical differences in Autism Spectrum Disorder presentation, self or teacher-report measures may present alternate findings.

Study 2 is a novel investigation towards the screening practices of twice-exceptional children and adolescents. Foremost, there remains limited understanding of the appropriateness of Autism Spectrum Disorder screening tools when used with twice-exceptional children and adolescents. While some support for current screening tools is provided in these findings, study limitations (e.g., lack of diversity data in the sample, limited breadth of screening tools, lack of an average intellectual ability comparison sample) underscore the necessity of additional similar studies. Development of screening tools that are intended for use with twice-exceptional children and adolescents (e.g., Behrens, et al., 2012; Foley Nicpon, Behrens, & Candler, 2013; Lyon, et al., 2012) are necessary.

A primary finding of study 2 is that social skills deficits in twice-exceptional Autism Spectrum Disorder may be characterized by normative interest in social engagement, yet limited capacity to develop and sustain social relationships. Neihart (2000) discussed similar challenges faced by gifted adolescents diagnosed with Asperger's Syndrome. Future studies could incorporate child and adolescent interpretations of personal social skills deficits to better discern the nature of these weaknesses. Additionally, this finding suggests that content in many formal social skills interventional programs (e.g., Radley et al., 2014) may provide a mixture of relevant and irrelevant content. Thus, further investigation is needed to determine appropriate social skills training interventions for twice-exceptional children and adolescents. As twice-exceptional students are at greater risk for negative psychosocial adjustment (Foley Nicpon, Doobay, & Assouline, 2010; Foley Nicpon, et al., 2012), development of effective and efficacious interventions is critical.

Research investigating twice-exceptionality is limited. Within the community of academicians, clinicians, and educators committed to this cause, few individuals and projects address Autism Spectrum Disorder in high ability youth. Our lack of understanding of Autism Spectrum Disorder in high ability youth, including symptom overlap and unique features, leaves considerable room for future studies. Growth of the community of research and clinicians interested in twice-exceptionality has been demonstrated in recent years through increasing publication of studies assessing giftedness and learning disabilities (e.g., McCullum et. al., 2013; Gilger, Talvalage, & Oluvade, 2013) and other neurodevelopmental disorders, such as Attention-Deficit/Hyperactivity Disorder (ADHD; e.g., Fugate, Zentall, & Gentry, 2013).

Expansion of this interest to Autism Spectrum Disorder in high ability youth is merited, as this intersection of giftedness and disability is far less explored (Neihart, 2000).

Given that back-and-forth conversation may be less impaired for gifted children with Autism Spectrum Disorder, further investigation is needed to elucidate the qualitative features of conversational impairment. Future studies may consider impairment comparisons between typical and high ability youth with Autism Spectrum Disorder, including features such as to eye contact, affect recognition, use of facial expressions, gestures, or other aspects of non-verbal communication.

Clinical Implications

An important clinical consideration drawn from both studies is the role of parents in the identity and success of individuals with Autism Spectrum Disorder. Parents and caregivers of youth with Autism Spectrum Disorder are fundamentally important in their children's academic success, understanding of disability, and willingness to pursue challenge (Neumeister, Yssel, & Burley, 2013). Parents in this study were open to participate despite the lack of any tangible compensation for their time and effort. Professionals working with youth diagnosed with Autism Spectrum Disorder are reminded of the importance of incorporating parental support into any intervention plan. Further, clinicians are encouraged to utilize parents in the evaluation of Autism Spectrum Disorder symptoms.

Several important clinical implications can be drawn from study 1. First, the finding of no meaningful differences in parent report on existent symptom screening questionnaires between children diagnosed with Autistic Disorder, Asperger Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified provides support for the

current DSM-5 diagnostic model. Lack of evidence for symptomatic differences across these diagnoses understates the conceptualization of Autism Spectrum Disorder as a single diagnostic label. While reliable diagnosis of Autism Spectrum Disorder within the DSM-5 requires further inquiry, at this time, clinicians are encouraged to use the new manual. Second, this study provides construct validity evidence for the SRS and ASSQ as screening tools for Autism Spectrum Disorder through the consistent true positive results from participants. Clinicians assessing Autism Spectrum Disorder in the DSM-5 are encouraged to consider use of tools validated within the DSM-5 model. However, ongoing use of the SRS is not recommended given recent publication of the SRS-2 (Constantino, 2013), which includes development of new normative data and access to forms for adults.

While study 1 provides evidence for a single symptom presentation of Autism Spectrum Disorder, clinicians should continue to appreciate the heterogeneity within Autism Spectrum Disorder. Mental health practitioners must continue to consider individual challenges faced by each patient despite their shared symptom features. Thus, clinicians are reminded to consider the breadth of potential symptoms within each domain, as opposed to utilization of preconceived expectations for symptom presentation. Interdisciplinary practice is critical in both the evaluation and treatment of Autism Spectrum Disorder, due to the frequent co-morbidity of medical complications such as seizures, sensory processing deficits, and other neurological disorders (Jeste & Geschwind, 2014). Thus, psychologists assessing Autism Spectrum Disorder are encouraged to collaborate with other fields of healthcare, such as medicine and speech/language pathology.

Within study 2, the Twice-Exceptional Rating Form was successful in ascertaining parent perceptions of symptoms associated with high ability Autism Spectrum Disorder in this study. However, no current symptom screening tools exist which were developed for intended use with high ability youth. Measures such as the CARS-2-HF (Schopler, van Bourgondien, Wellman, & Love, 2010) are intended for use with children of at least average intellectual ability; however, form and item development progressed without consideration to giftedness. Thus, clinicians must evaluate tools that are instead intended for use with children and adolescents with either a "High Functioning" or Asperger Syndrome profile, neither of which are consistent with DSM-5 or International Statistical Classification of Diseases and Related Health Problems, 10th Edition (ICD-10; World Health Organization, 2001) diagnostic systems. Given the importance of early identification to promote positive outcomes through intervention, reliance on symptom screening questionnaires is necessary to triage children into more comprehensive evaluations. Thus, development of tools specialized in screening for Autism Spectrum Disorder in high ability youth is critical (e.g., Behrens, et al., 2012; Foley Nicpon, Behrens, & Candler, 2013; Lyon, et al., 2012). Development of these measures should incorporate consideration of form and test development procedures, such that a symptom screening tool is developed with the explicit use of identifying Autism Spectrum Disorder symptoms in high ability youth.

Study 2 also provides important clinical considerations regarding the presentation of Autism Spectrum Disorder symptoms in high ability youth. Parent responses on this study suggest that deficits in socialization for high ability youth with Autism Spectrum Disorder are primarily characterized by lack of friendship maintenance and weaknesses

in understanding social information. While high ability youth with Autism Spectrum Disorder were not rated as having lack of insight into social relationships, such as establishing a friendship, they were described as unsatisfied with peer relationships. One interpretation of this discrepancy is that high ability youth with Autism Spectrum Disorder are more aware of their deficits in developing and maintaining friendships when compared to other peers. While improved perception of social deficits may be beneficial in identifying areas of improvement, it also may contribute to symptoms of depression, anxiety, and generally poor psychosocial adjustment (Foley Nicpon, Doobay, & Assouline, 2010). This finding is also consistent with previous research suggesting that students who are twice exceptional endorse greater social problems (Assouline, Foley Nicpon, & Doobay, 2009; Cash, 1999; Lee, 2009). Clinicians working with high ability youth are recommended to evaluate social relationships with respect to (1) quantity and quality of social relationships, (2) perception into social challenges, and (3) impact of social communication weaknesses on psychosocial functions.

Psychologists working with high ability youth with Autism Spectrum Disorder should consider the nature of these social deficits when considering appropriate intervention options. Specifically, social skills interventions include both development of insight into social situations, as well as opportunity to develop and practice positive social behaviors (e.g., UCLA PEERS program; Mandelberg, et. al., 2014). Findings from this study suggest that social skills groups targeted towards high ability youth should primarily emphasize skill development and practice, with less incorporation of development of social insight. Thus, clinicians providing social skills services to high ability youth are recommended to evaluate the appropriateness of specific interventions.

While further inquiry into effective and efficacious interventions is necessary, possible skill targets include practicing social skills within a small group setting (e.g., behavioral laboratory experiments).

