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EXAMINATION OF THE RELATIONSHIP BETWEEN THE CHILD BEHAVIOR CHECKLIST/ 6-18
AND THE SOCIAL RESPONSIVENESS SCALE PARENT FORMS USING INDIVIDUALS WITH HIGH
FUNCTIONING AUTISM

A Dissertation
Submitted to the School of Graduate Studies
and Research
in Partial Fulfillment of the
Requirements for the Degree
Doctor of Education

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May 2011

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Title: Examination of the Relationship Between the Child Behavior Checklist/ 6-18 and the Social Responsiveness Scale Parent Forms Using Individuals with High Functioning Autism

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Autism spectrum disorders (ASD) are a developmental disability of neurobiological origin which affects approximately 1 in 110 to 1 in 160 individuals. Despite the fact that an ASD can be identified in children as young as 18 months of age, a great majority of these children are not identified until they are of school age. School psychologists often rely on the use of behavioral rating scales during a school-based evaluation. However, many of the behavior rating scales that have been developed for ASDs have demonstrated questionable psychometric properties. The Child Behavior Checklist/ 6-18 (CBCL/ 6-18; Achenbach & Rescorla, 2001) is one of the few broadband rating scales that is used by school psychologists during evaluations. Prior research has demonstrated the utility of the CBCL to screen for behaviors commonly associated with an ASD. The Social Responsiveness Scale (SRS; Constantino & Gruber, 2005) is one of the few narrow band rating scales used in the determination of an autism diagnosis with strong psychometric properties.

The goal of the current study was to determine the utility of the CBCL/ 6-18 in screening for an ASD using school-aged children with high functioning autism. The profiles of the CBCL/ 6-18 and SRS scores were examined using 54 Caucasian male children between the ages of 6 and 18. Pearson's correlations (r) were analyzed to determine the relationship among CBCL/ 6-18 and SRS scores. Multiple linear regression (MLR) analyses were conducted to determine which CBCL/ 6-18 scales were more diagnostically informative of a possible ASD diagnosis.

Results indicated a similar profile of CBCL/ 6-18 scores when compared to prior research using the CBCL with individuals with autism. Results indicated a statistically significant association ($p < .003$ Bonferroni adjusted) between several of the SRS scales and the CBCL/ 6-18 scales. MLR analyses revealed that the best predictor model of SRS Total score was the model consisting of the CBCL/ 6-18 Social Problems, Withdrawn/Depressed, and Thought Problems scales. This study provides further support for the utility of the CBCL/ 6-18 as a brief screening measure for an ASD. Implications of these findings and recommendations for further research are discussed.

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CHAPTER I

THE PROBLEM

Statement of the Problem

Autism is a developmental disability of neurobiological origin that is defined using behavioral and developmental features. According to the American Psychiatric Association's (APA) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; APA, 2000), autism is best characterized as a spectrum of disorders under the category of pervasive developmental disorders (PDD) that vary according to the severity of maladaptive behaviors. These disorders include autistic disorder, Asperger's disorder, pervasive developmental disorder not otherwise specified (PDD-NOS), childhood disintegrative disorder, and Rett syndrome (APA, 2000). In its proposed revision of the DSM-V, the APA has proposed to remove Rett's syndrome from the DSM-V. In addition, APA has proposed to subsume childhood disintegrating disorder, Asperger's disorder, and PDD-NOS in the DSM-V under an already-existing disorder, which will be called autism spectrum disorder (APA, 2010).

Epidemiology studies have indicated that autism spectrum disorders (ASDs) occur from 1 in 170 individuals (Baird, Cass, & Slonims, 2003) to 1 in 160 (Chakrabarti & Frombonne, 2001). While still considered a low incidence disorder, according to the U.S. Department of Education the number of children with an autism diagnosis receiving special education services under the Individuals with Disabilities Education Act (IDEA) has risen at a 20% average annual growth rate from the years 1992 through 2003 (US Department of Education, 2005). The U.S. Department of Education, Office of Special Education Programs (2005) reported that 292,638 students aged 6-21 years old were served under IDEA under the classification of autism in the year 2008. Despite the fact that an ASD can be identified in children as young as 18 months of age, a great majority of these children are not identified until

they are of school age (Glascoe, 2000; Howling & Moore, 1997; Mandell, Listerud, Levy, & Pinto-Martin, 2002; Mandell, Novak, & Zubritsky, 2005).

Some reasons for a delay in an ASD diagnosis include inadequate screening practices, low sensitivity of screening instruments for autism, slow response to parental concerns, and lack of awareness of symptoms that manifest early in life (Mandell et al., 2009). Misdiagnosis is often the result of the similarity of certain features of an ASD with other childhood conditions, such as attention deficit/hyperactivity disorder (AD/HD; Aman & Langworthy, 2000; Goldstein & Schwebach, 2004), obsessive-compulsive disorder and oppositional-defiant disorder (Mandell et al., 2009), and mental retardation (Bonde, 2000; Chakrabarti & Fombonne, 2001). Mandell et al. (2009) found that African American children with an ASD are diagnosed at older ages than White children and that Hispanic children are less likely than White children to be diagnosed with an ASD.

For many childhood disorders, the psychological assessment is a challenging and critical step in the formulation of an effective treatment plan. The accurate assessment of an ASD is even more challenging due to the heterogeneous symptomology and co-occurrence with other disorders. Furthermore, the prevalence of autism is increasing, and parental advocacy groups are increasing pressure on school districts to determine accurate diagnosis and appropriate educational programming for children with autism.

While the IDEA definition of *autism* broadly encompasses children who exhibit a range of characteristics on the autism spectrum in need of specially designed and individualized instruction, psychologists need to be familiar with the DSM-IV-TR criteria for the subtypes of ASDs (autistic disorder, Asperger's disorder, and pervasive developmental disorder not otherwise specified) to derive empirically based interventions and properly educate parents, teachers, administrators, and the individual with the disorder. Thus, it is inevitable that school psychologists will be

increasingly involved in the assessment and determination of eligibility for special education services for children with autism. However, there currently is a need for appropriately sensitive and specific autism screening and diagnostic instruments for individuals with autism.

Several studies have found that an overwhelming majority of children with an ASD are first identified by the school system as opposed to the healthcare system. Glascoe (2000) found that the school system identified 70% of children. Furthermore, Palfrey, Singer, Walker, and Butler (1987) found the proportion of children first identified by the school system to be closer to 80% while Yeargin-Allsopp et al. (2003) found that more than 75% of children with ASDs were identified through the school system. These findings have noteworthy implications for children with ASDs. Many school psychologists have not received appropriate training in the assessment and treatment of ASDs during their certification programs. Filipek et al. (1999) suggested that educational personnel, such as school psychologists, are in need of better methods to identify children with autism and develop intervention services.

Furthermore, educators and school-based professionals often report feeling incapable of adequately serving the needs of children with autism (Simpson, de Boer-Ott, & Smith-Myles, 2003). Some school psychologists continue to rely on diagnoses from outside agencies, which they confirm through results from rating scales and classroom observations. However, this current practice often leads to misclassification of children with autism in the form of children either being identified as having autism (when in reality they do not) or children not being identified as having autism (when in reality they do). A failure to correctly identify a child with an ASD can result in that child not receiving any special education services or receiving inappropriate services meant for another disability category (e.g., other health impairment or emotional disturbance).

The early diagnosis of child psychopathology, such as autism, is critical for successful treatment outcomes. An accurate diagnosis of a childhood disorder relies on a multitude of assessment methods, such as direct observations, questionnaires, clinical interviews, record review, behavioral checklists, and cognitive testing (Safran, 2001). School psychologists working with children with autism use a variety of instruments (e.g., questionnaires, behavioral rating scales, observational schedules, and standardized interviews) for diagnostic purposes in the evaluation process.

Behavior rating scales can be broad-band scales or narrow-band scales. Broad-band rating scales, such as the Child Behavior Checklist/ 6-18 (CBCL/6-18; Achenbach and Rescorla, 2001), measure a number of different behavior constructs and are useful in initial screening. The CBCL/6-18 is a widely used behavior symptom broad-band rating scale that is used to document behavior problems in children. The parent-report, teacher-report, and youth-self-report formats can typically be completed within 20 minutes (Achenbach, 2009). Several authors have examined older versions of the CBCL with individuals with autism (Achenbach & Rescorla, 2001; Bolte, Dickhut, & Poustka, 1999; Duarte, Bordin, de Oliveira, & Bird, 2003; Mazefsky, Anderson, Conner, & Minshew, 2010; Noterdaeme, Minow, & Amorosa, 1999; Rescorla, 1988). The CBCL/6-18 (2001) is an update of the previous edition of the school-aged CBCL (Achenbach, 1991). The 2001 version included updated norms as well as changes in the age range covered. Whereas the previous version included ages 4 and 5, those ages are now covered by the CBCL/1½ -5 (Achenbach & Rescorla, 2000). Although research has been conducted using the previous versions of the CBCL, an extensive literature review produced only one study examining the most recent revision of the CBCL/6-18 (Biederman et al., 2010) on school-aged children with autism.

The use of narrow-band scales are designed to measure a single, specific construct and are frequently used with a broad-band rating scale in

a comprehensive evaluation. There are several narrow-band rating scales that have been designed to specifically address symptoms of autism, including the Autism Behavior Checklist (Krug, Arick, & Almond, 1980), the Asperger's Syndrome Diagnostic Scale (Myles, Bock, & Simpson, 2001), and the Gilliam Autism Rating Scale-2nd Edition (GARS-2; Gilliam, 2006). However, there are inherent psychometric problems with these frequently administered rating scales commonly administered in the assessment of an ASD (Garro, 2007; Lecavalier, 2005; Sevin, Matson, Coe, Fee, & Sevin, 1991; South, Williams, McMahon, Owley, & Filipek, 2002; Volkmar et al., 1988; Wadden, Bryson, & Rodger, 1991). This lack of instrument sensitivity and professional exposure and training may lead to misclassification, misdiagnosing, and a failure of children to receive appropriate educational and related services as defined by federal and state regulations. Therefore, there is a need for valid, brief screening tools in the educational setting for use by school psychologists to determine whether a further comprehensive evaluation for an ASD is warranted.

One study examined the relationship between the Child Behavior Checklist/4-18 (CBCL/4-18) and the narrow-band rating scale, the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005). Constantino, Hudziak, and Todd (2003) conducted a study with 219 male twins with autism and indicated that the SRS scores likely influenced the CBCL Attention Problems scores and that the CBCL Social Problems scores likely influenced SRS scores (Constantino et al., 2003). However, to date, no study has examined the relationship of the CBCL/6-18 with an autism-specific rating scale, such as the SRS, which includes items that assess social awareness, social cognition, social communication, social motivation, and such autistic mannerisms as stereotypical or repetitive behaviors and preoccupations (Constantino & Gruber, 2005).

Within a school system, children are often referred to the school psychologist for additional assistance as a result of behavioral problems

exhibited within the classroom. In children with high functioning autism (HFA), these behaviors are often not entirely specific to children with an ASD, such as attention difficulties, anxiety, depression, and oppositional behaviors (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000). Thus, the use of a broad-band rating scale that assesses a broad range of problem behaviors and skills is important in the initial screening of referred children and serves to provide additional appropriate data for the second stage of the diagnostic process, which may involve a more in-depth school-based evaluation or appropriate referral to a mental-health facility and the administration of specific disorder (e.g., narrow-band) rating scales (Clark & Harrington, 1999). A broad-band rating scale, such as the CBCL/6-18, may be a useful instrument for school psychologists because it is a standardized and multidimensional rating system that is easily administered to parents and teachers. However, being able to generate CBCL/6-18 profiles for school-aged children with HFA could aid school psychologists in early screening, indicating a need for further comprehensive assessment of children with HFA. Comparing the results of the CBCL/6-18 profile to an autism-specific rating scale such as the SRS could further sharpen the usefulness of the CBCL/6-18 as a screening measure for HFA within the school setting.

Significance of the Problem

The aims of the current study are of importance to the field of education and school psychology for many reasons. First, the diagnosis of ASDs can be challenging because the manifestations of ASDs vary considerably across children and within an individual child over time. There is no single behavior or cognitive profile that is always typical of autism and no behavior or profile that would automatically exclude a child from a diagnosis of an ASD. Second, children with an ASD often have comorbidity with other disorders such as mental retardation, specific language delay, AD/HD, oppositional-defiant disorder, or obsessive-compulsive disorder (Aman &

Langworthy, 2000; Bonde, 2000; Chakrabarti & Fombonne, 2001; Mandell et al., 2009). A professional who does not possess a high level of knowledge in ASDs may misidentify a child based on the more salient behaviors (e.g., deficits in adaptive functioning, low cognitive functioning, language deficits, and behavioral problems) and fail to provide an ASD diagnosis. This lack of knowledge affects the third rationale, which is that early assessment leads to early identification and placement in appropriate intervention programming.

A fourth reason concerns the psychometric properties of several behavioral checklists that have been designed to specifically address behavioral symptoms of autism, such as the Autism Behavior Checklist (ABC; Krug, et al., 1980), GARS-2 (Gilliam, 2006), and the Asperger Syndrome Diagnostic Scale (ASDS; Myles, et al., 2001). Many of the commonly used instruments for autism, while having adequate-to-excellent reliability properties, fail to discriminate among the several subtypes of ASDs (e.g., autistic disorder, Asperger's disorder, and PDD-NOS). Many of the instruments used by school psychologist do not have empirical data supporting their use for all the subtypes of ASDs. Many of the instruments were normed on a sample population whose diagnosis was not confirmed and relied solely on parent or teacher report (Garro, 2007; Lecavalier, 2005; Sevin et al., 1991; South et al., 2002; Volkmar et al., 1988; Wadden et al., 1991). Several studies have demonstrated the cut-off scores established by the authors of some instruments often lead to high false-negative rates, resulting in children not being diagnosed or referred for further evaluation (Myles, Bock, & Simpson, 2001; South et al. 2002). Furthermore, many school psychologists may not have much experience in identifying and assessing children with pervasive developmental disorder not otherwise specified and Asperger's disorder, thereby compounding the complex nature of diagnosing an ASD.

Finally, accurate assessment measures lead to proper identification, which ultimately leads to educating the parents, teachers, school administrators, and the student concerning the disability. Such assessment could provide the child and his or her support system with the required information to access available resources to maximize the child's educational and psychological potential.

Questions to Be Researched

The following research questions guided the current study:

Research Question 1

What is the profile of T-scores on the CBCL/6-18 for a sample of school-aged children with high functioning autism? Specifically, what scales have T-scores ≥ 65 on the CBCL/6-18 for a sample of school-aged children with high functioning autism?

Research Question 2

What is the profile of T-scores on the SRS for a sample of school-aged children with high functioning autism?

Research Question 3

Which scales from the CBCL/6-18 are highly correlated with scales from the SRS?

Research Question 4

Which scales from the CBCL/ 6-18 are more predictive of an elevated (higher) SRS Total T-score?

Hypotheses

Five hypotheses and their related variables, as shown in Table 1, were prepared based on the review of the findings from several prior studies using the CBCL with individuals with autism. These findings demonstrated a consistent profile of scores in individuals with autism using the previous versions of the CBCL. Specifically, the hypotheses were based on the conclusions that indicated children with an autism spectrum disorder had CBCL

scale elevations on the Withdrawn and Social scales (Luteijn et al., 2000); Thought Problems scale (Duarte et al., 2003); Thought Problems, Attention Problems, and Withdrawn/Depressed scales (Bolte et al., 2003), and Thought Problems, Attention Problems, Withdrawn/Depressed, and Social Problems scales (Mazefsky et al., 2010; Noterdaeme et al., 1999).

The five hypotheses proposed in this study are as follows:

Hypothesis 1

When used with children with high functioning autism, the Thought Problems, Withdrawn/Depressed, Social Problems, Attention Problems, and Anxious/Depressed scales from the CBCL/6-18 will be at least one and a half deviations above the mean (e.g., T scores ≥ 65) suggesting a score in the borderline clinical range.

Hypothesis 2

When used with children with high functioning autism, the following scales on the SRS will be at least one standard deviation above the mean (e.g., T scores > 60) and not in the normal range as indicated by the test manual (Constantino & Gruber, 2005): Total Score, Social Awareness, Social Cognition, Social Communication, Social Motivation, and Autistic Mannerism.