Other common socialization weaknesses, such as lack of social interest and lack of reciprocity in social interactions, were less frequently endorsed on the Twice-Exceptional Rating Form. Communication weaknesses most frequently endorsed included fixation on specific interests and "missing the big picture." One explanation for these endorsements is that communication deficits in high ability Autism Spectrum Disorder are characterized primarily by rigid emphasis on details in language, rather than classic Autism Spectrum Disorder deficits in comprehension of pragmatics or more broad deficits in comprehensive and receptive speech (Neihart, 2000). Thus, clinicians working with high ability youth are recommended to tailor treatment interventions to tolerance for change.

High ability youth with Autism Spectrum Disorder may also demonstrate unique challenges with restricted interests and rigidity. Parent responses on the Twice-Exceptional Rating Form indicated ongoing difficulties with rigidity and fixation on interests; however, repetitive behaviors were not frequently endorsed. Thus, clinical interventions such as Applied Behavioral Analysis (ABA) or other behavior therapy modalities for high ability youth may be most beneficial with treatment goals of tolerance for change and willingness to engage in non-preferred activities. It is also important to note that parents of high ability youth endorsed difficulties with emotional dysregulation, which underlies the importance of interventional services.

Educational Implications

Study 1 supports the utilization of a single "Autism" diagnosis provided within IDEA. However, educators and school administrators working with youth diagnosed with Autism Spectrum Disorder should continue to develop Individualized Education Plans (IEP) or 504 Accommodation Plans that meet the needs of each child. In regards to classroom accommodations, it is again important to consider the heterogeneity of Autism Spectrum Disorder. Thus, generalized environmental changes are not merited and it is likely that classroom accommodations will need to be individually tailored.

Several educational implications can be drawn from the findings in study 2. Foremost, educational planning for twice-exceptional children and adolescents is challenging given the demands of simultaneously providing sufficient challenge as well as adequate support. However, many of the support and service considerations applicable to Autism Spectrum Disorder-only children may be appropriate for twice-exceptional students. These include social work services, access to a social skills support group, and classroom environment accommodations. Access to social work or counseling services to address poor frustration tolerance and self-esteem effects appears important given the insight twice-exceptional students appear to have into their social challenges. Further, these students may benefit from social skills groups, given primary reported weaknesses in developing and maintaining friendships. Consideration should be given to providing these discussed services to high ability youth; however, it is equally important to evaluate the efficacy and effectiveness of such interventions.

It is unfortunate that many twice-exceptional students are viewed solely through their weaknesses, with little appreciation for their considerable strengths. In many cases,

students are solely identified as having a disability, with little to no consideration of the importance of addressing giftedness (Neihart, 2000). Findings from this study support the psychosocial challenges faced by twice-exceptional students, which likely include contributions both from social and behavioral difficulties, as well as academic frustration. Given the breadth of academic enrichment and acceleration options (Assouline, Colangenlo, Lupkowski-Shoplik, & Lipscomb, 1998), it is important that students suspected of being twice exceptional be assessed in a comprehensive evaluation. Some general considerations for this group include potential for intensive, specific interest in academic subject areas (e.g., history, mathematics, science), as well as demonstrated talent in rote memorization of facts. These findings were consistent with previous research (e.g., Baron-Cohen, 2000).

Summary

Autism Spectrum Disorder (ASD) is a diagnosis that presents various challenges to families, health care providers, and educators. Prevalence estimates have soared to approximately 1 in 68 children in the United States (Blumberg, et. al., 2013) and diagnostic clarity continues to be problematic due to shifting criteria and dissent amongst many experts (McPartland, Reichow, & Volkmar, 2012). Recent boons in cultural and professional interest in Autism Spectrum Disorder have already contributed to expansion of national organizations (e.g., Autism Speaks (www.autismspeaks.org)), increased educational services in the schools, and development of assistive technology and treatment interventions (Blumberg et. al., 2013). However, lack of professional agreement upon symptom presentation in Autism Spectrum Disorder, including shift from the DSM-IV-TR multiple diagnoses model to the single diagnosis DSM-5 model,

presents a barrier to consistent assessment and intervention. Similarly, cultural and educational understanding of giftedness and meeting children's needs for challenge and enrichment in and out of educational settings represents a significant area of growth (Colangelo, Assouline, & Gross, 2004).

In the first study, consistency of previously used diagnoses now subsumed under Autism Spectrum Disorder was evaluated in regards to symptom screening practice. Results did not support a discrepancy in parent ratings across DSM-IV-TR diagnoses (i.e., AD, AS, and Pervasive Developmental Disorder, Not Otherwise Specified). Thus, current clinical practice in line with the DSM-5 diagnostic shift is supported due to the lack of specificity between DSM-IV-TR Autism Spectrum Disorder diagnoses.

Within the latter study, analysis of parent responses on a novel research questionnaire supported possible phenotypic differences for high ability youth. Specifically, socialization impairments are best classified as a weakness in maintaining friendships despite notable social interest. Excessive fixation of interest on a specific subject was consistently identified by parents as a core challenge for their children, with specific examples provided including academic or quasi-academic subjects (e.g., science and history). Some diagnostic features, such as weaknesses in reciprocal communication and the presence of repetitive behaviors, were less frequently endorsed.

Collectively, results from these two studies add to the growing body of literature addressing both Autism Spectrum Disorder and twice exceptionality, yet they also present important questions for further study. Previous diagnostic groups appear to share a core Autism Spectrum Disorder symptom presentation, which may be impacted by cognitive ability; however, the extent of the influence of cognitive ability requires further

inquiry. More research is needed to define potential categorical differences in Autism Spectrum Disorder presentation, as well as to better define the range of functional impairment within "the spectrum." Educators, clinicians, parents, and advocates must evaluate the developing landscape of Autism Spectrum Disorder resources, including applications for bright children and adolescents.

Table 1. Demographic Characteristics – Study 1 Parent Sample

Demographic Characteristic	N	Mean	SD	Range
Child Age:				
4-5 years	3			
6-7 years	3			
8-9 years	10			
10-11 years	8			
12-13 years	7			
14-15 years	10			
16-17 years	4			
TOTAL		11.13	2.87	5-17
Child Gender:				
Male	35			
Female	10			
Diagnosis				
Autistic Disorder	7			
Asperger's Syndrome	19			
PDD-NOS	19			
Parent Respondent				
Mother	26			
Father	6			
Mother and Father	13			

Table 2. Demographic Characteristics – Study 2 Parent Sample

Demographic Characteristic	N	Mean	SD	Range
Child Age:				
4-5 years	0			
6-7 years	1			
8-9 years	5			
10-11 years	6			
12-13 years	4			
14-15 years	5			
16-17 years	2			
TOTAL		13.04	3.11	6-17
Child Gender:				
Male	18			
Female	5			
Child Grade:				
K	0			
1-2	2			
3-4	5			
5-6	7			
7-8	4			
9-10	4			
11-12	1			
TOTAL		6.00	2.13	1-11
Intellectual Ability				
VCI		125.62	16.37	90-148
PRI		123.21	13.38	92-149
Diagnosis				
Autistic Disorder	1			
Asperger's Syndrome	9			
PDD-NOS	13			
Parent Respondent				
Mother	13			
Father	4			
Mother and Father	6			

Table 3. Psychometric Properties of Study Measures

Study Measure	Mean	SD	Range	Cronbach's α
SRS*				
Combined	73.08	12.85	46-90	r = .69
AD	74.57	12.86	51-90	
AS	71.60	15.17	46-90	
PDD-NOS	73.10	10.78	50-90	
ASSQ				
Combined	22.85	8.03	3-40	r = .77
AD	24.28	7.13	15-36	
PDD-NOS	21.40	9.39	3-36	
AS	23.80	6.91	13-36	
Twice-Exceptional Rating Form	38.30	15.01	13-72	

*SRS scores provided in t-scores

Table 4. Psychometric Properties of Twice-Exceptional Rating Form Items

Item Number	Mean	SD	Mode	Range
1	0.78	0.54	1	0-2
2	1.44	0.79	1,2	0-4
3	0.87	1.02	0	0-3
4	3.04	0.61	3	1-4
5	0.77	0.81	1	0-4
6	1.13	0.78	1	0-4
7	2.22	1.05	2,3	1-4
8	2.39	1.37	2	1-4
9	2.49	0.98	2,3	0-4
10	3.19	1.51	3	1-4
11	0.81	0.52	0	0-3
12	2.25	0.79	2	0-4
13	2.03	0.49	2	0-4
14	3.08	0.63	3	1-4
15	3.27	0.55	3,4	1-4
16	3.10	0.86	3	1-4
17	0.37	0.58	0	0-3
18	2.31	0.61	2	0-4
19	2.01	1.39	1	0-4
20	2.19	1.31	3	0-4

APPENDIX A

STUDY 1 PARENT EMAIL RECRUITMENT A

Email Title: Participation in a Belin-Blank Research Study

Email:

Dear Mr./Ms.X :

You are receiving this email because your child participated in a psychodiagnostic evaluation at the Belin-Blank Assessment and Counseling Clinic within the past 12 months. We obtained your name and address through consultation with the clinical director at the Belin-Blank Center. Approximately 25 people will take part in this study at the University of Iowa.

We invite you to participate in a study to evaluate measures assessing social communication and autism spectrum behaviors in a gifted and/or talented child population.

If you agree to participate, you will be sent a packet containing instructions for participation, an informed consent document, and 3 brief surveys. Questions on these surveys will focus on your beliefs about a variety of your child's behaviors, including: (1) social communication skills, (2) interpersonal behavior, (3) imaginative play and interests, (4) eccentric or unusual behaviors, and (5) adaptability. We expect your participation to last for 30-45 minutes. On all of the attached materials, you are free to not answer any questions that you would prefer not to answer.

If you wish to participate in this study, please respond to this email indicating your desire to participate. If you do not wish to participate in this study, please respond to this email indicating your desire to not participate. If we have not received a reply to this email

within 2 weeks, we will attempt to contact you once via telephone.

Thank you and best wishes,

Megan Foley Nicpon, PhD

Director, Belin Blank Assessment and Counseling Clinic

Zachary Sussman, MA
Graduate Student, University of Iowa

APPENDIX B

STUDY 1 PARENT EMAIL RECRUITMENT B

Email Title: Participation in an Autism Spectrum Research Study

Email:

Dear Parent,

We invite your child to participate in a study to evaluate measures assessing social communication and autism spectrum behaviors in a gifted and/or talented child population.

If you agree for your child to participate, you will be sent a packet containing instructions for participation, an informed consent document, and 3 brief surveys. Questions on these surveys will focus on your beliefs about a variety of your child's behaviors, including: (1) social communication skills, (2) interpersonal behavior, (3) imaginative play and interests, (4) eccentric or unusual behaviors, and (5) adaptability. We expect your participation to last for 30-45 minutes. On all of the attached materials, you are free to not answer any questions that you would prefer not to answer. Your child's participation will consist of a review of some of their Protected Health Information. There will be no direct involvement for the child.

If you wish for your child to participate in this study, please respond to this email indicating your desire to participate. If you do not wish for your child to participate in this study, please respond to this email indicating your desire to not participate. If we have not received a reply to this email within 2 weeks, we will attempt to contact you by sending an e-mail reminder in 2 weeks.

Thank you and best wishes,

Zachary Sussman, MA

Graduate Student, University of Iowa

APPENDIX C

INFORMED CONSENT DOCUMENT

INFORMED CONSENT DOCUMENT

Project Title: **The Intersection of Giftedness and Autism Spectrum Disorder: An Exploration of Current Screening and Conceptualization Practices for Twice Exceptional Children and Adolescents**

Principal Investigator: Zachary Sussman

Research Team Contact: **Zachary Sussman**

(206)-661-9781

This consent form describes the research study to help you decide if you want your child to participate. This form provides important information about what you and your child will be asked to do during the study, about the risks and benefits of the study, and about your child's rights as research subjects.

If you have any questions about or do not understand something in this form, you should ask the research team for more information.

You should discuss your child's participation with anyone you choose such as family or friends.

Do not agree to participate in this study unless the research team has answered your questions and you decide that you want your child to be part of this study.

WHAT IS THE PURPOSE OF THIS STUDY?

This is a research study. We are inviting your child to participate in this research study because your child participated in an assessment for social communication skills, imaginative play, and/or eccentric behaviors within the past 5 years.

The purpose of the study is to compare social communication and autism

spectrum behaviors amongst child and adolescent populations of varying cognitive ability.

HOW MANY PEOPLE WILL PARTICIPATE?

Approximately 75 subjects will take part in this study conducted by investigators at the University of Iowa.

HOW LONG WILL I BE IN THIS STUDY?

If you agree for your child to take part in this study, your involvement will last for 45 minutes. Your child's involvement will not require any direct participation.

WHAT WILL HAPPEN DURING THIS STUDY?

You will complete 3 brief surveys assessing your child's behaviors. Questions on these surveys will focus on your beliefs about a variety of your child's behaviors, including: (1) social communication skills, (2) interpersonal behavior, (3) imaginative play and interests, (4) eccentric or unusual behaviors, and (5) adaptability to new situations. You will be free to skip any questions that you would prefer not to answer on these surveys.

Your child will not directly participate in any study activities. If your child was evaluated at the Belin-Blank Assessment and Counseling Clinic, the research team will review the report from your child's past or current evaluation **only** to identify (1) your child's diagnoses, (2) name, and (3) performance on any intellectual assessments. Your child's diagnoses will be used with the brief surveys completed by you to determine variability in autism spectrum behaviors and social communication skills across varying cognitive abilities. No future mental health information will be created as a component of this study. No results from this study will be added to your child's medical record.

WHAT ARE THE RISKS OF THIS STUDY?

Your child may experience one or more of the risks indicated below from being in this study. In addition to these, there may be other unknown risks, or risks that we did not anticipate, associated with being in this study.

Loss of confidentiality. Measures in place to protect confidentiality are noted in the 'What About Confidentiality' section later in this document.

WHAT ARE THE BENEFITS OF THIS STUDY?

Your child will not benefit from being in this study.

However, we hope that, in the future, other people might benefit from this study because knowledge gained from this research may improve future evaluation experiences and provide more accurate findings during psychological evaluations.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?

You will not have any costs for being in this research study.

WILL YOUR CHILD BE PAID FOR PARTICIPATING?

Your child will not be paid for being in this research study.

WHO IS FUNDING THIS STUDY?

The University and the research team are receiving no payments from other agencies, organizations, or companies to conduct this research study.

WHAT ABOUT CONFIDENTIALITY?

We will keep your child's participation in this research study confidential to the extent permitted by law. However, it is possible that other people such as those indicated below may become aware of your child's participation in this study and may inspect and copy records pertaining to this research. Some of these records could contain information

that personally identifies your child.

- federal government regulatory agencies,
- auditing departments of the University of Iowa, and
- the University of Iowa Institutional Review Board (a committee that reviews and approves research studies)

To help protect your child's confidentiality, we will use confidential code identifier numbers as a reference for their contact information. Only your child's identifier number will be used on the electronic documents. If you are contacted over phone, we will use a secure line at the Belin-Blank center. If you are contacted via email, we will use our secure university email accounts, which include confidentiality and security clauses. Surveys completed during a clinic visit will be directly transferred to a confidential envelope which will be stored in the office of the principal investigator. All electronic records will be stored on a secure flash drive, which will also be stored in the office of the principal investigator. None of the electronic data will be kept on a computer desktop, or be transferred via email or a network connection. If we write a report or article about this study or share the study data set with others, we will do so in such a way that you and your child cannot be directly identified.

WILL MY CHILD'S HEALTH INFORMATION BE USED DURING THIS STUDY?

The Federal Health Insurance Portability and Accountability Act (HIPAA) requires Belin-Blank Assessment and Counseling Clinic to obtain your permission for the research team to access or create "protected health information" about your child for purposes of this research study. Protected health information is information that

personally identifies your child and relates to your child's past, present, or future physical or mental health condition or care. We will access or create health information about your child, as described in this document, for purposes of this research study. Once Belin-Blank Assessment and Counseling Clinic has disclosed your child's protected health information to us, it may no longer be protected by the Federal HIPAA privacy regulations, but we will continue to protect your child's confidentiality as described under "Confidentiality."

We may share your child's health information related to this study with other parties including federal government regulatory agencies, and the University of Iowa Institutional Review Boards and support staff.

Your child cannot participate in this study unless you permit us to use your child's protected health information. If you choose *not* to allow us to use your child's protected health information, we will discuss any non-research alternatives available to your child. Your decision will not affect your child's right to medical care that is not research-related. Your signature on this Consent Document authorizes Belin-Blank Assessment and Counseling Clinic to give us permission to use or create health information about your child.