Hypothesis 3

When used with children with high functioning autism, the SRS Total scale will yield at least moderate concurrent correlations with the Social Problems, Thought Problems Withdrawn/Depressed, Anxious/Depressed, Attention Problems scales from the CBCL/6-18.

Hypothesis 4

When used with children with high functioning autism, the SRS Total scale will yield non-significant correlations with the Somatic Complaints, Rule-Breaking Behavior, and Aggressive Behavior syndrome scales from the CBCL/6-18.

Hypothesis 5

When used with children with high functioning autism, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales will be more predictive of an elevated SRS Total T-score.

Table 1

Hypotheses and Variables of Current Study

Hypotheses	Variables Examined
1. When used with children with HFA, the Thought Problems, Withdrawn/Depressed, Social Problems, Attention Problems, and Anxious/Depressed scales from the CBCL/6-18 will be at least 1.5 SDs above the mean (e.g., T-score ≥ 65).	CBCL/ 6-18 Thought Problems, Withdrawn/Depressed, Social Problems, Attention Problems, and Anxious/Depressed T-scores
2. When used with children HFA, the Total Score, Social Awareness, Social Communication, and Autistic Mannerism scales of the SRS will be at least one SD above the mean (e.g., T-score > 60).	SRS Total, Social Awareness, Social Cognition, Social Communication, and Autistic Mannerism T-scores
3. When used with children HFA, the SRS Total scale score will yield concurrent correlations with the Social Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and Attention Problems scales from the CBCL/6-18.	CBCL/6-18 Social Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and Attention Problems, scales, and SRS Total T-scores
4. When used with children HFA, the SRS Total scale score will yield non-significant correlations with the Somatic Complaints, Rule-Breaking Behavior, and Aggressive Behavior scores from the CBCL/6-18.	Somatic Complaints, Rule-Breaking Behavior, and Aggressive Behavior T-scores from the CBCL/6-18
5. When used with children with HFA, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales will be more predictive of an elevated SRS Total T-score.	SRS Total Score, CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed T-scores

Definition of Terms

The following terms are defined to provide a common frame of reference.

Asperger's disorder (AS). AS is a pervasive developmental disorder characterized by severe and sustained impairment in social interaction with restricted, repetitive, or stereotypical activities. These impairments cause

clinically significant impairments in daily living, without the language and cognitive deficits characteristic of autistic disorder but in other ways is similar.

Autistic disorder (AD). AD is a pervasive developmental disorder characterized by gross and sustained impairment of social interaction and communication; restricted and stereotypical patterns of behavior, interest, and activities; and abnormalities before the age of 3 years.

Autism. *Autism* is an alternative name for autistic disorder.

Autism spectrum disorder (ASD). ASD is a broad term applied to an individual who has Asperger's disorder, autistic disorder, or pervasive developmental disorder not otherwise specified (APA, 2001).

Diagnostic and Statistical Manual of Mental Disorders- Fourth Edition-Text Revision (DSM-IV-TR). This book is published by the American Psychological Association (APA) and widely regarded as one of the most authoritative reference works on matters of definitions and classifications of mental disorders.

Pervasive developmental disorder (PDD). In the classification of the DSM-IV, PDD is a childhood onset disorder characterized by severe and extensive impairment in the development of social interaction and communication skills by the presence of stereotyped behaviors and/or restricted interests. PDD subtypes include autistic disorder, Asperger's disorder, and PDD-NOS.

Pervasive developmental disorder not otherwise specified (PDD-NOS). PDD-NOS is a pervasive developmental disorder characterized by severe and sustained impairment in the development of reciprocal social interaction associated with impairment in communication skills or the presence of stereotyped behaviors and interests but not to the degree to meet DSM-IV criteria for a specific PDD.

High functioning autism (HFA). HFA is used to describe an individual with an autistic disorder who has an intelligence quotient equal to or greater than 70 and is thought to be verbal or have at least sentence speech. For the current study, only individuals with HFA were examined.

Rating scale. In psychometrics, any device for quantifying a respondent's subjective judgment or response to a stimulus is a rating scale.

School psychologist. A school psychologist is an individual who is involved in the diagnosis and treatment of educational, emotional, and behavioral children and who has also completed graduate and postgraduate work.

Broad-band rating scale. A broad-band rating scale measures a number of different behavior constructs and is useful in initial screening.

Narrow-band rating scale. A narrow-band rating scale measures a single, specific construct, such as anxiety or depression.

Assumptions

The following statements are assumed to be true for this research.

1. The parents who rated their children were sufficiently knowledgeable to effectively rate their children.
2. The parents responded in a meaningful and thorough manner to the items on the behavior rating scales.
3. Behavioral scores reflect the child's current behavioral functioning.
4. The male participants did not have a psychiatric comorbid condition.

Delimitations

All participants were involved in a research study at the University of Pittsburgh. Archival data were used; therefore, data were limited to what was used.

Limitations

Results of the current study should be viewed in light of some methodological limitations. First, while the rates of autism are 4-5 times higher in males than females (APA, 2000), only males were used in this current study. Second, the current study included only information from the parent forms of the CBCL/ 6-18 and the SRS. Third, only the mothers of the children with HFA completed the CBCL/ 6-18 and the SRS. Fourth, the participants did not have a comorbid psychiatric diagnosis. Last, no control group or diagnostic group was administered the CBCL/ 6-18 or the SRS.

Summary

The aim of the current study is to provide additional insight into the use of the CBCL/6-18 with school-aged children with HFA. Specifically, the study examines the possible effectiveness of the CBCL/6-18 as a brief screening measure in identifying children who may need a more comprehensive evaluation for an ASD. The study examines the profile of CBCL/6-18 scores from 54 parents of male children with HFA to determine whether the yielded profile supports those of prior research using older versions of the CBCL with individuals with autism. Second, an examination of the relationship of the CBCL/6-18 scales with the SRS, an autism-specific narrow band rating scale, will be conducted to further provide support for a distinct cluster of CBCL/6-18 elevated scores in individuals with autism. This may provide further support that the CBCL/6-18 could be used by school psychologists and other professionals as a brief screening measure for a more comprehensive evaluation for an ASD. A pictorial representation of the current study is depicted in Figure 1.

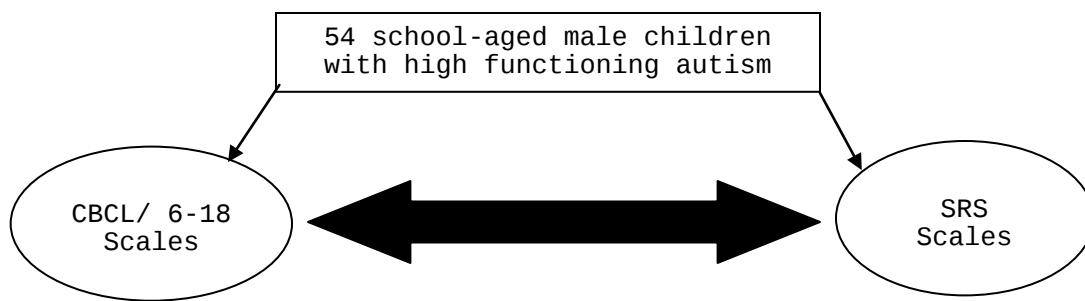


Figure 1. Overview of current study.

CHAPTER II

REVIEW OF RELATED LITERATURE

The purpose of this chapter is to provide the foundation on which the present dissertation study was constructed. The chapter begins with an overview of pervasive developmental disorders (PDDs), henceforth referred to as autism spectrum disorders (ASDs), including such topics as epidemiology, criteria for ASDs (autistic disorder, Asperger's disorder, and PDD-NOS), and a review of comorbid disorders often associated with ASDs. The next session reviews educational law with respect to identifying and providing services to children with ASD. Next, a discussion of the role of the school psychologist in identifying children with ASD will provide information regarding the assessment approach commonly used within the school setting. Finally, the chapter includes an overview of the related literature specific to ASDs and the Child Behavior Checklist/6-18 (CBCL/ 6-18) and the Social Responsiveness Scale (SRS).

Overview of Autism Spectrum Disorders

ASDs are characterized by dysfunction in three core areas of early childhood development, specifically, social interaction; communication and language skills; and the presence of stereotyped, repetitive behaviors, and restricted activities and interests (APA, 2000). An ASD is a developmental disability of neurobiological origin that is defined on the basis of behavioral and developmental features. According to the DSM-IV-TR, ASDs are best characterized as a spectrum of disorders that vary according to the severity of maladaptive behaviors. These disorders include autistic disorder, Asperger's disorder, and PDD-NOS (APA, 2000). Autistic disorder or autism is the most representative type of ASD and the most researched to date (Hoffman, 2009). Autism was first described by Leo Kanner in 1943, who recognized the unusual condition hallmarked by social aloofness, impaired social interactions, and disturbance in language development (Kanner, 1943).

Historically, there have been many terms used to describe this disorder, such as *childhood schizophrenia*, *infantile autism*, *pervasive developmental disorder-residual type*, and *autism psychoses* (Filipek et al., 1999).

Pervasive Developmental Disorder (PDD) originated as a diagnostic category in the third edition of the DSM in 1980 (APA, 1980). The PDDs included in the DSM-III were infantile autism (onset before 30 months), childhood onset PDD (onset after 30 months but before 12 years), residual autism (individuals with a history of infantile autism but no longer met criteria), and atypical autism (individuals who presented with autistic features but did not meet full criteria for a diagnosis). When the DSM-III was revised in 1987 (DSM-III-R), the diagnostic category of autism was retained but the other subtypes of PDD were collapsed into a single category of PDD-NOS (APA, 1987). The DSM-III-R included a list of symptoms for each domain for which a minimum number of observed symptoms were required for the diagnosis of autistic disorder and PDD-NOS. In addition, the DSM-III-R excluded the age of onset as a criterion.

In 1994, the DSM-IV was published and retained the diagnoses of autistic disorder and PDD-NOS (APA, 1994) with several changes. First, the age of onset criterion for autistic disorder was changed to before three years of age. The diagnosis of PDD-NOS was met when the criteria for autistic disorder were not met and the individual demonstrated impairment in social interaction, verbal and nonverbal communication, or repetitive or stereotyped behaviors. Second, the DSM-IV introduced several PDD subtypes, such as Asperger's disorder, Rett's disorder, and childhood disintegrative disorder. Rett's Disorder and childhood disintegrative disorder are currently not considered ASDs due to specific behavioral and genetic characteristics that differentiate them from other ASDs. A diagnosis of Asperger's disorder included qualitative impairments in social interaction and restricted, repetitive, and stereotyped patterns of behavior, interests,

and activities similar to that of autistic disorder, without the observed delays in language or cognitive development (APA, 2000).

The DSM-IV-Text Revision (DSM-IV-TR), published in 2000, described PDD-NOS as “a severe and pervasive impairment in the development of reciprocal social interaction” (APA, 2000, p. 84) that is associated with verbal and nonverbal communication deficits or the presence of restricted or repetitive behaviors when the diagnostic criteria for autistic disorder is not met. Thus, it is a subthreshold diagnosis applied for an individual demonstrating fewer or less severe symptoms than are present in the diagnosis of autistic disorder or Asperger’s disorder (APA, 2000).

The term *high functioning autism* (HFA) is commonly applied to individuals meeting the diagnostic criteria for autistic disorder who have overall cognitive functioning skills (e.g., IQ) that are greater than 70 and, therefore, not within the range associated with mental retardation. Numerous studies have attempted to determine whether Asperger’s disorder and HFA are distinct disorders or different levels of a single disorder with a few features that consistently distinguish them (Mayes, Calhoun, & Crites, 2001; Miller & Ozonoff, 2000; Schopler, 1996; Szmatmari, Bartolucci, & Bremner, 1989). In contrast, other studies have found limited group differences in repetitive behaviors (Szmatmari, Archer, Fisman, Streiner, & Wilson, 1995; Howlin, 2003). Woodbury-Smith, Klin, and Volkmar (2005) reported that the primary diagnostic distinction between Asperger’s disorder and HFA is “specific onset-criteria which indicate that there is no history of delay in spoken language as well as normal cognitive and adaptive development” (p. 236) in Asperger’s disorder.

DSM-IV-TR Classification

Many of the commonly used rating scales for autism were developed from the DSM-IV definition of *autism* and clinical theoretical understanding of PDDs. Therefore, the inclusion criteria for the three commonly diagnosed

ASDs—autistic disorder, Asperger’s disorder, and PDD-NOS, are discussed. Individuals with ASDs present with varying sensitivity and a number of symptoms (Szmatmari et al., 2002). As a result, classification systems have broadened to include ASD subtypes (e.g., autistic disorder, Asperger’s disorder, and PDD-NOS). It is widely accepted that ASD is characterized as an “umbrella” or spectrum disability with autism disorder at one end, typical development at the other end, and PDD-NOS in the moderate to mild end of the spectrum, although there are no clear boundaries between the ASDs (Towbin, 2005).

Autistic Disorder

The DSM-IV-TR diagnostic criteria of autistic disorder indicate that an individual must exhibit a total of six or more symptoms of qualitative impairments in social interaction; qualitative impairments in communication; and restricted repetitive and stereotyped patterns of behavior, interest, and activities (APA, 2000). The individual must exhibit “two of the four listed symptoms under the social interaction domain. The individual must also have evidence of abnormal or delayed functioning prior to 36 months of age in social interaction, social communication, and symbolic or imaginative play. In addition, criteria for Rett’s disorder or childhood disintegrative disorder are not met.” (APA, 2000, p. 75).

Asperger’s Disorder

Asperger’s disorder diagnostic criteria are established if an individual manifests two of the four criteria for qualitative impairment in social interaction, one of the four criteria for restricted and stereotyped behaviors, and the following criteria: (a) “The disturbance causes significant impairment in social, occupations, or other important areas of functioning, (b) there is no clinically significant general delay in language or clinically significant delay in cognitive or adaptive development, and (c)

criteria for another PDD or schizophrenia have not been met" (APA, 2000, p. 80).

PDD-NOS

Criteria for PDD-NOS is established when "there is a severe and pervasive impairment in the development of reciprocal social interaction associated with impairment in either verbal or nonverbal communication skills or with the presence of stereotyped behavior, interests, and activities, but the criteria are not met for a specific Pervasive Developmental Disorder" (APA, 2000, p. 84).

Figures 2, 3, and 4 provide detailed lists of the DSM-IV-TR (APA, 2000) criteria for autistic disorder, Asperger's disorder, and PDD-NOS, respectively.

Six criteria are met in three distinct categories:

- (1) Impairment in social interaction, as manifested by two of the following:
 - a. Marked impairment in the use of multiple nonverbal behaviors,
 - b. Failure to develop peer relationships appropriate to developmental level,
 - c. Lack of spontaneous seeking to share enjoyment, interests, or achievements with others, and/or
 - d. Lacking social or emotional reciprocity
- (2) Impairment in communication, as manifested by two of the following:
 - a. Delay in or lack of spoken language,
 - b. When speech is present, impairment in initiating or sustaining conversation,
 - c. Stereotyped or repetitive language and/or idiosyncratic language, and/or
 - d. Lacking developmentally appropriate imaginative or social imitative play.
- (3) Repetitive or stereotyped, interests, and activities, as manifested by one of the following:
 - a. Preoccupation with stereotyped and restricted patterns of interest which is abnormally intensive,
 - b. Inflexibility and strict adherence to routines or rituals,
 - c. Stereotyped and repetitive motor mannerisms, and
 - d. Persistent preoccupation with individual parts of objects

Additionally, the individual must exhibit delays or abnormal functioning in one of the following areas by age 3:

1. Social interaction,
2. Language as it relates to social communication, or
3. Creative play

Figure 2. DSM-IV-TR criteria for autistic disorder. Adapted from *DSM-IV-TR* (4th ed., text), by APA, 2000, Washington, DC: Author, p. 75.