Although you may not be allowed to see study information until after this study is over, you may be given access to your child's health care records by contacting your child's health care provider. Your permission for us to access or create protected health information about your child for purposes of this study has no expiration date. You may withdraw your permission for us to use your child's health information for this research study by sending a written notice to Zachary Sussman (Lindquist Center, University of

Iowa, Iowa City, IA 52242). However, we may still use your child's health information that was collected before withdrawing your permission. Also, if we have sent your child's health information to a third party, such as the study sponsor, or we have removed your child's identifying information, it may not be possible to prevent its future use. You will receive a copy of this signed document.

IS BEING IN THIS STUDY VOLUNTARY?

Taking part in this research study is completely voluntary. You may choose for your child not to take part at all. If you decide for your child to be in this study, your child may stop participating at any time. If you decide for your child not to be in this study, or if your child stops participating at any time, your child won't be penalized or lose any benefits for which your child otherwise qualifies.

WHAT IF I HAVE QUESTIONS?

We encourage you to ask questions. If you have any questions about the research study itself, please contact Zachary Sussman, MA via phone (206)-661-9781 or mail (N361 Lindquist Center, Iowa City, IA 52242). If your child experiences a research-related injury, please contact: Zachary Sussman, MA via phone (206)-661-9781.

If you have questions, concerns, or complaints about your child's rights as a research subject or about research related injury, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu. General information about being a research subject can be found by clicking "Info for Public" on the Human Subjects Office web site, http://research.uiowa.edu/hso. To offer input about your and your child's experiences as a research subject or to speak to someone other than

the research staff, call the Human Subjects Office at the number above.

This Informed Consent Document is not a contract. It is a written explanation of what will happen during the study if you decide for your child to participate. You are not waiving any legal rights by signing this Informed Consent Document. Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree for your child to take part in this study. You will receive a copy of this form.

APPENDIX D

STUDY 1 PARENT SAMPLE COVER LETTER

Date:

Inside Address:

Dear Mr./Ms.X :

This letter is to follow-up to the email that was sent to you about our research study; based on your response, we invite you to participate in the research study. The purpose of the study is to evaluate measures assessing social communication and autism spectrum behaviors in a gifted and/or talented child and adolescent population. We are inviting you to be in this study because your child received a diagnosis of Pervasive Developmental Disorder, Not Otherwise Specified, Asperger's Syndrome, or Autistic Disorder. For this study, we would like you to complete 3 brief surveys assessing your child's behaviors. Questions on these surveys will focus on your beliefs about a variety of behaviors, including: (1) social communication skills, (2) interpersonal behavior, (3) imaginative play and interests, (4) eccentric or unusual behaviors, and (5) adaptability. We expect your participation to last for 30-45 minutes.

If you agree to participate, we have enclosed two copies of an Informed Consent document describing the procedures for this study. We have included two copies of this document because we will need to access your child's diagnosis, if they were evaluated at the Belin-Blank Assessment and Counseling Clinic while this study is being conducted. As this diagnosis is considered the Private Health Information of your child, we require your additional consent for your child to retain their records for the study. For this study, we will only be accessing your child's diagnosis from their health record and will not be altering or adding materials to their file. Please read through this Informed Consent document and, if you agree to participate, please provide a signature where indicated.

After signing the document, please enclose **both** signed Informed Consent documents in the provided envelope and place the envelope in a U.S. Postal Service mailbox.

On all of the attached materials, you are free to not answer any questions that you would prefer not to answer. If you have changed your mind or do not wish to participate, please send back the unsigned Informed Consent documents in the attached envelope. If we have not received your return envelope within 2 weeks of the date the packet was mailed out, you will be contacted once via phone to confirm your interest in participation. If we cannot reach you by phone, we will send a final email reminder about the surveys.

If you have any questions about the research study itself, please contact Zachary Sussman, MA via phone (206)-661-9781, mail (N361 Lindquist Center, Iowa City, IA 52242), or email (zachary-sussman@uiowa.edu). If you experience a research-related injury, please contact: Zachary Sussman via phone (206)-661-9781. If you have questions about the rights of research subjects, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu. To offer input about your experiences as a research subject or to speak to someone other than the research staff, call the Human Subjects Office at the number above.

Thank you very much for your consideration.

Sincerely,

Zachary Sussman, MA
Doctoral Candidate, University of Iowa

APPENDIX E

STUDY 2 PARENT SAMPLE EMAIL RECRUITMENT

Email Title: Participation in an Autism Spectrum Research Study

Email:

Dear Mr./Mrs. X,

We invite your child to participate in a study to evaluate measures assessing social communication and autism spectrum behaviors in a gifted and/or talented child population.

If you agree for your child to participate, you will be sent a packet containing instructions for participation, an informed consent document, and 3 brief surveys. Questions on these surveys will focus on your beliefs about a variety of your child's behaviors, including: (1) social communication skills, (2) interpersonal behavior, (3) imaginative play and interests, (4) eccentric or unusual behaviors, and (5) adaptability. We expect your participation to last for 30-45 minutes. On all of the attached materials, you are free to not answer any questions that you would prefer not to answer. Your child's participation will consist of a review of some of their Protected Health Information. There will be no direct involvement for the child.

If you wish for your child to participate in this study, please respond to this email indicating your desire to participate. If you do not wish for your child to participate in this study, please respond to this email indicating your desire to not participate. If we have not received a reply to this email within 2 weeks, we will attempt to contact you by sending an e-mail reminder in 2 weeks.

Thank you and best wishes,

Zachary Sussman, MA

Graduate Student, University of Iowa

APPENDIX F

STUDY 2 PARENT SAMPLE COVER LETTER

Date:

Inside Address:

Dear Mr./Ms.X :

This letter is to follow-up to the email that was sent to you about our research study; based on your response, we invite you to participate in the research study. The purpose of the study is to evaluate measures assessing social communication and autism spectrum behaviors in a gifted and/or talented child and adolescent population. We are inviting you to be in this study because your child received a diagnosis of Pervasive Developmental Disorder, Not Otherwise Specified, Asperger's Syndrome, or Autistic Disorder. For this study, we would like you to complete the enclosed surveys assessing your child's behaviors. Questions will focus on your beliefs about a variety of behaviors, including: (1) social communication skills, (2) interpersonal behavior, (3) imaginative play and interests, (4) eccentric or unusual behaviors, and (5) adaptability. We expect your participation to last for 30-45 minutes.

If you agree to participate, we have enclosed two copies of an Informed Consent document describing the procedures for this study. We have included two copies of this document because we will need to access your child's diagnosis, if they were evaluated at the Belin-Blank Assessment and Counseling Clinic while this study is being conducted. As this diagnosis is considered the Private Health Information of your child, we require your additional consent for your child to retain their records for the study. For this study, we will only be accessing your child's diagnosis from their health record and will not be altering or adding materials to their file. Please read through this Informed Consent document and, if you agree to participate, please provide a signature where indicated.

After signing the document, please enclose **both** signed Informed Consent documents in the provided envelope and place the envelope in a U.S. Postal Service mailbox.

On all of the attached materials, you are free to not answer any questions that you would prefer not to answer. If you have changed your mind or do not wish to participate, please send back the unsigned Informed Consent documents in the attached envelope. If we have not received your return envelope within 2 weeks of the date the packet was mailed out, you will be contacted once via phone to confirm your interest in participation. If we cannot reach you by phone, we will send a final email reminder about the surveys.

If you have any questions about the research study itself, please contact Zachary Sussman, MA via phone (206)-661-9781, mail (N361 Lindquist Center, Iowa City, IA 52242), or email (zachary-sussman@uiowa.edu). If you experience a research-related injury, please contact: Zachary Sussman via phone (206)-661-9781. If you have questions about the rights of research subjects, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu. To offer input about your experiences as a research subject or to speak to someone other than the research staff, call the Human Subjects Office at the number above.

Thank you very much for your consideration.

Sincerely,

Zachary Sussman, MA
Doctoral Candidate, University of Iowa

APPENDIX G

TWICE-EXCEPTIONAL RATING FORM

Twice-Exceptional Rating Form

Name of Child:_____

Sex: Male _____ Female_____ Grade:_____ Age:_____

Date of Birth: _____ (mm/dd/yyyy)

Today's Date:_____(mm/dd/yyyy)

Name of personal completing this form:_____

Relationship to the child:_____

Please answer the following questions based on your child's behaviors. Responses vary from 0 (never observing the behavior), to 4 (almost always observing the behavior). Please complete all items.