Asperger's Disorder should be diagnosed when an individual exhibits impairments in social interaction, evidenced by at least two of the following:

1. Impairment in nonverbal behavior,
2. Impaired peer relations at age-appropriate level,
3. Not engaging in sharing of enjoyment, interests, or achievements with others,
4. Lacking social/ emotional reciprocity

Individuals will also demonstrate at least one of the following:

1. Stereotyped or restricted patterns of interest to an abnormal degree,
2. Strict adherence to routines or rituals,
3. Stereotypical motor movements, and
4. Preoccupation with parts of objects

*Autism is supposed to be diagnosed over Asperger's Disorder if enough criteria are met for autism

Figure 3. DSM-IV-TR criteria for Asperger's disorder. Adapted from *DSM-IV-TR* (4th ed., text), by APA, 2000, Washington, DC: Author, p. 84.

PDD-NOS is diagnosed when there exists significant impairment in social interaction due to communication or with the display of stereotyped behaviors, interests, and activities, but the criteria are not explicitly met for another PDD, Schizophrenia, Schizotypal Personality Disorder, or Avoidant Personality Disorder. Atypical autism is also included in this category.

Figure 4. DSM-IV-TR criteria for PDD-NOS. Adapted from *DSM-IV-TR* (4th ed., text), by APA, 2000, Washington, DC: Author, p. 84.

Epidemiology

Epidemiology studies have indicated that ASDs occur in from 1 in 170 individuals (Baird et al., 2001) to 1 in 160 (Chakrabarti & Fombonne, 2001). Fombonne (2005) reviewed epidemiological studies of autism and related disorders and found the following conservative prevalence estimates: 13/10000 (autistic disorder), 21/10000 (PDD-NOS), and 2.6/10000 (Asperger's disorder). Several researchers have concluded that the increase in rates of PDDs is best accounted for by changes in diagnostic concepts and criteria and by improved identification (Baird, Cass, & Slonims, 2003; Chakrabarti & Fombonne, 2001; Fombonne, 2003 & 2005; Rutter, 2005).

Males are more likely to be diagnosed with ASDs than are females, with three to six males being diagnosed for every one female (CDC, 2007); however, findings are contradictory regarding sex differences in the severity of behaviors (Quellette-Kuntz et al., 2007). Rutter (2005) indicated that a wide range of neurodevelopmental disorders (including attention-deficit/hyperactivity disorder, dyslexia, specific developmental language disorders, and early-onset lifespan persistent antisocial behaviors) also show a preponderance among males.

Federal Law

The Education of All Handicapped Children Act was established by Congress in 1975 and is legally known as Public Law number 94-142 (PL 94-142). This law mandated that all school-aged children with special needs receive a free and appropriate public education (FAPE) and legislated that the rights of these children and their parents were protected by providing nondiscriminatory evaluations, education in the least restricted environment (LRE), due process, and individualized educational programming (IEPs). In 1986, PL 94-142, renamed PL 99-457, was amended to encourage provision of services to eligible preschool children and provided federal incentives for the development of infant and toddler programs. In 1990, PL 99-457 was renamed the Individuals with Disabilities Education Act (IDEA, PL 101-476). In this revision, Congress included autism and its definition in the list of disabilities eligible for special education services. The amendment also mandated a transition plan be included in students' IEPs. The IDEA amendments of 1997 were passed as PL 105-17 and added language to further strengthen the role of parents in the educational process and required states to establish a voluntary mediation system.

In December 2004, PL 108-446, the Individuals with Disabilities Education Improvement Act (IDEIA), was signed into law and became effective July 1, 2005. While IDEIA had several purposes, arguably, one of the most

important sections of the IDEIA is concerned with the development and implementation of the IEP. Best practices dictate that the goals and interventions of the IEP should be developed from the assessments conducted by professionals, including the school psychologist. Because many states require a school psychologist to determine whether a child meets IDEIA's definition of a child with a disability, such as autism, it is important for the school psychologist to conduct an assessment using empirically supported and validated instruments.

The IDEIA was not intended to be a diagnostic system for childhood disorders. Rather, it was federal legislation designed to serve children with special education needs within a public school setting. Under the United States Code (U.S.C.), the term *child with a disability* refers to a child:

- i. With mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (hereinafter referred to as "emotional disturbance"), orthopedic impairment, autism, traumatic brain injury, other health impairments, or specific learning disability and
- ii. Who, by reason thereof, needs special education and related services.

The regulation (34 C.F.R.) 300.7 (c) (1)) further defines autism:

- i. Autism means a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age 3, that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences. The term does not apply if a

child's educational performance is adversely affected primarily because the child has an emotional disturbance, as defined in this section.

ii. A child who manifests the characteristics of "autism" after age 3 could be diagnosed as having "autism" if the criteria in paragraph (c)(1)(i) of this section are satisfied. (Office of Special Education, 1999, p.12).

Comparisons of DSM-IV-TR and IDEA

The DSM-IV-TR (APA, 2000) and the IDEA share several similarities. For example, both are categorical in nature; that is, an individual either meets or does not meet criteria. Both focus on the observance of behavior rather than behavioral function, and both have been used in legal decision making regarding special-education placement and treatment. Despite these similarities, there are clear distinctions between the two systems. The IDEA is more concerned with establishing eligibility for special education and related services, such as occupational therapy, physical therapy, speech-language pathology and audiology services, psychological services, recreation, counseling services, rehabilitation services, orientation and mobility services, medical and school health services, social work services in school, and parent counseling and training. The IDEA does not have the diagnostic specificity of the DSM-IV-TR. Thus, while it would appear that children who received a DSM-IV-TR diagnosis of autistic disorder would also be eligible for an autism classification under IDEA, it is unclear whether children with other ASDs (Asperger's disorder and PDD-NOS) would be eligible for school-based services. Finally, although the DSM-IV-TR diagnosis is considered the primary authority in the fields of psychological diagnosis, the IDEA definition is the controlling authority for hearing or review officers in the legal system with regard to eligibility decisions (Fogt, Miller, & Zirkel, 2003; House, 2002). Therefore, it is essential for school psychologists to become familiar with the diagnostic criteria for the various

ASDs in order to make appropriate eligibility decisions and educational recommendations.

Comorbidity of ASD With Other Disorders

According to the DSM-IV-TR (APA, 2000), all of the disorders under the ASD heading “are characterized by severe and pervasive impairments in several areas of development: reciprocal social interaction skills, communication skills, or the presence of stereotyped behavior interests and activities. The qualitative impairments that define these conditions are distinctly deviant relative to the individual’s development level and mental age” (APA, 2000, p. 69). Although the behaviors that define ASDs are clearly delineated, the distinctions among the subtypes of ASDs can be somewhat arbitrary and are often associated with other developmental or psychological disorders, such as AD/HD, mental retardation, obsessive-compulsive disorder (OCD), bipolar disorder, and schizophrenia.

Obsessive-Compulsive Disorder

OCD is characterized by recurrent obsessions and compulsions that are time consuming, cause marked distress, and significantly impair social or occupational functioning (APA, 2000). Obsessions are characterized as persistent thoughts, ideas, or impulses that are intrusive and inappropriate and cause marked anxiety in the individual. Compulsions are repetitive rituals or patterns that are performed primarily to decrease anxiety in an individual. There are many similarities between the symptoms commonly associated with obsessive-compulsive disorder (OCD) and the ritualistic and repetitive behaviors typical of ASDs. The presence of repetitive behaviors is also observed in individuals with OCD, making these two disorders challenging to distinguish. However, in OCD, restricted, repetitive, and/or stereotyped behaviors often occur without social or communication deficits. Furthermore, individuals with ASD often enjoy engaging in the repetitive

behavior, whereas these behaviors often cause anxiety and distress in individuals with OCD (Gillberg & Billsted, 2000).

Attention-Deficit/Hyperactivity Disorder

The differential diagnosis of an ASD versus ADHD is particularly difficult given the overlapping presentation of these disorders (Hartley & Sikora, 2009). Symptoms of inattention, hyperactivity, and impulsivity are frequent among individuals with ASD and have been described by many (Ehlers & Gillberg, 1993; Gadow, De Vincent, & Schnieder, 2009; Ghanzaiuddin, Weidmer-Mikhail, & Ghaziuddin, 1998; Goldstein & Schwebach, 2004; Lecavalier, 2006; Luteijn et al., 2000). The rates of AD/HD in samples of individuals with ASDs have been reported as between 28% and 78% (de Bruin, Ferdinand, Meester, de Nijis, & Verheij, 2007; Ghanzaiuddin et al., 1998; Goldstein & Schwebach, 2004). The DSM-IV-TR (APA, 2000) recognized AD/HD as a disorder that coexists or is comorbid with ASDs; however, the reverse is not true. Thus, in terms of clinical diagnoses, current DSM-IV-TR criteria exclude the diagnosis of AD/HD when an ASD is present. However, given that attention and hyperactivity are the behavior problems most commonly reported by parents and educators of children with ASDs (Lecavalier, 2006), it is important for school psychologists to investigate further the function of these problem behaviors and not simply provide a diagnosis of AD/HD, thus failing to recognize an ASD.

Similarities between children with AD/HD and ASDs include attention and social problems. Luteijn et al. (2000) found that 5-12-year-old children with ASD and those with AD/HD had similar rates of AD/HD symptoms as measured by the CBCL. Their findings suggested that some symptoms overlap in terms of social problems; however, the autism group could be distinguished based on higher scores on the CBCL subscales measuring social problems and social withdrawal, as well as higher scores on parent-completed autism-specific rating scales.

Communication/Language Disorders

Another category of childhood disorder that is often difficult to differentiate in relation to ASDs is communication or language disorders. Language disorders or impairments are common in ASDs (Hagberg, Miniscalco, & Gillberg, 2010) and the diagnosis of an expressive language disorder (ELD), mixed receptive-expressive language disorder (MRELD), or pragmatic language impairment (PLI) can be difficult to differentiate from an ASD as a result of highly similar impairments in verbal and nonverbal communication skills. Both disorders involve deficits in expressive, receptive (hearing), pragmatics (language use), and semantics (language content). Lack of communicative competence and pervasive pragmatic deficits are core symptoms in individuals with ASD; however, these children are often initially referred for examination of delayed language development and not an ASD (Dahlgren & Gillberg, 1989).

Mawhood, Howlin, and Rutter (2000) found that children with developmental language disorder (and not diagnosed with autism) showed nonlanguage impairment similar to that found in autism. In Hagberg et al. (2010), the authors concluded that school-aged children who present with ASD and AD/HD have similar neuropsychological and early language development profiles. Their study found that those children who presented with a suspicion of early preschool language delay were often diagnosed with an ASD or AD/HD when school aged.

Given these findings, it is not surprising that language disorders are often confused with an ASD because communication dysfunction can lead to social impairment, which increases the likelihood that such deficits could be mistaken for an ASD (Tager-Flusberg, Paul, & Lord, 2005). However, the pattern and course of these symptoms can be distinguished from ASDs. Bishop and Norbury (2002) indicated that language disorders are best reserved for those individuals whose primary impairment is in the acquisition of language

or the use of pragmatic language; however, no diagnostic label is provided in the DSM-IV-TR for a pragmatic language disorder.

Intellectual Disability

In addition to impaired language abilities, individuals with autism often show deficits in their adaptive and cognitive abilities (Gilham, Carter, Volkmar, & Sparrow, 2000; Stone, Ousley, Hepburn, Hogan, & Brown, 1999). It has been estimated that over 75% of individuals with an ASD function within the range associated with intellectual disability (e.g., mental retardation; APA, 2000); however, more recent studies have suggested that approximately 50% of individuals with autism have average or better intellectual functioning (Mazefsky, Williams, & Minshew, 2008). An evaluation of adaptive functioning is recommended as a best practice in the assessment of autism to assist with diagnostic classification and treatment planning (Perry, Flannigan, Dunn-Geier, & Freeman, 2009).

The Vineland Adaptive Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) have been used over the past 20 years to assess adaptive behavior in individuals with an ASD. The VABS evaluate adaptive functioning in four domains: communication, daily living skills, socialization, and motor skills. A number of studies comparing VABS scores for children with and without autism have shown similar results. One consistent finding is that children with autism show deficits in socialization relative to comparative groups (Perry et al., 2009), a finding that supports the assumption that social difficulties are the core deficit in autism. Several studies have demonstrated that individuals with ASDs demonstrate deficits in communication (Carpentieri & Morgan, 1996; Stone et al., 1999; Tomanik, Pearson, Loveland, Lane, & Shaw, 2007) although Fenton et al. (2003) found equivalent communication skills when compared with daily living and motor skills. Research has consistently demonstrated that children with autism have

deficits in adaptive functioning that extend beyond their cognitive deficits, particularly among children with HFA (Liss et al., 2001).

The substantial overlap of behavioral problems, such as self-injurious behaviors, that can occur between ASDs and mental retardation often complicates arriving at an accurate diagnosis. Deficient cognitive levels can account for less-developed social and communication skills in addition to higher rates of repetitive behaviors (DiLavore, Lord, & Rutter, 1995). An accurate diagnosis differentiating between mental retardation and an ASD is generally made by considering an individual's social and language impairment relative to his or her overall intellectual functioning and determining whether there is a discrepancy between the scores (Towbin, 2005). Restricted and repetitive behaviors are also common symptoms shared among individuals with mental retardation and an ASD; however, restricted interests and resistance to changes in routines are more specific to ASDs than mental retardation (Szmatmari et al., 2006).

Schizophrenia

Autism was originally believed to be childhood-onset schizophrenia, but this distinction was established in the DSM-III (APA, 1987) based on clinical, familial, and follow-up studies. Rapoport, Chavez, Greenstein, Addington, and Gogtay (2009, p. 10) reported that childhood-onset schizophrenia is "onset of psychosis before age 13 years and is a rare and severe form of schizophrenia." Onset is usually after age 7 years, and positive and negative symptoms are prominent. In contrast, a PDD is defined by abnormal behavior and development in the areas of communication, socialization, and stereotypical behaviors within the first 3 years of life. Childhood-onset schizophrenia is considered to have little, if anything, to do with ASDs. However, there is suggestive evidence that children diagnosed with childhood-onset schizophrenia have an early history indicating ASD. Studies have shown that a proportion of individuals with a PDD do present

with hallucinations and/or delusions (Rapoport et al., 2009; Reaven, Hepburn, & Ross, 2008). Furthermore, approximately 25% of individuals with childhood-onset schizophrenia meet lifetime diagnostic criteria for ASD (Sporn et al., 2004). According to the DSM-IV-TR (APA, 2000), PDD and schizophrenia are mutually exclusive and if a person with an ASD also meets the diagnostic criteria for schizophrenia, only the diagnosis of schizophrenia is rendered.

Anxiety Disorders

Increasing attention has been given to the relationship between ASDs, particularly HFA and Asperger's disorder, and anxiety symptoms in light of the social impairments and repetitive, ritualistic behaviors that are a hallmark characteristic of ASDs (Farrugia & Hudson, 2006). Simonoff, Pickles, Charman, Chandler, and Baird (2008) concluded that up to 42% of children with ASD meet diagnostic criteria for an anxiety disorder. Furthermore, White, Oswald, Ollendick, and Scahill (2009) found that up to 84% of children with ASD suffer from some degree of impairing anxiety symptoms, and Gillott, Furniss, and Walter (2001) found that children with HFA showed significantly higher levels of anxiety when compared to typically developing children. This finding is consistent with previous studies examining anxious symptoms in individuals with an ASD to the general population (Bellini, 2004; Farrugia & Hudson, 2006; Green, Gilchrist, Burton, & Cox, 2000; Kim, et al., 2000). Moreover, Tatum (2000) suggested that high trait anxiety is a common feature of individuals across the spectrum of autism. According to Tatum, the most common anxiety symptoms exhibited by individuals with ASDs are social anxiety, panic, and obsessive-compulsive rituals. Much of the literature examining anxiety in children with ASDs has concentrated on symptoms of anxiety as a result of disruptions in routines, the need to preserve sameness, sensory sensitivities, low frustration tolerance, and physiological hyperarousal (Bellini, 2004; Grandin, 1995; Howlin, 1998).

A few studies have examined the association between social interactions and impairments in individuals with ASDs and anxiety (Bellini, 2004; Kuusikko et al., 2008; La Greca & Lopez, 1998). La Greca and Lopez (1998) and Bellini (2004) suggested that social skill deficits may lead to social anxiety in children with ASDs, and Kuusikko and colleagues found that children with HFA reported an increase in social anxiety as they grew older, whereas typically developing children reported a decrease in social anxiety as they grew older. Additionally, they found that adolescents with HFA reported more behavioral avoidance and generalized social anxiety symptoms than did the control group. Furthermore, parents of children with HFA reported significantly more internalizing problems, such as withdrawal, anxiety or depression, and social anxiety symptoms, than did parents of the control group assessed with the CBCL/4-18.