	My Child:	Never	Rarely	Sometimes	Often	Almost Always
1	Has difficulty engaging in imaginative play	0	1	2	3	4
2	Is overly sensitive to particular senses (e.g., touch, sound, taste, smell)	0	1	2	3	4
3	Has unusual or odd movements (e.g., flaps her/his hands or repeats simple movements many times)	0	1	2	3	4
4	Has difficulty with emotions in comparison to his/her peers (e.g., more OR less of an emotional response to situations)	0	1	2	3	4
5	Has an unusual voice or style of speech (e.g., unusual use of language and/or unusual sound of voice)	0	1	2	3	4
6	Shows less facial expression than her/his peers	0	1	2	3	4
7	Becomes upset more easily in social situations than his/her peers	0	1	2	3	4
8	Misses the "big picture" due to focusing on smaller parts (i.e., gets stuck on a particular details of a problem and misses solving/answering the entire problem)	0	1	2	3	4
9	Has difficulty adjusting to changes in routines or activities	0	1	2	3	4
10	Is very dedicated to several specific interests or hobbies, and may tend to get "stuck" thinking or talking about these interests	0	1	2	3	4
11	Plays with only parts of objects or toys, rather than using them as they were intended	0	1	2	3	4

12	Has poor awareness of his/her difficulties in social interactions	0	1	2	3	4
13	Avoids social interactions with peers	0	1	2	3	4
14	Has fewer or less quality relationships with peers in comparison to most of his/her peers	0	1	2	3	4
15	Has difficulty communicating with peers and/or family (this includes comprehension and expression)	0	1	2	3	4
16	Has difficulty understanding appropriate methods of socializing with peers	0	1	2	3	4
17	Has a very literal understanding of conversations (e.g., tends to miss subtle subtext in conversations)	0	1	2	3	4
18	Is unsatisfied with peer relationships (e.g., wants to have more or better quality peer relationships).	0	1	2	3	4
19	Acts like a "little professor" (e.g., provides very structured and formal responses in conversation).	0	1	2	3	4
20	Asks more inappropriate questions or makes more inappropriate comments in conversation when compared to his/her peers.	0	1	2	3	4

Does your child have any additional challenges related to socialization, communication, or unusual behaviors?

Yes _____ No _____

If Yes, what are the additional challenges?

_____

_____

_____

_____

_____

_____

REFERENCES

Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity. *Psychological Bulletin, 101*(2), 213-232.

Allison, C., Baron-Cohen, S., Wheelwright, S., Charman, T., Richler, J., Pasco, G., & Brayne, C. (2008). The Q-CHAT (quantitative Checklist for autism in toddlers): A normally distributed quantitative measure of autistic traits at 18-24-months of age: Preliminary report. *Journal of Autism and Developmental Disorders, 38*(8), 1414-1425. doi:10.1007/s10803-007-0509-7

American Psychiatric Association. (1980). *Quick reference to diagnostic criteria from DSM-III / [prepared by the task force on nomenclature and statistics, american psychiatric association]*. Washington : American Psychiatric Association.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders : DSM-III-R*. Washington, DC : American Psychiatric Association.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders : DSM-IV-TR*. Washington, DC : American Psychiatric Association.

American Psychiatric Association. (2010). *Proposed revisions: Autism spectrum disorder*. Retrieved January/5, 2011, from http://www.dsm5.org/ProposedRevisions/Pages/proposedrevision.aspx?rid=94

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Washington, DC: American Psychiatric Association

Asperger, H. (1949). Bild und soziale wertigkeit der autistischen psychopathen. [the aspects and social significance of autistic psychopaths.]. *Proceedings.International Orthopedics Congress II, Amsterdam*, , 257-269.

Assouline, S. G., Colangenlo, N., Lupkowski-Shoplik, A., & Lipscomb, J. (1998). Iowa Acceleration Scale Manual: A guide for whole-grade acceleration K-8. Great Potential Press: Scottsdale, AZ.

Assouline, S. G., Foley Nicpon, M., & Doobay, A. (2009). Profoundly gifted girls and autism spectrum disorder: A psychometric case study comparison. *Gifted Child Quarterly*, *5*3(2), 89-105. doi:10.1177/0016986208330565

Assouline, S. G., Foley Nicpon, M., & Huber, D. H. (2006). The impact of vulnerabilities and strengths on the academic experiences of twice-exceptional students: A message to school counselors. *Professional School Counseling*, *1*0(1), 14-24.

Autism Research Institute. (2005). *Autism treatment evaluation checklist (ATEC) report*. Retrieved April/8, 2010, from http://www.autism.com/ari/atec/atec_report.htm

Autism Research Institute. (2008). *Diagnostic checklist form E-2 and research questionnaire form E-3*. Retrieved April/8, 2010, from http://www.autism.com/autism/first/e23.htm

Bagatell, N. (2010). From cure to community: Transforming notions of autism. *Ethos*, *3*8(1), 33-55. doi:10.1111/j.1548-1352.2009.01080.x

Bailey, A., Phillips, W., & Rutter, M. (1996). Autism: Towards an integration of clinical, genetic, neuropsychological, and neurobiological perspectives. *Journal of Child Psychology and Psychiatry, 3*7(1), 89-126. doi:10.1111/j.1469-7610.1996.tb01381.x

Baron-Cohen, S. (2000). Is asperger syndrome/high-functioning autism necessarily a disability*? Development and Psychopathology, 1*2(3), 489-500. doi:10.1017/S0954579400003126

Baron-Cohen, S., Allen, J., & Gillberg, C. (1992). Can autism be detected at 18 months? the needle, the haystack, and the CHAT. *British Journal of Psychiatry, 16*1, 839-843. doi:10.1192/bjp.161.6.839

Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"*? Cognition, 2*1(1), 37-46. doi:10.1016/0010-0277(85)90022-8

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The autism-spectrum quotient (AQ): Evidence from asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders, 3*1(1), 5-17. doi:10.1023/A:1005653411471

Bennett, T., Szatmari, P., Bryson, S., Volden, J., Zwaigenbaum, L., Vaccarella, L., . . . Boyle, M. (2008). Differentiating autism and asperger syndrome on the basis of language delay or impairment. *Journal of Autism and Developmental Disorders, 3*8(4), 616-625. doi:10.1007/s10803-007-0428-7

Berument, S. K., Rutter, M., Lord, C., Pickles, A., & Bailey, A. (1999). Autism screening questionnaire: Diagnostic validity. *British Journal of Psychiatry, 17*5, 444-451. doi:10.1192/bjp.175.5.444

Bishop, D. V. M. (2000). What's so special about asperger syndrome? the need for further exploration of the borderlands of autism. In *Asperger syndrome*. (pp. 254-277) New York, NY, US: Guilford Press.

Bleuler, E. (1950). *Dementia praecox or the group of schizophrenia*s Oxford, England: International Universities Press.

Blumberg, S. J., Bramlett, M. D., Kogan, M. D., Schieve, L. A., Jones, J. R., & Lu, M. C. (2013). Changes in prevalence of parent-reported autism spectrum disorder in school-aged U. S. children: 2007-2012. National Health Statistics Report, 65, 1-12.

Bölte, S., Poustka, F., & Constantino, J. N. (2008). Assessing autistic traits: Cross-cultural validation of the social responsiveness scale (SRS). *Autism Research,* 1(6), 354-363. doi:10.1002/aur.49

Bornstein, M. H., & Hendricks, C. (2013). Screening for developmental disabilities in developing countries. *Social Science & Medicine, (97),* 307-315.

Boucher, J., & Bowler, D. (2008). *Memory in Autism: Theory and Evidence.* Cambridge University Press: New York, NY.

Cash, A. B. (1999). A profile of gifted individuals with autism: The twice-exceptional learner. *Roeper Review: A Journal on Gifted Education, 2*2(1), 22-27. doi:10.1080/02783199909553993

Charman, T. (2003). Why is joint attention a pivotal skill in autism? In *Autism: Mind and brain*. (pp. 67-87) New York, NY, US: Oxford University Press.

Chiang, H., Tsai, L. Y., Cheung, Y. K., Brown, A., & Li, H. (2014). A meta-analysis of differences in IQ profiles between individuals with Asperger's Disorder and high functioning autism. *Journal of Autism and Developmental Disorders, 44,* 1577-1596.

Clancy, H., Dugdale, A., & Rendle-Short, J. (1969). The diagnosis of infantile autism. *Developmental Medical Child Neurology, 1*1(4), 432-442.

Colangelo, N., Assouline, S. G., & Gross, M. (2004). A nation deceived: How school's hold back America's brightest students. University of Iowa: Iowa City, IA.

Constantino, J. N. (2013). *Social Responsiveness Scale, 2nd Edition*. Western Psychological Services: Los Angeles, CA.

Constantino, J. N., Davis, S. A., Todd, R. D., Schindler, M. K., Gross, M. M., Brophy, S. L., . . . Reich, W. (2003). Validation of a brief quantitative measure of autistic traits: Comparison of the social responsiveness scale with the autism diagnostic interview-revised. *Journal of Autism and Developmental Disorders, 3*3(4), 427-433. doi:10.1023/A:1025014929212

Constantino, J. N., & Gruber, C. P. (2005). *Social responsiveness scal*e Western Psychological Services: Los Angeles, CA.

Constantino, J. N., Hudziak, J. J., & Todd, R. D. (2003). Deficits in reciprocal social behavior in male twins: Evidence for a genetically independent domain of psychopathology. *Journal of the American Academy of Child & Adolescent Psychiatry, 4*2(4), 458-467.

Constantino, J. N., Przybeck, T., Friesen, D., & Todd, R. D. (2000). Reciprocal social behavior in children with and without pervasive developmental disorders. *Journal of Developmental and Behavioral Pediatrics, 2*1(1), 2-11. doi:10.1097/00004703-200002000-00001

Conway, F. (2006). Review of the social responsiveness scale. In *Seventeenth mental measurement yearbook* () Buros Institute.

Corsello, C., Hus, V., Pickles, A., Risi, S., Cook, E. H., Jr., Leventhal, B. L., & Lord, C. (2007). Between a ROC and a hard place: Decision making and making decisions

about using the SCQ. *Journal of Child Psychology and Psychiatry, 4*8(9), 932-940. doi:10.1111/j.1469-7610.2007.01762.x

Croen, L. A., Braunschweig, D., Haapanen, L., Yoshida, C. K., Fireman, B., Grether, J. K., . . . Van, d. W. (2008). Maternal mid-pregnancy autoantibodies to fetal brain protein: The early markers for autism study. *Biological Psychiatry, 6*4(7), 583-588. doi:10.1016/j.biopsych.2008.05.006

De Giacomo, A., & Fombonne, E. (1998). Parental recognition of developmental abnormalities in autism. *European Child and Adolescent Psychiatry, 7*(3), 131-136.

DeMyer, M. K., Hingtgen, J. N., & Jackson, R. K. (1981). Infantile autism reviewed: A decade of research. *Schizophrenia Bulletin,* 7(3), 388-451.

DeVellis, R. F. (2012). Scale development: Theory and applications, 3rd Edition. Sage Publications: Thousand Oaks, CA.

Eaves, L. C., Wingert, H. D., Ho, H. H., & Mickelson, E. C. R. (2006). Screening for autism spectrum disorders with the social communication questionnaire. *Journal of Developmental and Behavioral Pediatrics, 2*7, S95-S103. doi:10.1097/00004703-200604002-00007

Ehlers, S., & Gillberg, C. (1993). The epidemiology of asperger syndrome: A total population study. *Journal of Child Psychology and Psychiatry, 3*4(8), 1327-1350. doi:10.1111/j.1469-7610.1993.tb02094.x

Ehlers, S., Gillberg, C., & Wing, L. (1999). A screening questionnaire for asperger syndrome and other high-functioning autism spectrum disorders in school age children. *Journal of Autism and Developmental Disorders, 2*9(2), 129-141. doi:10.1023/A:1023040610384

Feinstein, A. (2010). *A history of autism: Conversations with the pioneer*s Wiley-Blackwell.

Foley Nicpon, M., Behrens, E., & Candler, M. (2013, November). *Identifying gifted students with autism spectrum disorder.* Paper presented at the meeting of the National Association for Gifted Children, Indianapolis, IN.

Foley Nicpon, M., Rickels, H., Assouline, S. G., & Richards, A. (2012). Self-esteem and self-concept examination among gifted students with ADHD. *Journal for the Education of the Gifted, 35*(3), 220-240.

Foley Nicpon, M., Doobay, A. F., & Assouline, S. G. (2010). Parent, teacher, and self perceptions of psychosocial functioning in intellectually gifted children and adolescents with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 4*0(8), 1028-1038. doi:10.1007/s10803-010-0952-8

Freeman, B. J., Ritvo, E. R., & Schroth, P. C. (1984). Behavior assessment of the syndrome of autism: Behavior observation system. *Journal of the American Academy of Child Psychiatry, 2*3(5), 588-594. doi:10.1016/S0002-7138(09)60352-6

Fugate, C. M., Zentall, S. S., & Gentry, M. (2013). Creativity and working memory in gifted students with and without characteristics of attention deficit hyperactive disorder: Lifting the mask. *Gifted Child Quarterly, 57*(4), 234-246.

Gandhi, M. (2011). *Brainyquote.com*. Retrieved January/4, 2011, from http://www.brainyquote.com/quotes/quotes/m/mohandasga150726.html

Ganz, M. L. (2007). The lifetime distribution of the incremental societal costs of autism. *JAMA Pediatrics, 161(*4), 343-349.

Garro, A. (2007). Review of the gilliam autism rating scale, 2nd edition. *Seventeenth mental measurement yearboo*k: Buros Institute.

Gilger, J. W., Talavage, T. M., & Olulade, O. A. (2013). An fMRI study of nonverbally gifted reading disabled adults: Has deficit compensation affected gifted potential? *Frontiers in Human Neuroscience, 7*, 1-25.

Gillberg, C. (1998). Asperger syndrome and high-functioning autism. *British Journal of Psychiatry, 17*2, 200-209. doi:10.1192/bjp.172.3.200

Gilliam, J. E. (2001). *Gilliam asperger's disorder scal*e. PRO-ED.

Gilliam, J. E. (2003). *Gilliam asperger's disorder scale [2003 update*] PRO-ED, 8700 Shoal Creek Blvd., Austin, TX 78757-6897; Telephone: 800-897-3202; FAX: 800-397-7633; E-mail: info@proedinc.com; Web: www.proedinc.com.

Gilliam, J. E. (2006). *Gilliam autism rating scale-second editio*n PRO-ED, 8700 Shoal Creek Blvd., Austin, TX 78757-6897; Telephone: 800-897-3202; FAX: 800-397-7633; E-mail: info@proedinc.com; Web: www.proedinc.com.

Glascoe, F. P. (2005). Screening for developmental and behavioral problems. *Mental Retardation and Developmental Disabilities Research Reviews*, 1(3), 173-179. doi:10.1002/mrdd.20068

Goldstein , S., & Naglieri, J. (2010). *Autism spectrum rating scale*s Multi-Health Systems, Inc., P.O. Box 950, North Tonawanda, NY 14120-0950; Telephone: 416-492-2627 or 800-456-3003; FAX: 416-492-3343 or 888-540-4484; E-mail: CUSTOMERSERVICE@MHS.COM; Web: www.mhs.com.

Goldstein, S., & Ozonoff, S. (2009). Historical perspective and overview. In *Assessment of autism spectrum disorders*. (pp. 1-17) New York, NY, US: Guilford Press.

Harris, B., Barton, E., Albert, C. (2014). Evaluation autism diagnostic and screening tools for cultural and linguistic responsiveness. *Journal of Autism and Developmental Disorders, 44*(6), 1275-1287.

Hazen, E. P., McDougle, C. J., & Volkmar, F. R. (2013). Changes in the diagnostic criteria for autism in the DSM-5: Controversies and concern. *Journal of Clinical Psychiatry, 74*(7), 739-741.

Hoffman, E. J. (2009). Clinical features and diagnosis of autism and other pervasive developmental disorders. *Primary Psychiatry, 1*6(1), 36-44.

Institute of Medicine Immunization Safety Review Committee. (2004). Immunization safety review: Measles-mumps-rubella vaccine and autism.