Mood Disorders

Other affective disorders commonly comorbid with ASS are mood disorders and depressive disorders. Depression accompanied by withdrawal symptoms is common among adults with HFA and Asperger's disorder (Ghaziuddin, Ghaziuddin, & Greden, 2002; Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006). In addition, Hurtig et al. (2009) examined multi-informant reports using the CBCL/4-18 and found that parents of adolescents with HFA and Asperger's disorder emphasized withdrawn behaviors and social problems, whereas the adolescents' self-reporting yielded higher rates of anxious/depressed symptoms. Bauminger, Shulman, and Agam (2003) reported that children and adolescents with HFA reported more feelings of both social and emotional loneliness than did typically developing peers. However, ASD can be distinguished from mood disorders based on developmental history, a primary impairment in social reciprocity, and the presence of communication deficits or restricted and repetitive behaviors.

Diagnosis of Autism

The diagnosis of an ASD is based on observation of the individual, direct interaction with the individual, a review of the individual's developmental history through parent or caregiver report, and multi-informant reporting. Criteria for a diagnosis are based on the DSM-IV-TR (APA, 2000). Individuals must demonstrate six of the 12 behaviors, with at least two of the behaviors coming from the area of social interaction, one from communication, and one from restricted and repetitive behaviors, interests, or activities. In addition, at least some of the symptoms must have been present prior to the age of 3 years (Schwartz & Drager, 2008). Increasing evidence has indicated that a diagnosis of autism can be made in the first 2 years of life as a result of increased scientific knowledge about early warning signs and the development of effective screening and diagnostic instruments (Baranek et al., 2005; Bryson, Zwaigenbaum, & Roberts, 2004; Ozonoff et al., 2008; Zwaigenbaum et al., 2005). Nevertheless, the average age for diagnosis in the United States is much later, averaging 3-6 years of age (Moore & Goodson, 2003) and, in some cases, when the child becomes school aged (Howlin, 1998; Mandell et al., 2002; Mandell et al., 2005).

Assessment of Autism

The diagnosis of an ASD ideally would involve an appropriate identification through clinical assessment within a transdisciplinary-approach framework (Klin, Saulnier, Tsatsanis, & Volkmar, 2005). Such a framework requires a cohesive clinical team benefiting from the expertise of different professional domains (psychological, medical, speech and language, and educational). Assessing individuals with an ASD is complex and should be completed by professionals with specialized training and experience with working with individuals in the autism spectrum. Clinical assessment should address several domains—including intellectual; adaptive functioning; neuropsychological functioning; speech, language, and communication;

socioemotional, and behavioral—through a detailed developmental history and direct observation (Klin et al., 2005).

The “gold-standard” diagnostic tools commonly used in the assessment of an ASD are the Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur, & Lord, 2002) and the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, Di Lavore, & Risi, 1999). However, the practical use of the ADI-R and ADOS in the educational setting is questionable, in part because of the extensive training and practice required to successfully administer and score the instruments, the time constraints required to administer and score them, the cost (in terms of materials and staff hours) involved in their administration, and the lack of school professionals’ exposure to these instruments to encourage continued professional dialogue and continued reliability of administration and scoring. Furthermore, the ADOS and ADI-R have not demonstrated usefulness in terms of educational verification of autism, development of educational programming goals, or placement decision making (Shriver, Allen, & Mathews, 1999).

Assessment Within the School Setting

Within the school setting, school psychologists are required to verify a diagnosis of a disability in order to determine a need for special-education services. However, research over the past 10 years has advanced the understanding of ASDs. For example, neuroscientists have been able to identify cognitive strengths and weaknesses in individuals with HFA and Asperger’s disorder (Minshew, Goldstein, & Siegel, 1997). Functional magnetic resonance imaging (fMRI) findings indicate that the synchronization between frontal and posterior regions of the brain is lower in individuals with autism (Just, Chorkassky, Keller, & Minshew, 2004). Furthermore, researchers have identified autism as a genetic and neurological disorder and are continuing to discover the multiple genes and activation of neural pathways associated with ASD (Minshew & Williams, 2007).

These findings have advanced the knowledge base regarding ASD; however, translating research into practice among educators is often a slow process. In the field of school psychology, this difficulty is often encountered in the practice of identifying children with disabilities. For example, it has long been known that the ability-achievement discrepancy model of determining learning disabilities has been refuted by empirical evidence; however, it was not until the latest amendment to the IDEA in 2004 that federal law acknowledged the use of an alternative model (i.e., response to intervention) for learning-disability identification. Since the adoption of autism as a disability category, research has contributed much to the understanding of the cognitive, genetic, and neurological basis of autism; however, the questions are whether educators—in particular, school psychologists—have kept abreast of the current research and, more importantly, whether the practice of assessing and identifying children with ASD in the schools reflects these current research findings and is empirically supported.

To date, the answers to these critical questions appear to be negative. Many school psychologists have not received appropriate training in ASDs during their certification program. As Filipek et al. (1999) suggested, such educational personnel as school psychologists are in need of better methods to identify children with autism and develop intervention services. However, educators and school-based professionals often report feeling incapable of adequately serving the needs of children with autism (Simpson, de Boer-Ott, & Smith-Myles, 2003). Nevertheless, Hoagwood and Johnson (2003) indicated that school psychologists can play a central role in bridging the gap between research and practice pertaining to students with autism through the use of evidence-based practices in schools.

Use of Behavioral Rating Scales

School psychologists typically use parent or teacher interviews as a routine part of their assessment practice (Shriver et al., 1999). Behavioral

rating forms are commonly used to provide direct written report or rating of behaviors characteristic of autism to guide interviews with parents and teachers. The use of behavioral rating scales is beneficial within the school setting for several reasons. They are generally less expensive because they require less professional time and training to learn to administer, permit multiple informants to provide information about a student in different environments over long periods of time, are standardized and give quantifiable information supported by reliability and validity, and provide normative data to judge the severity of problems by comparing an individual to a large sample of others that are representative of the general (and in some case, clinical) population (Merrell, 2008; Sattler, 2002). Disadvantages to behavioral rating scales are that they assess only current functioning and cannot be used alone to make a diagnosis (McConaugh & Ritter, 2008).

Problems with Autism-Specific Behavioral Rating Scales

A particular concern in the school-based evaluation of a child with autism, particularly HFA, is the poor psychometric properties of commonly used behavior scales that purport to aid in the diagnosis of and intervention strategies for autism. These instruments often fail to discriminate among the several subtypes of ASD and fail to have empirical data supporting their use for all subtypes of ASD. This weakness is especially true for identifying HFA. School psychologists working with children with autism use a variety of instruments (e.g., questionnaires, checklists, observational schedules, and standardized interviews) for diagnostic purposes in the evaluation process. However, inherent psychometric problems pertain to the frequently administered rating scales commonly administered in the assessment of an ASD.

For example, although content and criterion validity is acceptable for the Autism Behavior Checklist (ABC; Krug, Arick, & Almond, 1980), several

studies have demonstrated questionable discriminant validity suggesting the proposed cutoff score for autism is too high and may not identify all individuals in the autism spectrum, such as those with PDD-NOS or Asperger's Disorder (Sevin, Matson, Coe, Fee, & Sevin, 1991; Volkmar, Cicchetti, Dykens, Sparrow, Leekman, & Cohen, 1988; Wadden, Bryson, & Rodgers, 1991).

Blair (2003) reported several significant limitations of the Asperger Syndrome Diagnostic Scale (ASDS; Myles-Smith, Bock, & Simpson, 2001) including the failure of the ASDS to confirm the diagnosis of Asperger's syndrome for the small normative sample ($N = 115$), the failure of the test items in addressing the fact that the DSM-IV-TR distinguishes autistic disorder from Asperger's disorder in that individuals with Asperger's disorder do not evidence abnormalities in cognitive or language functioning (APA, 2000), and the nature of the ASDS's dichotomous scoring system which does not provide much qualitative information about the individual because the rater simply rates whether a behavior is observed or not observed, not the degree to which it is observed. Garro (2007) reported inaccuracies in the diagnostic process in the norming sample of the Gilliam Autism Rating Scale-Second Edition (GARS-2; Gilliam, 2006). Specifically, Garro (2007) indicated that Gilliam failed to report information about the specific diagnostic criteria used in the GARS-2 norming sample.

Possible Solution to the Problem

This lack of instrument sensitivity and professional exposure and training may lead to misclassification, misdiagnosis, and failure to give children appropriate educational and related services as specified in federal and state regulations. Therefore, there is a need for valid, brief screening tools in the educational setting for school psychologists to use in determining a need for further comprehensive evaluation for a potential diagnosis of an ASD. Studies examining the use of CBCL and the SRS with

individuals with autism may add such valid screening tools for school psychologists to use in their evaluation of students with autism.

Child Behavior Checklist (CBCL)

The CBCL/6-18 (Achenbach & Rescorla, 2001) is an update of the previous edition of the school-age CBCL (Achenbach, 1991). The primary difference between the CBCL/ 4-18 (older version) and the CBCL/ 6-18 (current version; Achenbach & Rescorla, 2001) is updated normative data and a change in the lower limit of the age range. Whereas the previous version included ages 4 and 5, those ages are now covered by the CBCL/1.5 -5 (Achenbach & Rescorla, 2000). The authors noted that "most children's scores would rank at nearly the same level on the new and 1991 versions" and "if a child's functioning has not changed much between assessments on the 1991 and new versions of a form, the child's syndrome scores should be equivalent to about the same percentile and T-scores on each version" (Achenbach & Rescorla, 2001, pp 166). Although research has been conducted using the CBCL with children with autism, to date, little research has examined the most recent revision of the CBCL, the CBCL/6-18 (2001), on school-aged children with HFA.

The Achenbach System of Empirically Based Assessment (ASEBA; Achenbach & Rescorla, 2001), which includes the Child Behavior Checklist (CBCL), is a syndrome-based scale that includes two parts, one assessing the child's social competence and the other assessing his or her emotional and behavior problems. The CBCL is one of the widely used broad-band behavior-rating scales used in the school and clinical setting (Achenbach & Rescorla, 2001). The CBCL/6-18 contains 118 items that differentiate the individual's behavior into three broad-band dimensions (internalizing problems, externalizing problems, and total problems). The CBCL/6-18 also includes eight syndrome dimensions, including Aggressive Behavior, Anxious/Depressed, Attention Problems, Rule-Breaking Behavior, Social Problems, Somatic Complaints, Thought Problems, and Withdrawn/Depressed.

In the manual for the CBCL, Achenbach and Rescorla (2001) reported that the scales have demonstrated adequate reliability and validity. The standard score for the eight syndrome dimensions are reflected as a T-score with a mean of 50 and a standard deviation of 10. Scores in the range of 40-59 are considered to be in the average range. T-scores from 65 to 69 are considered to be in the “borderline clinical range” because they are high enough to be of concern to warrant further investigation but not so high as to be clearly deviant as those in the clinical range (T-scores ≥ 70). During the assessment, parents or guardians are asked to reflect on the child’s behavior during the previous 6 months and respond to each of the 118 items using a 3-point scale: 0 = *not true*, 1 = *somewhat or sometimes true*, and 2 = *very true or often true* (Achenbach & Rescorla, 2001). Table 2 shows descriptions of the eight subscales measured by the CBCL/6-18 (Achenbach & Rescorla, 2001).

Table 2

Descriptions of CBCL/6-18 Subscales

Subscale	Description
Aggressive Behavior	Includes items that assess physically or verbally aggressive behaviors
Anxious/Depressed	Contains items assessing symptoms of separation anxiety, generalized anxiety, phobias, and depression
Attention Problems	Includes items that assess for symptoms of AD/HD.
Rule Breaking Behavior	Consists of items assessing disobedience at home and school, defiance, and angry moods
Social Problems	Assesses difficulties with social interactions with peers
Somatic Complaints	Includes items that assess for physical ailments such as headaches, nausea, aches and pains, and gastrointestinal symptoms
Thought Problems	Assesses the observance of strange or odd behaviors that are not age appropriate
Withdrawn/Depressed	Assesses for symptoms of social withdrawal

CBCL and autism. The CBCL was originally intended to screen for the possibility of several psychological disorders and the CBCL// 6-18 was not

specifically developed to identify individuals on the autism spectrum. However, several authors have examined the CBCL with individuals with autism (Achenbach & Rescorla, 2001; Bolte et al., 1999; Duarte et al., 2003; Luteijn et al., 2000; Mazefsky et al., 2010; and Noterdaeme et al., 1999).

Bolte et al. (1999) conducted a study on 54 male and 23 female German-speaking children 4-18 years old and identified as having an autistic disorder based on the Autism Diagnostic Interview-Revised (ADI-R), German version. The authors reported that, in 38 of the children with autism, an IQ score could not be obtained from the German versions of the Wechsler Intelligence Scale for Children-Revised (WISC-R) due to "restlessness, withdrawn behavior, and refusal" (p. 94). In these cases, IQ was estimated using parent input from the Vineland Adaptive Behavior Scale (VABS) and a review of school records. The children's overall cognitive abilities (WISC-III and estimated VABS) ranged between 20 and 128 with a mean IQ of 61.3 ($SD = 25.9$).

Bolte et al. (1999) investigated whether a pattern of performance on the eight CBCL scale scores could be found for children with an autism disorder that differed from the German CBCL normative sample ($N = 2,856$) and the German CBCL clinical sample ($N = 1,655$). Using a one-way MANOVA, with sex as a factor and age as well as IQ as covariate predictors for all eight CBCL scales, Bolte et al. found that the autistic group ($N = 77$) had higher Total Problem scores and exhibited striking social, attentional, and thought impairment even in comparison with a mixed clinical sample. The autistic group obtained higher mean scores on the Social Problems, Thought Problems, Attention Problems, and Withdrawn scales compared to the normative and clinical samples. The authors noted that the results of their study reflected symptoms often associated with autism, such as social immaturity, social dependency, and bizarre, impulsive patterns of behaviors. Bolte et

al. (1999) demonstrated the ability of the CBCL to record strong indications of autistic behavior and identify it as clinically relevant.

Duarte et al. (2003) examined the validity of the Brazilian version of the CBCL/ 4-18 (Portuguese language version) and Rescorla's (1988) Autistic/bizarre factor by comparing and contrasting three groups of 4-11-year-old children: 36 children with autism and related conditions, 31 children with other psychiatric conditions (AD/HD [$n = 14$], Conduct/Oppositional Defiant Disorder [$n = 4$], Separation Anxiety/Obsessive-Compulsive Disorder [$n = 3$], and one missing diagnosis), and 34 typically developing children. The diagnosis of autism and the other psychiatric conditions were determined by experienced child psychologists and psychiatrists through clinical evaluations based on the International Statistical Classification of Diseases and Related Health Problems, 10th Revision criteria (ICD-10).

A principal axis factor analysis was conducted by Duarte et al. (2003), initially using 110 items from the CBCL/4-18. The authors omitted eight items because they presented a frequency of occurrence in the sample lower than 5%. Then, logistic regression analysis was used to identify combinations of CBCL scales that could discriminate among the three groups using separate logistical regression models. The analysis proceeded from the most general of the CBCL scores (Total score) to the most specific score (Autistic/bizarre factor). Last, forward stepwise logistic regression analysis was used to identify scales that would result in better predictions in the identification of autism.

Duarte et al. (2003) found that the results of the principal factor analysis were unstable as a result of the small sample size, the large number of items investigated, and the sample composition. The results of the logistic regression analysis indicated that Rescorla's Autistic/bizarre scale and the Thought Problems scale distinguished the autistic group from the

other psychiatric disorders group and the typically developing group. Moreover, Duarte et al. (2003) found that the Thought Problems scale alone perfectly differentiated between the autistic group and the typically developing group with 100% specificity. Their study contributed to the field of autism in that it offered a promising alternative to the systematic identification of autism in settings in which more specific assessment instruments are not available, such as in school districts with limited resources and pediatrician offices.