Jarusiewicz, B. (2002). Efficacy of neurofeedback for children in the autistic spectrum: A pilot study. *Journal of Neurotherapy, 6*(4), 39-49. doi:10.1300/J184v06n04_05

Jiao, Y., Chen, R., Ke, X., Chu, K., Lu, Z., & Herskovits, E. H. (2010). Predictive models of autism spectrum disorder based on brain regional cortical thickness. *NeuroImage, 50*(2), 589-599. doi:10.1016/j.neuroimage.2009.12.047

Johnson, C. P., & Myers, S. M. (2007). Identification and evaluation of children with autism spectrum disorders. *Pediatrics, 120*(5), 1183-1215. doi:10.1542/peds.2007-2361

Juneja, M., Sharma, S., & Mukherjee, S. B. (2010). Sensitivity of the autism behavior checklist in indian autistic children. *Journal of Developmental and Behavioral Pediatrics, 31*(1), 48-49. doi:10.1097/DBP.0b013e3181c7241a

Kamphaus, R. W., Reynolds, C. R., Hatcher, N. M., & Kim, S. (2004). Treatment planning and evaluation with the behavior assessment system for children (BASC).

In *The use of psychological testing for treatment planning and outcomes assessment: Volume 2: Instruments for children and adolescents (3rd ed).* (pp. 331-354) Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Kane, M. (2006). Content-related validity evidence in test development. In *Handbook of test development* (pp. 131-153). Mahwah, New Jersey: Lawrence Erlbaum Associates.

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

King, B., Veenstra-VanderWeele, J., & Lord, C. (2013). DSM-5 and autism: Kicking the tires and making the grade. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*(5), 454-457.

Klin, A., Saulnier, C., Tsatsanis, K., & Volkmar, F. R. (2005). Clinical evaluation in autism spectrum disorders: Psychological assessment within a transdisciplinary framework. In *Handbook of autism and pervasive developmental disorders, vol. 2: Assessment, interventions, and policy (3rd ed.).* (pp. 772-798) Hoboken, NJ, US: John Wiley & Sons Inc.

Krug, D. A., & Arick, J. R. (2003). *Krug asperger's disorder index* PRO-ED, 8700 Shoal Creek Blvd., Austin, TX 78757-6897; Telephone: 800-897-3202; FAX: 800-397-7633; E-mail: info@proedinc.com; Web: www.proedinc.com.

Krug, D. A., Arick, J., & Almond, P. (1980). Behavior checklist for identifying severely handicapped individuals with high levels of autistic behavior. *Journal of Child Psychology and Psychiatry, 21*(3), 221-229. doi:10.1111/j.1469-7610.1980.tb01797.x

Kulage, K. M., Smaldone, A. M., & Kohn, E. G. (2014). How will DSM-5 affect autism diagnosis? A systematic literature review and meta-analysis. *Journal of Autism and Developmental Disorders, 44*(8), 1918-1932.

le Couteur, A., Rutter, M., Lord, C., Rios, P., & et al. (1989). Autism diagnostic interview: A standardized investigator-based instrument. *Journal of Autism and Developmental Disorders, 19*(3), 363-387. doi:10.1007/BF02212936

Lee, G. K. (2009). Parents of children with high functioning autism: How well do they cope and adjust? *Journal of Developmental and Physical Disabilities, 21*(2), 93-114. doi:10.1007/s10882-008-9128-2

Lewis, K. M., & Hepburn, P. (2010). Open card sorting and factor analysis: A usability case study. *The Electronic Library, 28*(3), 401-416.

Lord, C., & Bishop, S. L. (2010). Autism spectrum disorders: Diagnosis, prevalence, and services for children and families. *Social Policy Report, 24*(2), 1-21.

Lord, C., Rutter, M., DiLavore, P. C., Risi, S., Gotham, K., & Bishop, S. (2012) Autism Diagnostic Observation Schedule, Second Edition. Torrance, CA: Western Psychological Services.

Lord, C., Petkova, E., Hus, V., Gan, W., Lu, F., Martin, D. M., Ousley, O.,… & Risi, S. (2012). A multisite study of the clinical diagnosis of different autism spectrum disorders. *Archives of General Psychiatry, 69*(3), 306-313.

Lord, C., Rutter, M. L., Goode, S., Heemsbergen, J., & et al. (1989). Autism diagnostic observation schedule: A standardized observation of communicative and social behavior. *Journal of Autism and Developmental Disorders, 19*(2), 185-212. doi:10.1007/BF02211841

Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism diagnostic Interview—Revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24*(5), 659-685. doi:10.1007/BF02172145

Lyon, M., Sussman, Z., Foley Nicpon, M., Berns, A., Gaasedelen, O., & Behrens, E. (2012, August). *Development and testing of an autism screening measure for use with gifted children*. Poster presented at the 120th Annual Convention of the American Psychological Association, Orlando, FL.

Mandelberg, J., Laugeson, E. A., Cunningham, T. D., Ellingsen, R., Bates, S., & Frankel, F. (2014). Long-term treatment outcomes for parent-assisted social skills training for adolescents with Autism Spectrum Disorder: The UCLA PEERS program. *Journal of Mental Health Research in Intellectual Disabilities, 7(*1), 45-73.

Matson, J. L., Dempsey, T., LoVullo, S. V., & Wilkins, J. (2008). The effects of intellectual functioning on the range of core symptoms of autism spectrum disorders. *Research in Developmental Disabilities, 29*(4), 341-350. doi:10.1016/j.ridd.2007.06.006

Mattila, M., Jussila, K., Kuusikko, S., Kielinen, M., Linna, S., Ebeling, H., . . . Moilanen, I. (2009). When does the autism spectrum screening questionnaire (ASSQ) predict autism spectrum disorders in primary school-aged children? *European Child & Adolescent Psychiatry, 18*(8), 499-509. doi:10.1007/s00787-009-0044-5

Mayes, S. D., Black, A., Tierney, C. D. (2013). DSM-5 underidentifies PDDNOS: Diagnostic agreement between the DSM-5, DSM-IV, and Checklist for Autism Spectrum Disorder. *Research in Autism Spectrum Disorders, 7*(2), 298-306.

McCann, J., Peppé, S., Gibbon, F. E., O'Hare, A., & Rutherford, M. (2007). Prosody and its relationship to language in school-aged children with high-functioning autism. *International Journal of Language & Communication Disorders, 42*(6), 682-702. doi:10.1080/13682820601170102

McCullum, R. S., Bell, S. M., Coles, J. T., Miller, K. C., Hopkins, M. B., Hilton-Prillhart, A. (2013). A model for screening twice-exceptional students (gifted with learning disabilities) within a response to intervention paradigm. *Gifted Child Quarterly, 57*(4), 209-222.

McPartland, J. C., Reichow, B., & Volkmar, F. R. (2012). Sensitivity and specificity of proposed DSM-5 diagnostic criteria for autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 51*(4), 368-383.

Mesibov, G. B., Adams, L. W., & Schopler, E. (2000). Autism: A brief history. *Psychoanalytic Inquiry, 20*(5), 637-647. doi:10.1080/07351692009348913

Morrison, W. F., & Rizza, M. G. (2007). Creating a toolkit for identifying twice-exceptional students. *Journal for the Education of the Gifted, 31*(1), 57-76.

Müller, J, & Furniss, T. (2013). Correction of distortions in distressed mothers' ratings of their preschool children's psychopathology. *Psychiatry Research, 210*(1), 294-301.

Neihart, M. (2000). Gifted children with asperger's syndrome. *Gifted Child Quarterly, 44*(4), 222-230. doi:10.1177/001698620004400403

Nellis, L. (2003). Review of krug's asperger's disorder index. In *Sixteenth mental measurement yearbook* () Buros Institute.

Neumeister, K. S., Yssel, N., & Burney, V.H. (2013). The influence of primary caregivers in fostering success in twice-exceptional children. *Gifted Child Quarterly, 57*(4), 263-274.

Norris, M., & Lecavalier, L. (2010). Screening accuracy of level 2 autism spectrum disorder rating scales: A review of selected instruments. *Autism, 14*(4), 263-284. doi:10.1177/1362361309348071

Patel, S., Mullins, W., Turk, A., Dekel, N., Kinjo, C., & Sato, J. (2011). Distress screeing, rater agreeming, and services in pediatric oncology. *Psycho-Oncology, 20*(12), 1324-1333.