Noterdaeme et al. (1999) also found parental responses on the CBCL yielded scores in the clinically significant range on the Thought Problems scale for the autistic group ($n = 34$) when compared to sex-and-IQ-matched children with a speech and language disorder ($n = 34$). Furthermore, Noterdaeme et al. (1999) found that, although half of the children with a language impairment obtained elevated scores on the Attention Problems, Social Problems, and Withdrawn scales, two thirds of the autistic group obtained similar results. Additionally, Noterdaeme et al. found that parent responses on the CBCL yielded a score within the clinical range (T score >70) on the Thought Problems scale for 32 out of 34 children with autism in contrast to only one child with a language impairment. The authors concluded that the mean score on the CBCL Thought Problems scale for the autistic group differed from that of the language impaired group. Furthermore, compared to the language impaired group, elevated scores were obtained on the Attention Problems, Social Problems, and Withdrawn scales for the autism group. Their findings supported the need for a further evaluation to determine the presence of a possible autistic disorder in children with similar CBCL pattern elevations.

Furthermore, Luteijn et al. (2000) examined possible differences and similarities between social behavior problems as measured by the CBCL in five groups of Dutch children: children with PDD-NOS ($N = 190$), children with ADHD

($N = 152$), children meeting the criteria for both PDD-NOS and ADHD ($N = 98$), a clinically controlled group consisting of children diagnosed with an anxiety disorder, a depressive disorder, or a somatization disorder ($N = 65$), and a group of typically developing children ($N = 113$). On the CBCL Withdrawn scale, the children in the PDD-NOS group had significantly higher scores in comparison with the PDD-NOS/ADHD group and the ADHD group (in both comparisons, $p < 0.001$). The scores of the ADHD group and the PDD-NOS and ADHD group did not differ significantly ($p = 0.27$). The differences between the PDD-NOS and the PDD-NOS and ADHD groups were not significant ($p = 0.39$) on the CBCL Attention Problems scale. A similar result was found between the PDD-NOS and ADHD groups ($p = 0.24$) although the scores from the PDD-NOS/ADHD group were significantly higher than the ADHD group ($p < 0.01$). On the CBCL Social Problems scale, the children in the PDD-NOS/ADHD group yielded the highest scores but their scores did not differ significantly ($p = 0.11$) from the PDD-NOS group. Both groups had significantly higher Social Problem scale scores than the ADHD group (in both comparisons, $p < 0.001$). No significant differences were found on the Total CBCL scores of the PDD-NOS and the PDD-NOS/ADHD and ADHD groups; however, the PDD-NOS/ADHD group had significantly higher CBCL Total scores than the ADHD group ($p < 0.001$). Analysis of variance showed significant overall differences among the groups on the CBCL Total Problem, Social Problems, and Withdrawn scores. However, the overall differences failed to reach significance for the Attention Problems scale.

Luteijn et al.'s (2000) study showed that children with an autism spectrum disorder (i.e., PDD-NOS) exhibited significantly more withdrawn behavior than the children in the ADHD, PDD-NOS/ADHD, and clinically controlled groups. There were no significant differences between the PDD-NOS and ADHD groups on the Attention Problems scale. However, the scores obtained from the PDD-NOS/ADHD group exceeded those of the ADHD group, and

children in the PDD-NOS and PDD-NOS/ADHD groups had higher scores than children in the ADHD group.

Most recently, Mazefsky et al. (2010) investigated patterns of CBCL/4-18 scores in 108 children with HFA and typically-developing children. Results revealed that the autistic group had significantly higher scores (mean scores greater than two standard deviations) than controls for the Thought Problems, Social Problems, and Attention Problems scales and had scores at least 1.5 standard deviations from the mean for the Withdrawn/Depressed scale of the CBCL/4-18. Additionally, Mazefsky and colleagues' findings revealed that the Thought Problems and Social Problems scales significantly differentiated the autism and control group with a high degree of sensitivity (.97) and specificity (.96).

The findings from the aforementioned studies suggest a consistent profile of scores in individuals with autism using the previous versions of the CBCL. Elevations were found on the CBCL Withdrawn and Social scales (Luteijn, et al., 2000); Thought Problems scale (Duarte, et al., 2003); Thought Problems, Attention Problems, and Withdrawn/Depressed scales (Bolte et al., 2003); and Thought Problems, Attention Problems, Withdrawn/Depressed, and Social Problems scales (Mazefsky et al., 2010; Noterdaeme et al., 1999).

Biederman et al. (2010) evaluated the properties of the CBCL/6-18 in discriminating 8-14-year-old children referred to a specialized program at a university-affiliated hospital focused on the treatment of ASDs from psychiatrically referred children without an ASD. The autism group consisted of children meeting DSM-IV criteria for autistic disorder ($n = 34$), Asperger's disorder ($n = 16$), or PDD-NOS ($n = 15$). The psychiatrically referred group included 62 children meeting diagnostic criteria for disruptive behavior disorder ($n = 47$), anxiety disorder ($n = 45$), or mood disorder ($n = 31$). Children who also met the diagnostic criteria for an ASD

were excluded from the comparison group. Both groups had similar mean IQ scores within the average range; however, the study did not report which instrument was used to measure this variable. The authors first compared the ASD group and the non-ASD group on each individual CBCL/6-18 scale, using linear regression with a significance level of 0.05. Second, step-wise logistic regression (backward selection, $p = 0.20$ for removal) was used to identify CBCL scales as candidates for predicting ASDs using the non-ASD group. A third statistical procedure, the receiver operating characteristic curve, was used to examine the ability of significant predictor to identify ASD participants as opposed to non-ASD participants. This procedure uses each value across the entire range of CBCL scale T scores as the cutoff for defining a case and compares this classification to the "true" diagnosis (in this study, the "true" diagnosis was defined by the authors' clinical interview). Finally, conditional probabilities were used to examine the diagnostic utility of various cutoff points.

The results of Biederman et al. (2010) revealed that the ASD group had significantly higher T-scores in all of the CBCL/6-18 scales compared to the non-ASD group with the exception of the Somatic Complaints ($p = 0.23$) and Delinquent Behavior ($p = 0.14$) scales. Findings from the stepwise logistic regression predicting ASD status from the continuous CBCL/6-18 T-scores identified the Withdrawn ($z = 2.66$, $p = 0.008$), Social Problems ($z = 3.54$, $p < 0.001$), and Thought Problems ($z = 4.36$, $p < 0.001$) scales as the best independent predictors of ASD status. Results from the receiver operating characteristics analysis suggested that the sum of the Withdrawn, Social Problems, and Thought Problems scores yielded an area under the curve of 0.86, suggesting an 86% chance that the aggregate sum of these three scales for a randomly selected ASD child would be greater than the aggregate T score for a randomly selected non-ASD child. Furthermore, the findings indicated that a cutoff score of 195 for the total sum of the Withdrawn, Social

Problems, and Thought Problems scales correctly classified 78% of all participants. Thus, the corresponding sensitivity indicated that 78% of ASD children would receive a positive screen (i.e., autism diagnosis) and that 77% of non-ASD children would receive a negative screen (i.e., no autism diagnosis). Biederman et al. (2010) referred to the sum of the Withdrawn, Social Problems, and Thought Problem T scales as the *"CBCL-ASD profile"* (p. 488) and encouraged replication of their study to further support their findings and the use of the CBCL/6-18 as a useful screening measure for ASDs.

Social Responsiveness Scale

The Social Responsiveness Scale (SRS) is a 65-item rating scale that examines autistic symptoms as quantitative traits across the entire range of severity in which they occur as reported by parents or teachers (Constantino & Gruber, 2005). The SRS was formerly known as the Social Reciprocity Scale prior to its publication by Western Psychological Services (WPS; Constantino & Gruber, 2005). The instrument uses a 4-point Likert scale (*not true, sometimes true, often true, and almost always true*) for each item and requires approximately 20 minutes to complete. The SRS includes items that ascertain social awareness, social cognition, social communication, social motivation, and autistic mannerisms (e.g., stereotypical or repetitive behaviors and preoccupations). The SRS Total Score serves as an index of severity of social deficits in individuals with autism. Higher scores on the SRS indicate greater severity of social impairment (Constantino & Gruber, 2005). The SRS exhibits strong supportive discriminant, concurrent, and structural validity and reliability (Constantino & Gruber, 2005). The test authors suggested that the SRS may be used to clarify diagnostic ambiguities in children between the ages of 4 and 18 years with developmental disorders. The SRS is completed by a parent or teacher knowledgeable about the child's behavior, which is rated on a Likert scale of 1 to 4 for each item on the questionnaire. Items are characteristic of ASDs and include domains of

interpersonal behavior, communication, and repetitive or stereotypic behaviors associated with the disorders. The test includes an SRS profile sheet that contains the 65 test items, a scoring sheet, and tables for converting raw scores to standard scores. Forms are available for parents and teachers, each specifying T-score conversion norms for males and females.

The items on the SRS represent all three criterion domains for autism (social deficits, communication deficits, and restricted or stereotypic behaviors or interests). Factor analytic studies have failed to demonstrate the existence of separable clusters of deficiency for the three criterion domains for autism and appear to attribute to a single underlying continuously distributed variable, characterized by a single index score representing a general impairment in reciprocal social behavior (Constantino & Todd, 2003). Scores on the SRS are represented by a T-score with a mean of 50 and a standard deviation of 10. Because the SRS T-scores were calculated separately for males and females, a given T-score represents similar results for both sexes. Constantino and Gruber (2005) provided guidelines for interpreting yielded T-scores. T-scores of 60 to 75 were characterized as being within the "mild to moderate range" and indicating deficiencies in reciprocal social behavior that are clinically significant and result in mild-to-moderate interferences in everyday social interactions. Individuals who obtain scores within this category are often diagnosed with HFA, PDD-NOS, or Asperger's disorder. T-scores greater than 76 were classified as being within the "severe range" and providing very strong evidence of the presence of a clinically diagnosable PDD. Scores in this range suggest a severe interference in everyday social interactions.

Constantino and Gruber (2005) included several case examples of how the SRS may be applied to a range of diagnostic categories occurring within the spectrum, including (a) the identification of PDDs not otherwise specified, (b) undiagnosed Asperger's disorder, (c) severity of autistic symptoms below

the diagnostic threshold, (d) conflicting scores on the SRS and ADOS, and (e) autism spectrum condition identified by parent or teacher SRS report (Conway, 2007). Table 3 shows definitions of the five treatment subscales (Constantino & Gruber, 2005).

Table 3

Definitions of SRS Treatment Scales

Scale	Definition
Social Awareness	Measures an individual's ability to pick up social cues
Social Cognition	Measures an individual's ability to interpret social cues once they have been picked up
Social Communication	Measures aspects of an individual's expressive social communication skills
Social Motivation	Measures elements of social anxiety, inhibition, and empathetic orientation
Autistic Mannerism	Assesses observed stereotypical behaviors or highly restricted interests

SRS and autism. Several studies have examined the SRS for use with individuals with an ASD. Constantino and Todd (2003) examined the distribution and genetic structure of autistic traits in the general population using the SRS. The sample included 788 pairs of twins aged 7 to 15 years randomly selected from the Missouri Twin Study. The sample consisted of 219 male-male pairs (91 monozygotic and 128 dizygotic), 319 female-female pairs (177 monozygotic and 142 dizygotic), and 250 opposite-sex pairs. One parent of each pair of twins completed the SRS on each child. Structural equation modeling was used to determine path models that mathematically represent the totality of causal influences on the traits of interests. Results indicated that, in the general population, characteristics of social behavior measured by the SRS were found to be common, continuously distributed, moderately to highly heritable, influenced by the same additive genetic factors, and exhibiting no evidence of non-additive genetic factors. Furthermore, the results supported the notion that

the behaviors measured by the SRS represented a specific domain of social development that was distinguishable from other domains of behavioral impairments. The mean SRS score for children with a PDD were more than two standard deviations higher than the mean scores for typically developing children or children with other psychiatric disorders. Second, the SRS scores were unrelated to IQ and strongly correlated with the DSM-IV algorithm scores from the ADI-R.

Furthermore, Constantino et al. (2003) examined the relationship between the SRS and the ADI-R in 61 children admitted to a psychiatric hospital unit. The sample included 40 with an ASD diagnosis and 21 with a non-ASD diagnosis. Pearson's coefficient of correlation was computed for the associations between mother-, father-and teacher-reported SRS scores, ADI-R algorithm scores, and full scale IQs. The results indicated that the SRS was highly correlated with the ADI-R. Coefficients were greater than 0.64 between the SRS scores and all ADI-R scores. Unlike the ADI-R, SRS scores were unrelated to IQ. There was also strong agreement between mothers, fathers, and teachers on the quantitative assessment of autistic deficits using the SRS. Constantino et al. (2004) built on previous research by exploring the factor structure of quantitative measurements of autistic traits in 226 children with and without PDD. The authors employed cluster analysis of data from the ADI-R and principal components factor analysis of data from the SRS. The results were consistent with Constantino's and Davis' (2003) study demonstrating the existence of a singular, continuously distributed underlying factor manifested by disparate phenotypic characteristics across social deficits, communication deficits, and repetitive or stereotypic behaviors.

In addition, Pine, Luby, Abbacchi, and Constantino (2006) examined the SRS on 73 preschool children with an ASD ($n = 51$) and without an ASD ($n = 22$). The authors wanted to determine whether quantitative indices of

autistic symptomology measured by the SRS in preschool children were related to other established measures of autism symptoms. The authors found strong correlations between the SRS Total score and scores for social impairment on the ADI-R ($r = 0.634$, $p = 0.002$) and on overall adaptive behavior functioning as measured by the Adaptive Behavior Composite on the Vineland Adaptive Behavior Scales (VABS; $r = -0.862$, $p = 0.001$). The authors concluded that it is possible to obtain brief and reliable quantitative measurements of autistic social impairment in preschool children using the SRS. This finding is noteworthy because it may be useful for early identification of subthreshold autistic syndromes and for measuring subtle effects of early intervention over time.

Moreover, the precision in ascertaining and quantifying autistic symptomology through teacher report was examined in a 2007 study by Constantino et al. Their sample included 577 students with ($n = 406$) and without ($n = 171$) a PDD. The SRS was completed by one parent and one teacher. Additionally, the ADI-R and ADOS were administered to determine a diagnosis of a PDD. The authors observed strong correlations between parent- and teacher-report SRS Total scores ($r = 0.72$). In addition, correlations between parent- and teacher-report SRS treatment subscales ranged from .57 to .68 and were all significant at the $p = 0.0001$ level. Moderate to strong correlations were exhibited for the SRS Total score with the ADI-R Social Interaction score and the ADOS Social Interaction score. Furthermore, the results of the study showed that, when teacher and parent SRS assessments were used to characterize a student, the condition of elevated scores by both reports was associated with a high degree of diagnostic accuracy. The results from a receiver operating characteristic curve analysis revealed that, when both a parent and a teacher rated a student as having a T score of 60 or greater, the likelihood of a clinically identified diagnosis of PDD is

96.8% compared to 84% specificity for parent-report alone and 90% specificity for teacher-report alone.

The notion that autistic social impairment (ASI) is continuously distributed in nature and that subtle autistic-like social impairments aggregate in family members of children with PDDs was examined by Constantino et al. (2009) in a study of 95 male-male twin pairs with and without a PDD. Constantino et al. (2009) administered the SRS at two time points, spaced at one year apart for the PDD group and 5 years apart for the general twin group. Analyzing raw SRS scores, the results of the study demonstrated a high degree of preservation of inter-individual differences in ASI over time, but also subtle improvements in behaviors over the course of the study for the two groups. This finding suggested that the level of stability in inter-individual difference over time indicates that quantitative measurements of ASI can serve as reliable markers of symptomology, which might relate to neurobiological and genetic determinants of autism (Constantino & Todd, 2009).

CBCL and SRS

One study examined the relationship between the CBCL/4-18 and the SRS with 219 pairs of male twins (Constantino et al., 2003). In their study, Constantino et al. found that variability in CBCL scores accounted for 43-52% of the variance in SRS scores, with most of the variability coming from the CBCL Attention Problems and Social Problems scales. Approximately 50% of the variance in SRS scores was independent of what is measured by the CBCL. Further investigation using bivariate analysis involving SRS scores and Attention Problems scores and SRS scores and Social Problems scores confirmed the presence of both shared and specific causal influences on SRS scores. The results indicated that the SRS scores likely influence the CBCL Attention Problems scores and that CBCL Social Problems scores likely influence SRS Scores (Constantino, et al, 2003).

Summary

This chapter provided an overview of ASDs, their comorbidity with other psychological disorders, and the similarities and differences between the clinical and educational classification systems for ASDs. This overview highlighted the difficulty in differentiating an ASD from other common childhood disorders, especially in the case of HFA or Asperger's disorder. A review of the literature addressing diagnosis and assessment was discussed along with the frequent problems faced by school psychologists in these areas. Specifically, this chapter highlighted the inherent psychometric concerns with commonly used behavioral rating scales used in the assessment of ASDs. The results of research into these problems support the need for a brief yet accurate screening instrument to aid school psychologists in recognizing a need for a more comprehensive assessment and evaluation of a child with an ASD, particularly for children with HFA. The research reviewed in the current chapter provides further evidence of the usefulness of the CBCL/6-18 as a potentially accurate, non-time-intensive tool in this necessary process.

CHAPTER III

METHODS

The current study examined the relationship between the Child Behavior Checklist/ 6-18 (CBCL/6-18) and the Social Responsiveness Scale (SRS) using 54 male children with high functioning autism (HFA). The study used archival data from an ongoing University of Pittsburgh research study funded by the National Institute of Child Health and Development (NICHD) and conducted by Nancy Minshew, M.D. The CBCL/6-18 and the SRS Parent Forms were administered to determine the levels of participants' behavior functioning and were completed by the participants' parents (usually mothers) between the years 2008-2009. The Autism Diagnostic Observation Schedule-Generic (ADOS-G; Lord et al., 2000) and the Autism Diagnostic Interview-Revised (ADI-R; Rutter, LeCouter, & Lord, 2003) were administered to determine eligibility as a participant with autism and were administered between the years 2004-2009 and 1998-2009, respectively. The Wechsler Abbreviated Intelligence Scale (WASI) was administered between the years 2006-2009 to determine participants' levels of cognitive functioning and whether they met the eligibility criteria of having overall intelligence, as measured by the Full Scale IQ (FSIQ) no lower than the below average range (FSIQ > 70).

Design

This study used a correlational design to observe whether a relationship exists between the CBCL/6-18 and the SRS. Pearson's correlations were used to examine the relationship between the obtained scores from the CBCL/6-18 and the SRS for all participants. Figure 5 provides a visual representation of the current study.

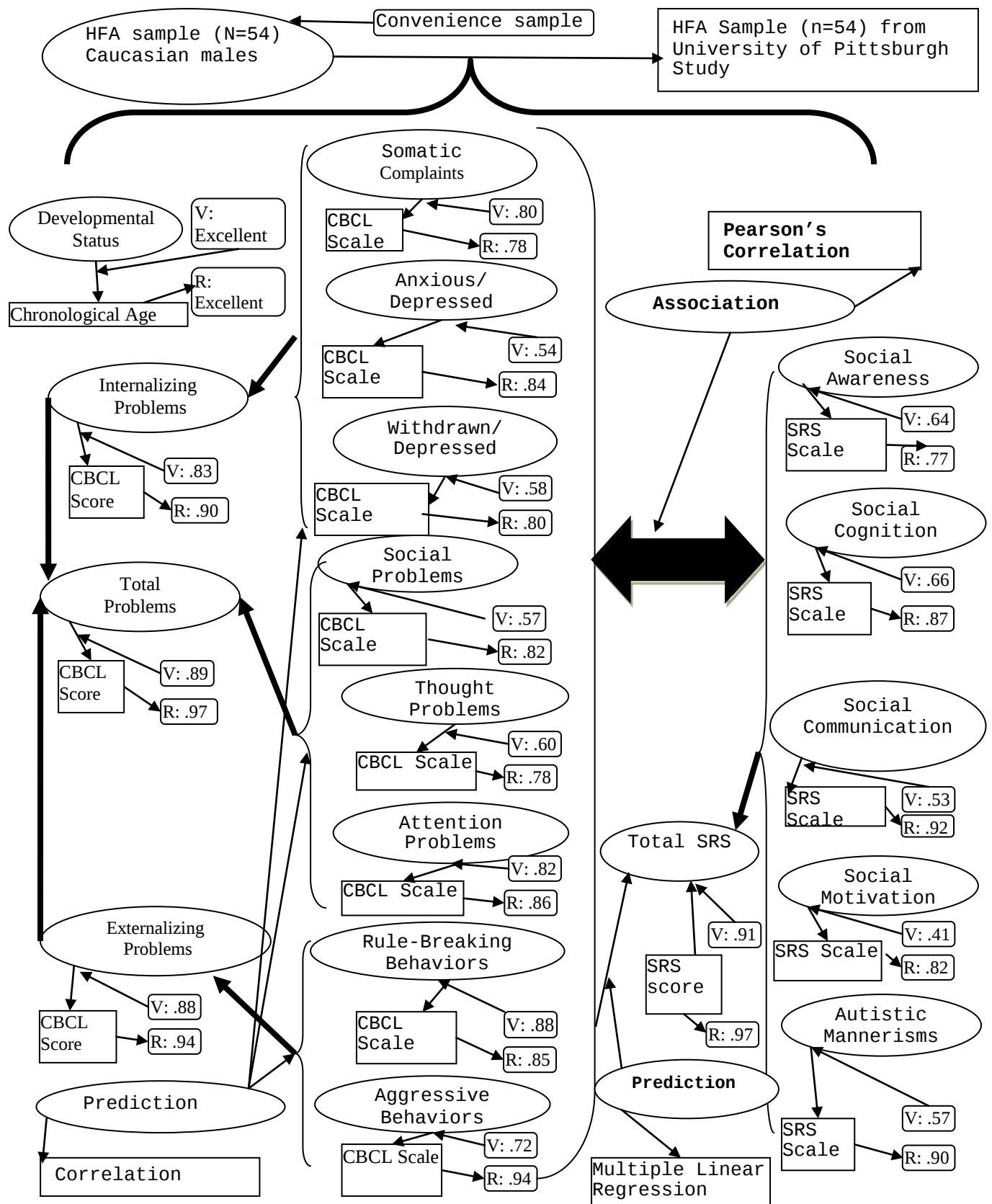


Figure 5. Path diagram of the current study.

Population

The population of interest included school-aged Caucasian male children with HFA. This age group was chosen because of the need for appropriately sensitive and specific screening and diagnostic instruments for school-aged children with autism. Several studies have found an overwhelming majority of children with an autism spectrum disorder (ASD) are first identified by the school system as opposed to the healthcare system (Glascoe, 2000; Palfrey et al., 1987; Yeargin-Allsopp et al., 2003).

Sample

Fifty-four Caucasian males 6-18 years of age with HFA participated in this study. The rates of autism are 4-5 times higher in males than females (APA, 2000).

Assignment

The data analyzed in this study were archival data routinely collected as part of a larger research study from the University of Pittsburgh's IRB-approved neuropsychological testing battery. Participants were identified by an identification number assigned to them by a staff member. The names of the participants were kept confidential and were not provided to the author. The data were collected by transferring scores from the test protocols to a Data Summary Sheet (DSS) by a staff member at the Program. The information on the DSS was entered into a data library by the data manager, and the accuracy of the data entered was verified by reliability check from another trained staffer. Test protocols and DSSs were kept in participants' binders, which were stored in a locked cabinet. The data library was accessed only by employees of the research program and was double-password protected.

Measurement

Parents of the participants in the study completed the CBCL/6-18 (Achenbach, 2001) and the SRS (Constantino & Gruber, 2005). Participants

with autism were administered the ADOS-G (Lord et al., 2000), the ADI-R (Rutter, 2003), and the WASI (Wechsler, 1997).

The author obtained permission from Dr. Minshew to use the archival data (Appendix A). The requested data were sent to the author in Microsoft Excel format via e-mail from the Senior Project Manager of the research program. Descriptive statistics were used to examine the profile of CBCL/6-18 and SRS scores from the sample. In addition, an examination of the relationship between the CBCL/6-18 and the SRS was conducted using Pearson's correlation between the CBCL/6-18 scales and the SRS treatment scales. Statistical analyses were calculated using the software Statistical Package for the Social Sciences (SPSS), Version 19.

Instruments

The Child Behavior Checklist 6/18 (CBCL/6-18)

The CBCL/6-18 (Achenbach, 2001) is a standardized questionnaire for parents to report the frequency and intensity of behavioral and emotional problems in their children over the previous 6 months. The CBCL/6-18 was completed by parents (usually the mother) of participants in the NICHD-supported study while the ADOS and the ADI-R were being conducted. The CBCL/6-18 includes 113 behavior problem items rated on a 3-point scale. A Total score is calculated in addition to eight problem scales (Withdrawn, Somatic Complaints, Anxious/ Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior) and two broad-band factors (Internalizing and Externalizing Behavior).

Reliability of the CBCL/ 6-18. *Reliability* refers to the agreement between repeated assessments of phenomena when the phenomena themselves are expected to remain constant. Achenbach and Rescorla (2001) reported two kinds of reliability, internal consistency, test-retest reliability, cross-informant agreement, and stability. Internal consistency refers to the correlation between half of a scale's items and the other half of its items.

For the syndrome scales and overall problem behavior scales (Internalizing, Externalizing, and Total Problems), Cronbach's alphas ranged from .78 to .97. which are acceptable ranges when examining the usefulness of rating scales. Table 4 displays Cronbach's alphas for each scale.

To assess for reliability in both the rank ordering and magnitude of scale scores, Pearson r correlations and t tests of differences were calculated between CBCL ratings of both referred and non-referred children at mean intervals of 8 to 16 days (Achenbach & Rescorla, 2001). There were significant ($p < .05$) declines in scores on the Withdrawn/Depressed and Total Problems scales; however, the declines in scores were small, accounting for a mean of $< 3\%$ of the variance in scores. Cohen (1988), who defined small effect sizes in t tests as ranging from 1% to 5.9% of the variance, indicated that effects of this magnitude are small. Table 4 displays the Cronbach's alpha and the test-retest reliabilities for the CBCL scale scores (Achenbach & Rescorla, 2001).

Table 4

Cronbach's Alpha Coefficients and Test-Retest Reliabilities (r) for CBCL/6-18 Scales

Scale	Cronbach's alpha	Test-retest
Anxious/Depressed	.84	.82
Withdrawn/Depressed	.80	.89
Somatic Complaints	.78	.92
Social Problems	.82	.90
Thought Problems	.78	.86
Attention Problems	.86	.92
Rule-Breaking Behavior	.85	.91
Aggressive Behavior	.94	.90
Internalizing Problems	.90	.91
Externalizing Problems	.94	.92
Total Problems	.97	.94
Mean r		.90

Adapted from Manual for the ASEBA School-Age Forms & Profiles, by Achenbach and Rescorla, 2001, p. 101.

Cross-informant agreement. Cross-informant agreement was determined by comparing the CBCLs completed by mothers and fathers of referred children, the teacher reports (Teacher Report Form; TRF), and children's self-reports (Youth Self Report; YSR). All cross-informant correlations (Pearson's r) were significant at $p < .05$. The mean r s between parents were .76 and between teachers were .60. For the combination of CBCL x YSR, the CBCL x TRF, and the YSR and TRF ratings, the mean r s ranged from .16 to .56. All cross-informant correlations are shown in Table 5 (Achenbach & Rescorla, 2001).

Table 5

Cross-Informant Agreement on CBCL/ 6-18 Scales

Scale	CBCL	TRF	CBCL X YSR	CBCL X TRF
$N =$	297	88	1038	1126
Anxious/Depressed	.68	.59	.45	.19
Withdrawn/Depressed	.69	.57	.40	.24
Somatic Complaints	.65	.28	.40	.15
Social Problems	.77	.59	.49	.31
Thought Problems	.75	.59	.37	.18
Attention Problems	.73	.61	.48	.44
Rule-Breaking Behavior	.85	.69	.55	.38
Aggressive Behavior	.82	.69	.52	.33
Internalizing Problems	.72	.58	.48	.21
Externalizing Problems	.85	.69	.56	.36
Total Problems	.80	.55	.54	.35
Mean r	.76	.60	.48	.29

Note. Adapted from Manual for the ASEBA School-Age Forms and Profiles, by Achenbach and Rescorla, 2001, p. 104. All Pearson r s were significant at $p < .05$, except the YSR X TRF ratings on the Somatic Complaints Syndrome.

Stability. The stability of scale scores was computed using Pearson correlations (r). The CBCL protocols were completed over 12- and 24-month intervals by mothers of 7- through 9-year-olds in a longitudinal study that included low and normal birth-weight children. The Pearson r s were significant and none of the scale scores changed significantly over the 12-

or 24-month intervals. Pearson correlations (r) for the stabilities of the scale scores are shown in Table 6 (Achenbach & Rescorla, 2001).

Table 6

Stabilities of CBCL/ 6-18 Scores

Scale	CBCL 12 months	CBCL 24 months
Anxious/Depressed	.68	.56
Withdrawn/Depressed	.71	.73
Somatic Complaints	.64	.50
Social Problems	.69	.73
Thought Problems	.72	.61
Attention Problems	.70	.60
Rule-Breaking Behavior	.67	.71
Aggressive Behavior	.82	.81
Internalizing Problems	.80	.70
Externalizing Problems	.82	.82
Total Problems	.81	.80
Mean r	.74	.70

Note. Adapted from Manual for the ASEBA School-Age Forms and Profiles, by Achenbach and Rescorla, 2001, p. 105.

Validity of CBCL/6-18. The concept of validity pertains to the accuracy with which a procedure measures what it is supposed to measure. Content validity addresses whether a measure's content includes what it is intended to measure. A test's construct validity is the degree to which the test measures the theoretical construct or trait that it was designed to measure (Allen & Yen, 1979). Criterion-related validity is used when test scores can be related to a criterion to determine the degree to which one set of measurements correlate to another measurement.

Content validity. The evidence for content validity for the CBCL/6-18 is extensive, with analysis of the item and scale scores well documented and based on extensive literature reviews, consultation with mental health professionals and educators, and pilot testing with parents and other caregivers (Achenbach, 1991; Flanagan, 2005). In the development of the

current version of the CBCL, the authors omitted two problem items that had failed to discriminate significantly between referred and non-referred children (i.e., allergy and asthma). All of the new problem items were scored significantly higher ($p < .01$) for the referred group than the non-referred group (Achenbach & Rescorla, 2001).

Criterion-related validity. Evidence of criterion-related validity of the CBCL/6-18, YSR, and TRF is based on multiple regression analyses and indicates that 2-33% of the variance on individual scales is accounted for by referral status. Additional evidence is based on classification accuracy by referral status, using discriminant analysis procedures (79-85%; Achenbach & Rescorla, 2001; Flanagan, 2005). The CBCL manual (Achenbach and Rescorla, 2001) provided information to assist practitioners in interpreting the data for youth who are not clearly in the clinical range but may be exhibiting behavior or affect of concern; this is of considerable importance to school psychologists.

Construct validity. Construct validity was evaluated on the basis of correlations with similar instruments, in particular the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 1992), the Conners' Rating Scales-Revised CRS-R; Conners, 1997), and the DSM-IV Checklist (Hudziak, 1998). Correlations with the Conners' Rating Scales and the DSM-IV Checklist are moderate; correlations with the BASC are more substantial (Flanagan, 2005).

Social Responsiveness Scale (SRS)

The SRS is a 65-item rating scale that measures the severity of autism spectrum symptoms as they occur in the natural setting. It provides a clear picture of an individual's social impairments by assessing social awareness, social communication, social information processing, and autistic preoccupations and traits. Items are rated on a scale from 0 (*not true*) to 3 (*almost true*) on the basis of the frequency of their occurrences. Higher

scores on the SRS indicate a higher degree of social impairments. The SRS can be used to assess children from 4 through 18 years of age. It may be completed by a parent, teacher, or another individual who is familiar with the child's current behavior and developmental history. The SRS is typically completed in about 15 minutes.