Perner, J., Frith, U., Leslie, A. M., & Leekam, S. R. (1989). Exploration of the autistic child's theory of mind: Knowledge, belief, and communication. *Child Development, 60*(3), 689-700. doi:10.2307/1130734

Posserud, M., Lundervold, A. J., & Gillberg, C. (2009). Validation of the autism spectrum screening questionnaire in a total population sample. *Journal of Autism and Developmental Disorders, 39*(1), 126-134. doi:10.1007/s10803-008-0609-z

Posserud, M., Lundervold, A. J., Steijnen, M. C., Verhoeven, S., Stormark, K. M., & Gillberg, C. (2008). Factor analysis of the autism spectrum screening questionnaire. *Autism, 12*(1), 99-112. doi:10.1177/1362361307085268

Radley, K. C., O'Handley, R. D., Ness., E. J., Ford, W., B., Battaglia, A. A., McHugh, M. B., & McLemore, C. E. (2014). Promoting social skill use and generalization in children with autism spectrum disorder. *Research in Autism Spectrum Disorders, 8*(6), 669-680.

Reis, S. M., Baum, S. M., & Burke, E. (2014). An operational definition of twice-exceptional learners: Implications and Applications. *Gifted Child Quarterly, 58*(3), 217-230.

Rimland, B. (1962a). Personality test faking: Expressed willingness to fake as affected by anonymity and instructional set. *Educational and Psychological Measurement, 22*(4), 747-751. doi:10.1177/001316446202200409

Rimland, B. (1962b). A scoring technique for reducing the effects of response bias in personality tests. *Psychological Reports, 10*(2), 546. doi:10.2466/PR0.10.2.546-546

Rimland, B. (1971). The differentiation of childhood psychoses: An analysis of checklists for 2,218 psychotic children. *Journal of Autism & Childhood Schizophrenia, 1*(2), 161-174. doi:10.1007/BF01537955

Rimland, E., & Edelson, S. (1999). *Autism treatment evaluation checklist (ATEC).* Retrieved April/8, 2010, from http://www.autism.com/ari/atec/atec-online.htm

Rizza, M. G., & Morrison, W. F. (2003). Uncovering stereotypes and identifying characteristics of gifted students and students with emotional/behavioral disabilities. *Roeper Review: A Journal on Gifted Education, 2*5(2), 73-77. doi:10.1080/02783190309554202

Rutter, M., Bailey, A., & Lord, C. (1999). *Social communication questionnair*e. Los Angeles, CA: Western Psychological Services.

Rutter, M., Le Couteur, A., & Lord, C. (2003). *Autism diagnostic interview, revise*d. Los Angeles, CA: Western Psychological Services.

Sansosti, F. J., & Powell-Smith, K. (2006). High-functioning autism and asperger's syndrome. In *Children's needs III: Development, prevention, and intervention*. (pp. 949-963) Washington, DC, US: National Association of School Psychologists.

Santos, G. J. (2006). Card sort technique as a qualitative substitute for quantitative exploratory factor analysis. *Corporate Communications*, *1*1(3), 288-302. doi:10.1108/13563280610680867

Sattler, J. M. (2008). *Assessment of children : Cognitive foundations / jerome M. sattle*r. San Diego : J.M. Sattler.

Schatz, J., & Hamdan-Allen, G. (1995). Effects of age and IQ on adaptive behavior domains for children with autism. *Journal of Autism and Developmental Disorders, 2*5(1), 51-60. doi:10.1007/BF02178167

Schopler, E., & Mesibov, G. B. (1992). In Mesibov G. B. (Ed.), *High-functioning individuals with autis*m New York, NY, US: Plenum Press.

Schopler, E., van Bourgondien, M. E., Wellman, G., J., & Love, S. R. (2010). *Child autism rating scale, 2nd editio*n. Los Angeles, CA: Western Psychological Services.

Schopler, E., Reichler, R. J., DeVellis, R. F., & Daly, K. (1980). Toward objective classification of childhood autism: Childhood autism rating scale (CARS). *Journal of Autism and Developmental Disorders, 1*0(1), 91-103. doi:10.1007/BF02408436

Shea, V., & Mesibov, G. B. (2009). Age-related issues in the assessment of autism spectrum disorders. In *Assessment of autism spectrum disorders*. (pp. 117-137) New York, NY, US: Guilford Press.

Siegel, D. J., Minshew, N. J., & Goldstein, G. (1996). Wechsler IQ profiles in diagnosis of high-functioning autism. *Journal of Autism and Developmental Disorders, 2*6(4), 389-406. doi:10.1007/BF02172825

Sigman, M., Dijamco, A., Gratier, M., & Rozga, A. (2004). Early detection of core deficits in autism. *Mental Retardation and Developmental Disabilities Research Reviews, 1*0(4), 221-233. doi:10.1002/mrdd.20046

Simek, A., & Wahlberg, A. C. (2010). Test review: Autism spectrum rating scales. *Journal of Psychoeducational Assessment,* , 1-5.

Snow, A. V., & Lecavalier, L. (2008). Sensitivity and specificity of the modified checklist for autism in toddlers and the social communication questionnaire in preschoolers suspected of having pervasive developmental disorders. *Autism, 1*2(6), 627-644. doi:10.1177/1362361308097116

Szatmari, P., Archer, L., Fisman, S., & Streiner, D. (1994). Parent and teacher agreement in the assessment of pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24*(6), 703-717.

Tuchman, R. F., & Rapin, I. (1997). Regression in pervasive developmental disorders: Seizures and epileptiform electroencephelogram correlates. *Pediatrics, 9*9(4), 560-566.

Venter, A., Lord, C., & Schopler, E. (1992). A follow-up study of high-functioning autistic children. *Journal of Child Psychology and Psychiatry, 3*3(3), 489-507. doi:10.1111/j.1469-7610.1992.tb00887.x

Volker, M. A., & Lopata, C. (2008). Autism: A review of biological bases, assessment, and intervention. *School Psychology Quarterly, 2*3(2), 258-270. doi:10.1037/1045-3830.23.2.258

Wiggins, L. D., Bakeman, R., Adamson, L. B., & Robins, D. L. (2007). The utility of the social communication questionnaire in screening for autism in children referred for early intervention. *Focus on Autism and Other Developmental Disabilities, 2*2(1), 33-38. doi:10.1177/10883576070220010401

Wechsler, D. (2003). WISC-IV Technical and Interpretive Manual. Psychological Corporation: San Antonio, TX.

Wechsler, D. (2013). WAIS-IV Technical and Interpretive Manual. Psychological Corporation: San Antonio, TX.

Williams, D. L., Goldstein, G., Kojkowski, N., & Minshew, N. J. (2008). Do individuals with high functioning autism have the IQ profile associated with nonverbal learning disability? *Research in Autism Spectrum Disorders, 2*(2), 353-361. doi:10.1016/j.rasd.2007.08.005

Wing, L. (1997). The history of ideas on autism. *Autism, 1*(1), 13-23. doi:10.1177/1362361397011004

Wing, L., & Gould, J. (1978). Systematic recording of behaviors and skills of retarded and psychotic children. *Journal of Autism & Childhood Schizophrenia, 8*(1), 79-97. doi:10.1007/BF01550280

Wing, L., & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. *Journal of Autism and Developmental Disorders, 9*(1), 11-29. doi:10.1007/BF01531288

Wing, L., Leekam, S. R., Libby, S. J., Gould, J., & Larcombe, M. (2002). The diagnostic interview for social and communication disorders: Background, inter-rater reliability and clinical use. *Journal of Child Psychology and Psychiatry, 43*(3), 307-325. doi:10.1111/1469-7610.00023

Witwer, A. N., & Lecavalier, L. (2007). Autism screening tools: An evaluation of the social communication questionnaire and the developmental behaviour checklist--autism screening algorithm. *Journal of Intellectual and Developmental Disability, 32*(3), 179-187. doi:10.1080/13668250701604776

Wolff, S. (2004). The history of autism. *European Child & Adolescent Psychiatry, 13*(4), 201-208. doi:10.1007/s00787-004-0363-5

Youngstrom, E., Findling, R. L., & Calabrese, J. R. (2003). Agreement between psychiatric diagnosis, youth, parent, and teacher report. *Journal of Abnormal Child Psychology, 31*(3), 231-245.

Youngstrom, E., Loeber, R., & Stouthamer-Loeber, M. (2000). Patterns and correlates of agreement between parent, teacher, and male adolescent ratings of externalizing and internalizing problems. *Journal of Consulting and Clinical Psychology, 68*(6), 1038-1050.