Reliability of the SRS. The manual described investigations of three types of reliability. These included a study of internal consistency of SRS scores, a construct temporal stability investigation, and an examination of interrater agreement. Internal consistency was expressed in terms of Cronbach's alpha and documents how closely the items cohere by focusing on a single construct as shown in Table 7 (Constantino & Gruber, 2005). The internal consistency study estimated split-half reliability using ratings completed by more than 1,000 parents and 500 teachers. The alpha coefficients from this study were .93 and .94 from the parent ratings and .97 and .96 from the teacher ratings. A third data set from a clinical sample of 281 child psychiatric patients with and without autism spectrum conditions yielded a coefficient of .97. These data provide strong evidence to support the split-half reliability of SRS total scores. Table 8 illustrates the alpha coefficients for the SRS subscales, which ranged from .77 to .92, with a median coefficient of .87 (Constantino & Gruber, 2005). These lower subscale values suggest the need for caution when interpreting subscale scores (Venn, 2007).

Table 7

Internal Consistency for SRS Total Scores in Varied Study Groups

Group	Cronbach's alpha
Normative Parent Ratings	
Males	.94
Females	.93
Normative Teacher Rating	
Males	.97
Females	.96
Clinical Ratings	
All	.97

Note. Adapted from The Social Responsiveness Scale Manual, by Constantino and Gruber, 2005, p. 31.

Table 8

Internal Consistency for SRS Treatment Subscales

Subscale	Cronbach's alpha
Social Awareness	.77
Social Cognition	.87
Social Communication	.92
Social Motivation	.82
Autistic Mannerisms	.90

Note. Adapted from Social Responsiveness Scale Manual, by Constantino and Gruber, 2005, p. 39.

Construct temporal stability. The construct temporal stability was estimated using a sample of 379 children and the results displayed in Table 9 (Constantino & Gruber, 2005). To estimate the construct temporal stability of SRS scores, raters were given the SRS twice with an average delay of 17 months between the first and second administrations (Venn, 2007).

Table 9

Test-Retest Reliabilities for Parent Report SRS Scores

Group	N	Test-retest	Total T-score	
			SD	SEM
Males	102	.85	11.6	4.5
Females	277	.77	9.2	4.4

Adapted from the Social Responsiveness Scale Manual, by Constantino and Gruber, 2005, p. 32.

Interrater agreement. The interrater agreement of SRS scores was considered during SRS development. The study included 62 children and involved having both parents of the children and the children's teachers complete the SRS. The results of the analysis (Table 10; Constantino & Gruber, 2005) yielded correlation coefficients of .91 between mothers and fathers, .82 between mothers and teachers, and .75 between fathers and teachers (Venn, 2007).

Table 10

Interrater Agreement for the SRS (N = 62)

Comparison	Test-retest	Total T-score	
		SD	SEM
Mother-father	.91	15.3	4.6
Mother-teacher	.82	12.3	5.5
Father-teacher	.75	14.6	7.3

Adapted from Social Responsiveness Scale Manual, by Constantino and Gruber, 2005, p. 33.

Validity of the SRS. The SRS has been studied extensively in varied research designs, contrasting scores in varied clinical diagnostic groups, research on concurrent validity comparing SRS results to those obtained with extensive clinical interviews directed at ASDs, epidemiological twin studies examining prevalence and heritability of autistic traits, and various statistical procedures pertaining to the independence of symptom clusters within the autism spectrum (Constantino & Gruber, 2005).

Concurrent validity. Evidence of the validity of the SRS was provided in a concurrent validity study (Constantino et al., 2003). This clinical research investigation compared the SRS results with the ADI-R results for 61 child psychiatric patients. The correlations between SRS scores and ADI-R algorithm scores for DSM-IV criterion sets were largely in the .70 range, providing initial evidence of the concurrent validity of the SRS as a tool for measuring autistic traits.

Discriminant validity. The authors argued that the SRS demonstrated discriminant validity because the SRS has been found to distinguish children with autism spectrum disorders from children with other psychiatric diagnoses. Constantino, Przybeck, Friesen, and Todd (2000) conducted the initial research that launched the SRS as a rating scale and provided preliminary evidence of the discriminant validity of the instrument. That study involved 158 children who were psychiatric patients with and without autism spectrum conditions and 287 randomly selected children from a metropolitan school district. The children were placed into six groups for the analysis. The groups were 4-to-7-year-old school children, 8-to-14-year-old school children, children with PDD-NOS, autistic children who were verbal, autistic children who were nonverbal, and clinical controls. The distributions of SRS scores among the six groups were essentially smooth and continuous, suggesting a continuous distribution of deficits among the groups.

Structural validation. Structural components of the SRS were also validated in epidemiological twin studies. Deficits in social behavior, verbal communication, and stereotypic repetitive behaviors were found to be consistently present in twins. Treatment subscales were added to the SRS after it had been validated. Specific symptom domains were established and shown to be reliable through internal consistency measures, which ranged from .77 to .92 (Venn, 2007).

Construct validity. Constantino and Gruber (2005) also used data from a number of other studies to establish the effectiveness of the SRS as a measure of the construct of autistic traits. Results from these investigations support the existence of a single continuously distributed underlying factor that explains most of the variance in SRS scores. The developers used this finding to conclude that the SRS is an effective measure of overall autistic traits in children. In contrast to the conclusion about the construct validity of the SRS total scores, the treatment subscale scores may not clearly measure separate dimensions of autistic behavior. In fact, the SRS treatment subscales, which were added to the instrument after the total score was developed and validated, are highly correlated with each other. Thus, the authors suggested that clinicians should exercise much caution when conducting subscale score analysis.

Autism Diagnostic Observation Schedule-Generic (ADOS-G)

The ADOS-G Modules 3 or 4 (Lord et al., 2000) were used to determine the classification of autism. Module selection was determined by participants' current ages and clinical impression of expressive and receptive language skills. The ADOS is a semi-structured assessment consisting of various activities that allow an examiner to observe social and communication behaviors related to the diagnosis of PDDs. The ADOS-G provides standardized information concerning the diagnosis of autism in the areas of reciprocal social interactions, social communication, play or imagination and creativity, and stereotyped behaviors and restricted interests. It can be completed in approximately 30 to 45 minutes.

A rater scores observed behaviors based on the quantity and quality of specific behaviors produced during an interview. Scores are coded on an algorithm from 0 (*no abnormality*) to 3 (*severe abnormality*). Scores of 3 are converted to 2 in the algorithm for diagnostic cutoff criteria. The ADOS provides cutoff scores based on an algorithm for autism and autism spectrum.

Diagnostic classification is based on cutoff total scores for two domains—communication and social interaction—and the combined Communication and Social Interaction scores. The manual stated that the cutoff scores were provided because PDD is a spectrum disorder and the severity of the communication and social deficits seen in the subtypes of PDD have been empirically documented to be more prominent in autism as compared to Asperger's syndrome or PDD-NOS (Lord et al., 1999).

Reliability of the ADOS-G. Mean agreements for each of the modules in the ADOS were high, ranging from 88.2% (Module 3) to 91.5% (Module 1), and provided evidence of interrater reliability. Interrater item reliability coefficients were also strong for Social Interaction (range = .92-.93), Communication (range = .80 to .84), and Social Interaction and Communication Total (range = .90 to .92). Interrater item correlation was adequate for Stereotyped Behaviors and Restricted Interests (range = .72 to .86; Lord et al., 2001). Lord et al. (1999) provided supporting evidence for stability reliability in the test-retest administration of the ADOS to 27 participants with stable diagnoses of PDD-NOS over an average of 9 months. Correlation coefficients were adequate, ranging from .59 (Stereotyped Behaviors and Restricted Interests) to .82 (Social Interaction and Communication Total). Total scores for the communications and social interaction domains decreased slightly from the initial administration while scores for the stereotyped behaviors and restricted interests domain increased slightly but not to a significant degree. Three children had their diagnoses changed from autism to autism spectrum and three from autism spectrum to autism (Lord et al., 1999).

Validity of the ADOS-G. The validity of the items was examined by exploratory factor analysis, which showed that almost all items on the social interaction and communication domain loaded highly on the factor, accounting for 52-53% variance in Modules 3 and 4 and 72-78% in Modules 1 and 2. Items

on the stereotyped behaviors and restricted interests domain loaded on separate factors that varied across modules; therefore, Lord et al. (1999) did not include this domain as part of the algorithm. Furthermore, fixed effect analysis of variance (ANOVA) was performed comparing the items for the autism sample and a non-autism sample as well as an autism, PDD-NOS, and non-spectrum sample. Items that did not reach correlation coefficients greater than .70 were dropped. Additionally, results from this study indicated that the mean scores for the autism sample were significantly higher than for the PDD-NOS and non-spectrum sample (Lord et al., 1999).

Autism Diagnostic Interview-Revised (ADI-R)

The ADI-R (Rutter, et al., 2003) is an extended interview designed to elicit a full range of information needed to produce a diagnosis of a PDD. It consists of 93 items composing three functional domains: communication; reciprocal social interaction; and restricted, repetitive, and stereotyped behaviors and interests. For this assessment, the examiner poses questions in a semi-structured interview situation. The questions address the child's background and early development, particularly in the three functional domains. The ADI-R is administered to the parent or caretaker of the child who has extensive knowledge of the child's development during the first 5 years of life. The in-depth developmental history interview takes approximately 2½ hours to administer. Scores are obtained and coded on an algorithm that provides established cutoff scores for autism.

Reliability of the ADI-R. Rutter, Le Couteur, and Lord (2002) cited three studies providing supportive evidence of interrater reliability. Lord, Rutter, and Le Couteur (1994) found interrater correlation coefficients greater than .70 for 26 of the 35 items and none had correlations less than .60. Furthermore, Poustka, Lisch, and Ruhl (1996) found interrater reliability coefficients greater than .70 for 27 of the 36 items and coefficients less than .60 for six items. More recently, Chakrabarti and

Fombonne (2001) found interrater reliability for the domains to have correlations in the range of .59 to .87 with a total correlation of .86. Test- retest reliability has been evidenced by two studies. Lord's (1993) study in which two independent raters coded 20 interviews 2-5 months apart showed correlation coefficients in the range of .93 to .97. Hill, Bolte, and Petrova (2001) found correlations in the range of .82 to .97 with 55 interviews.

Validity of the ADI-R. The items of the ADI-R are derived from the theoretical perspective of autism from the DSM-III and DSM-IV, as well as the ICD-10. Therefore, content validity is established. Discriminant validity has been supported by three studies. Lord et al. (1994) compared the ADI-R scores of 25 children with autism to those of an equal number of children with language impairment or mental retardation. The results indicated that all but one of the autism group met ADI-R criteria of an ASD and only two from the clinical control group met the criteria. In addition, Cox, Klein, and Charman (1999) compared 42-month-old children with autism and those with language disorders and found that seven out of eight of the children with autism met the ADI-R criteria of autism. There were no false positives from the language disordered group. Finally, Gilchrist et al. (2001) compared ADI-R scores for three groups: HFA, Asperger's syndrome, and conduct disorder. Results demonstrated that overall ADI-R algorithm scores for the autism group were significantly higher than those for the Asperger's group and the conduct disorder group. Similarly, the Asperger's group overall ADI-R scores were significantly higher than the conduct disorder group.

Wechsler Abbreviated Scale of Intelligence (WASI)

The WASI (Wechsler, 1999) is an individually administered intelligence test given to individuals from the ages of 6 to 89 years. The WASI consists of four subtests: Vocabulary, Block Design, Similarities, and Matrix Reasoning. It yields a Verbal IQ (VIQ), which is comprised of results

of the Vocabulary and Similarities subtests, and a Performance IQ (PIQ), which is comprised of results of the Block Design and the Matrix Reasoning subtests. A Full Scale IQ (FSIQ) provides an overall general estimate of intellectual functioning. Subtest raw scores are converted to T scores with a mean of 50 and a standard deviation of 10. The FSIQ score is represented as a standard score with a mean of 100 and a standard deviation of 15. The manual reported that the WASI correlates highly with other measures of intellectual functioning, including the Wechsler Adult Intelligence Scale-3rd Edition (WAIS-III), the Wechsler Intelligence Scale for Children-3rd Edition (WISC-III), and the Kaufman Brief Intelligence Test (K-BIT). The WASI was standardized on a national sample of 2,245 children and adults aged 6 through 89.

Reliability of the WASI. The manual provided data for both internal consistency and test-retest reliability. For the child sample, which consisted of 1,100 children, the split-half reliability coefficients (corrected using the Spearman-Brown formula) ranged from .81 to .96 at the subtest level and from .92 to .97 at the IQ score level. For adults, these values ranged from .84 to .98 for subtest scores and from .92 to .98 for the IQ score. Data for test-retest reliability were based on 222 participants with a testing interval of 2 to 12 weeks and a mean retest interval of 31 days. The test-retest reliabilities ranged from .73 to .86 at the subtest level and from .85 to .93 for the IQ score level for the child sample. For the adult sample, the test-retest values ranged from .79 to .90 for subtest scores and .87 to .92 for the IQ scores (Wechsler, 1999).

Validity of the WASI. WASI construct validity was demonstrated by confirmatory and exploratory factor analyses. Two joint factor analyses were conducted with the WISC-III and the WAIS-III. The results supported a factor pattern separating the verbal from the nonverbal subtests. These results provided support of the construct validity of the WASI, in addition to

providing some general support for a 4-factor solution for the Wechsler full batteries (Wechsler, 1999). Content validity was demonstrated by correlation of the WASI scores with scores from the WISC-III and WAIS-III. Based on a nonclinical sample of 176 children, correlations between the WASI and the WISC-III ranged from .69 to .74 for subtest scores and from .76 to .87 for IQ scores. Similarly, for a sample of 248 adults, correlations between the WASI and the WAIS-III ranged from .66 to .88 for subtest scores and from .84 to .92 for IQ scores (Wechsler, 1999). Evidence of clinical validity was based on data collected from various populations, including individuals with mental retardation, Down's syndrome, AD/HD, reading disability, math disability, gifted students, and traumatic brain injury. Wechsler (1999) presented evidence that the WASI provides accurate score estimates for previously identified clinical groups.

Procedures

Archival data used in this current study were part of a larger research study conducted by the Center for Excellence in Autism Research (CeFAR) Program at the University of Pittsburgh between the years 2004-2009 which included an extensive neuropsychological battery as well as brain imaging (fMRI) studies. Individuals with autism were identified either through referrals from pediatricians, psychologists, or parents of children with autism or were self-referred to the CeFAR Program at the University of Pittsburgh. Parents of individuals with autism contacted the Program to obtain a release form. Then, the potential participant's name, address, and phone number were obtained in order to mail the release form. Once the release form was returned, one of the Bachelor's level study staff who was well-trained, contacted the potential participant to conduct a phone screen interview. If the participant was 17 years or younger, the interview was conducted exclusively with a parent.

The interview consisted of a series of questions relating to current demographic data, such as name of participant, date of birth, sex, address, phone number, years of education, height, and weight. A series of questions were asked to obtain a detailed history of developmental milestones. Additionally, a series of questions pertaining to current and past medical and psychological history were asked. After completing the interview, the staff person reviewed the information. If the potential participant appeared eligible, the individual was invited to the office to participate in the second step of the eligibility process. This step involved the administration of the ADOS-G and ADI-R. The individual was found eligible for the study only if he or she met the criteria for autism and or autism spectrum on both the ADOS-G and the ADI-R. Furthermore, a participant could not have a neurological disorder, brain injury, mental retardation, Fragile X syndrome, or stroke. The potential participant was then invited to participate in the study and given a thorough explanation of the study. Consent forms were provided and reviewed with the participants and their parents. The participants were informed verbally and in writing that their participation was voluntary and that they could terminate their participation at any time. Participants were compensated for their time. The amount of the compensation depended on the number of tasks completed. Table 11 illustrates a timeline of the various tasks involved throughout the current study.

Table 11

Examination of the CBCL/6-18 and SRS Task Table

Task	Description	Begin	End	Person(s)
1. Project idea	Based on a review of autism-specific rating scales, examine current trends in autism assessment practices.	Jun 06	Aug 06	R. Glosser
2. Refine idea	Present idea to N. Minshew, obtain permission to consult with C. Mazefsky, review literature, present idea to G. Rattan	June 08	Sep 08	R. Glosser N. Minshew C. Mazefsky G. Rattan
3. Conduct literature review	Review CBCL/6-18 and SRS studies conducted with autistic population	Oct 08	Dec 09	R. Glosser
4. Present study summary	Write and revise study summary	Oct 09	Nov 09	R. Glosser G. Rattan
5. Form dissertation committee	Invite professionals	Dec 09	Dec 09	R. Glosser G. Rattan C. Mazefsky W. Barker T. Runge
6. Department IRB approval	Revise study summary and submit for Department IRB approval	Jan 10	Apr 10	R. Glosser
7. IUP IRB approval	Make recommended changes for IUP IRB approval	Apr 10	May 10	R. Glosser G. Rattan
8. Compose Chapters 1-3	Write and revise first three chapters of dissertation	July 10	Dec 10	R. Glosser G. Rattan

Table 11 continued

Task	Description	Begin	End	Person(s)
9. Defend Chapters 1-3	Defend first three chapters with Dissertation Committee members	Feb 11	Feb 11	R. Glosser G. Rattan C. Mazefsky W. Barker T. Runge
10. Compose Chapters 4 & 5	Write and revise final two chapters of dissertation	Feb 11	March 28	R. Glosser G. Rattan C. Mazefsky W. Barker T. Runge
11. Final Defense	Prepare to defend entire dissertation study	Apr 12	Apr 12	R. Glosser G. Rattan C. Mazefsky W. Barker T. Runge
12. Submit final version for graduation	Submit approved version to Graduate School for publication	Apr 13	Apr 19	R. Glosser

Sample Size

Responses from the CBCL/6-18 and the SRS for 54 male school-aged children with HFA were examined for this current correlational study. An a priori power analysis was conducted to establish the minimum number of participants needed to achieve adequate power. Power represents the probability that existing effects have a chance of producing statistical significance through data analysis (Tabachnick & Fidell, 2007). Stevens (2002) suggested that power ≥ 0.80 is considered adequate for multivariate analyses with a medium effect size of 0.50. The decision to use a medium effect size of 0.50 is based on the conventional interpretation and common practice of using Cohen's d by most social scientists, which suggests that an effect size of 0.50 indicates a moderate to larger difference. G*Power 3.1.2 (Faul, Erdfelder, Lang, & Buchner, 2007) was used to determine the number of participants necessary to achieve adequate power with medium effect sizes. For a bivariate correlation model with an effect size of 0.50, power of 0.80 at $\alpha = 0.05$, a sample size of 29 participants is suggested to achieve an actual power of 0.81. Given the sample size of the archival data, adequate power was expected for the current study.

Statistical Analyses

The means, standard deviations, medians, and ranges were calculated to provide informal descriptive analysis for each CBCL/6-18 and SRS scale. A Pearson's correlation was used to analyze the relationship between the CBCL/6-18 and SRS scores. Bonferroni corrections were applied due to the high number of correlations conducted. The appropriateness of using each statistical technique for the data was determined by reviewing whether assumptions specific to each statistical procedure used were met. For Pearson's correlation, these assumptions included the use of interval or ratio data, normality of the data, equal variances of dispersion, and linearity.

The first assumption to be met required the use of interval or ratio data. With interval data, equal differences between the data reflect equal differences in magnitude. Ratio data share the same characteristic as interval data with the exception of having a well-defined anchor point. The second assumption to be verified indicated that the data were normally distributed. This assumption was verified using visual inspection by plotting a frequency distribution accompanied by a normal curve. Secondly, normality was verified by testing the normality of standardized residuals and standardized predicted values (Field, 2000). This was accomplished by examining the histogram and normal probability plot (P-P plot). Visual inspection of the histogram indicated a bell-shaped curve. Secondly, visual inspection of the P-P plot revealed that the points fell closely on the regression line which suggests normality (Field, 2000). A third assumption of homoscedasticity is that variability in scores for one continuous variable is approximately the same at all values of another continuous variable (Tabachnick & Fidell, 2007). Homoscedasticity is closely associated with the assumption of normality; when multivariate normality is achieved, the relationships between variables are homoscedastic. For grouped data, homogeneity of variance can be formally assessed using a number of methods, including inspection of boxplots and Levene's test of homogeneity of variance (Stevens, 2002). The fourth and final assumption to be met was that of linearity. A linear relationship between the scores demonstrates the form and degree of the relationship between the variables and can be verified by a visual inspection of a scatterplot.

As a review, the research questions for this study were as follows:

1. What is the profile of T-scores on the CBCL/6-18 for a sample of school-aged children with HFA? Specifically, what scales have T-scores ≥ 65 on the CBCL/6-18 for a sample of school-aged children with HFA?

2. What is the profile of T-scores on the SRS for a sample of school-aged children with high functioning autism?
3. Which scales from the CBCL/6-18 are highly correlated with scales from the SRS?
4. Which scales from the CBCL/ 6-18 are more predictive of an elevated (higher) SRS Total T-score?

The following hypotheses for this study were as follow:

1. When used with children with HFA, the Thought Problems, Withdrawn/Depressed, Social Problems, Attention Problems, and Anxious/Depressed scales from the CBCL/6-18 will be at least 1.5 *SDs* above the mean (e.g., T score ≥ 65).
2. When used with children HFA, the Total Score, Social Awareness, Social Communication, and Autistic Mannerism scales from the SRS will be at least one *SD* above the mean (e.g., T score > 60).
3. When used with children HFA, the SRS Total scale score will yield concurrent correlations with the Social Problems, Thought Problems, Withdrawn/ Depressed, Anxious/ Depressed, and Attention Problems scales from the CBCL/ 6-18.
4. When used with children HFA, the SRS Total scale score will yield non-significant correlations with the Somatic Complaints, Rule-Breaking Behavior, and Aggressive Behavior scores from the CBCL/6-18.
5. When used with children with high functioning autism, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales will be more predictive of elevated SRS scores.

For Research Question 1, a review of the means, medians, standard deviations, and range for each of the CBCL/6-18 scale T-scores from the sample was reviewed. For Research Question 2, a review of the means, medians, standard deviations, and range for each of the SRS scale T-scores

from the sample was reviewed. For Research Question 3, a Pearson's correlation was used to determine the relationship between each of the CBCL/6-18 subscale T-scores and the SRS Total and SRS subscale T-scores. A Bonferroni correction was applied for determining the significance of the p value due to the multiple comparisons analyzed in the study. For Research Question 4, a multiple linear regression analysis was conducted with the CBCL/ 6-18 subscales as the independent (predictor) and the SRS Total Score as the dependent (predicted) variable as a way to identify which CBCL/ 6-18 scales would result in a better prediction of an elevated SRS Total Score. The current study's research questions, hypotheses, variables, statistical techniques, and statistical assumptions are reviewed in Table 12.

Table 12

Research Questions, Hypotheses, Variables, Statistical Analyses, and Statistical Assumptions for the Project Examining the CBCL/6-18 and the SRS

Research question	Hypothesis	Variable	Statistic	Assumption	Assumption Appropriateness
1. What is the profile of T-scores on the CBCL/6-18 for a sample of school-aged children with HFA? Specifically, what scales have T-scores ≥ 65 on the CBCL/6-18 for a sample of school-aged children with HFA?	When used with children with HFA, the Thought Problems, Withdrawn/Depressed, Social Problems, Attention Problems, and Anxious/Depressed scales from the CBCL/6-18 will be at least 1.5 SDs above the mean (e.g., T score ≥ 65).	CBCL/ 6-18 T-scores	Central tendency	Interval data	Interval data Descriptive statistics
			Central tendency	Interval data	Interval data Descriptive statistics
2. What is the profile of T-scores on the SRS for a sample of school-aged children with high functioning autism?	When used with children HFA, the Total Score, Social Awareness, Social Communication, and Autistic Mannerism scales from the SRS will be at least one SD above the mean (e.g., T score > 60).	SRS T-scores	Central tendency	Interval data	Interval data Descriptive statistics
3. Which scales from the CBCL/6-18 are highly correlated with scales from the SRS?	When used with children HFA, the SRS Total scale score will yield concurrent correlations with the Social Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and Attention	CBCL/ 6-18 and SRS T-scores	Pearson's correlation	Interval data Normality Equal variance Linearity	Interval data Histogram within a normal curve Descriptive statistics

Problems scales from the CBCL/6-18.

When used with children HFA, the SRS Total scale score will yield non-significant correlations with the Somatic Complaints, Rule-Breaking Behavior, and Aggressive Behavior scores from the CBCL/6-18.

CBCL/ 6-18
and SRS
T-scores

Pearson's
correlation

Interval data
Normality
Equal variance
Linearity

Interval data
Histogram within a
normal curve
Descriptive statistics

4. Which scales from the CBCL/ 6-18 are more predictive of an elevated (higher)SRS Total T-score?

When used with children with high functioning autism, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales will be more predictive of elevated SRS scores.

CBCL/ 6-18
and SRS
T-scores

Linear
Regression

Interval data
Normality
Equal variance
Linearity
Multicollinearity

Interval data
Histogram within a
normal curve
Descriptive statistics
Scatterplot

Summary

The current study examined the profiles of obtained scores on the CBCL/6-18 and the SRS among 54 Caucasian male school-aged children with HFA. First, the means, medians, standard deviations, and ranges for each of the CBCL/6-18 and the SRS scales were calculated, and the descriptive data were reviewed. Second, correlations between the CBCL/6-18 and the SRS scores were calculated using the *SPSS Version 19* computer software program. A review of the obtained Pearson's correlations was completed to examine the association between the two rating scales on a sample of school-aged children with HFA. Lastly, multiple linear regression analyses were conducted to determine which CBCL/ 6-18 scales were more predictive of an elevated SRS Total score.

CHAPTER IV

RESULTS

This chapter presents the findings of statistical analyses that were conducted to examine this study's research questions. The primary objectives of the research questions were twofold. The first objective was to establish a relationship between the Child Behavior Checklist/ 6-18 (CBCL/ 6-18; Achenbach and Rescorla, 2001) and the Social Responsiveness Scale (SRS; Constantino and Gruber, 2005) using school-aged children with high functioning autism (HFA). This was accomplished by constructing a correlation matrix of the associations between the CBCL/ 6-18 and SRS T-scores. The second objective was to examine which CBCL/ 6-18 scales were the most highly predictive of an elevated SRS Total Score and therefore providing additional support for a distinct CBCL/ 6-18 profile using children with HFA. This was accomplished by reviewing the results of multiple linear regression analyses. Prior to running these analyses, descriptive statistics were obtained and preliminary analyses were conducted in order to evaluate assumptions.

Complications

There were no complications, protocol violations, or other unanticipated events/ problems during the course of the completion of this current study.

Computer Programs

Statistical analyses were calculated using the software *Statistical Package for the Social Sciences* (SPSS), Version 19. G*Power 3.1.2 (Faul et al., 2007) was used to conduct an a priori power analysis to establish the minimum number of participants needed to achieve adequate power.

Analysis

Descriptive Statistics

The sample included parent ratings from the CBCL/ 6-18 and the SRS using 54 male participants with a diagnosis of HFA. The parents completed the CBCL/ 6-18 and the SRS at different times during the overall study. The mean age of the participant at the time the CBCL/ 6-18 was completed was 13.2 years ($SD = 3.3$). The mean age of the participant at the time the SRS was completed was 13.3 years ($SD = 3.5$). The age range for the CBCL/ 6-18 and the SRS was 6.08-18.92 years.

Preliminary Analyses for Statistical Assumptions

Prior to conducting the formal analyses, the dataset was examined for outliers to ensure that no cases were exerting undue influences on the analyses. This was completed by an examination of the bivariate scatterplots and visually examining the histograms of the variables. The assumption of normality was assessed by visually examining histograms of the dependent variables in addition to obtaining skewness and kurtosis values. The CBCL/ 6-18 Withdrawn/Depressed, Attention Problems, and Rule Breaking Behaviors scales had kurtosis values greater than 1.5. Higher kurtosis values mean more of the variance is the result of infrequent extreme deviations, as opposed to frequently modestly sized deviations (Field, 2000). This is an expected finding in a sample of children with autism as this population tend not to disobey established rules and exhibit more attentional and depressive symptoms (Bellini, 2004). All histograms appeared to demonstrate normal distribution and calculated values for skewness and kurtosis were within acceptable limits (i.e., less than an absolute value of 1.5; Field, 2000). This indicated a distribution which is not very different from a normal distribution for each of the dependent variables. Histograms depicting normal distributions for the dependent variables are shown in Appendix B and Appendix C for the SRS and Appendix D, E, and F for the CBCL/ 6-18.

The assumption of linearity among the variables was assessed via bivariate scatterplots. A correlation scatterplot matrix for all the variables can be found in Appendix G. In addition, a bivariate correlation matrix of the CBCL/ 6-18 and SRS variables was constructed as part of the analysis for research question three. Given the results of the bivariate scatterplots and correlation matrix, as well as reasonably balanced distributions of the CBCL/ 6-18 and SRS variables, it is determined that the assumption of linearity was upheld. The assumption of homoscedasticity was checked for each Pearson's correlation by examining the scatterplots of the variables. Multicollinearity is a potential problem when conducting multiple linear regression analysis (Field, 2000). In the current study, the assumption of multicollinearity was checked by examining the correlation matrix between the CBCL/ 6-18 and SRS variables to see if any of the variables correlate very highly with each other (e.g., correlations of 0.80 or above, Fields, 2000). Multicollinearity was also assessed by examining the variance inflation factor (VIF), an indicator of whether a predictor has a strong linear relationship with the other predictors (Field, 2000). Field (2000) suggests that a value VIF value of ten or greater should be cause for concern. Multicollinearity was also assessed by examining the tolerance statistic, which is the reciprocal of the VIF ($1 / \text{VIF}$). Field suggested that tolerance values below 0.1 or 0.2 are worthy of concern.

The effect size of the associations for this current study was categorized by Rubin's (2010) correlation coefficient guidelines which described correlations in the range of .10 - .30 as weak correlations; .30-.50 as moderate correlations; and correlations greater than .50 as strong. In the current study, the CBCL/ 6-18 Aggressive Behavior and Rule Breaking Behavior scales were strongly correlated ($r = .74, p < .01$). Therefore, these scales were not included in the multiple logistical regression analyses. For the hierarchical regression analysis, the CBCL/ 6-18 Social

Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and Attention Problems were analyzed. The CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales were analyzed in the stepwise regression analysis.

The VIF statistic value for the hierarchical and stepwise multiple linear regression analyses fell within the acceptable range ($VIF > 10$). Furthermore, tolerance statistic value for the hierarchical and stepwise multiple linear regression analyses fell within the acceptable range ($\text{tolerance} < 0.2$). Therefore, there were no concerns with respect to multicollinearity for the CBCL/ 6-18 scales analyzed in the analyses.

Research Question One Results

The first research question utilized examinations of the mean, median, standard deviation, and range of the obtained T-scores from the CBCL/ 6-18. The CBCL/ 6-18 T-scores from 65-69 are considered to fall within the borderline clinical range. T-scores within the borderline clinical range are high enough to warrant concern but do not rise to the level to be of clinical concern. T-scores in the clinically-significant range ($T\text{-scores} \geq 70$) indicate clinically significant deviance because they reflect numerous behavioral problems. Scores that fall within this range indicate that a child is observed to exhibit more behavioral problems than 97% of their same age peers (Achenbach & Rescorla, 2001).

A review of the mean CBCL/ 6-18 T-scores (Table 13) indicated that no CBCL/ 6-18 mean T-score fell within the clinically-significant range (i.e., $T\text{-scores} \geq 70$) for the sample. CBCL/ 6-18 mean T-scores fell within the borderline clinical range (i.e., T-scores 65-69) for the Thought Problems ($M = 66.9$), and the Anxious/Depressed ($M = 65.9$) scales. The percentages of T-scores that fell within the borderline clinical range (e.g., T-scores 65-69) and clinically significant range ($T\text{-scores} \geq 70$) are indicated in Table 14.

The associations among the CBCL/ 6-18 scales and the participants' administration age are shown in Table 15. The Anxious/Depressed ($r = .88$, $p < .01$), Withdrawn/Depressed ($r = .75$, $p < .01$), and Somatic Complaints ($r = .72$, $p < .01$) scales demonstrated a strong and positive correlation with the Internalizing Problems scale. The Rule Breaking Behavior ($r = .82$, $p < .01$) and Aggressive Behavior ($r = .95$, $p < .01$) scales were highly and positively correlated with the Externalizing Problems. The Social Problems scale was highly correlated with the Internalizing Problems scale ($r = .69$, $p < .01$) and moderately correlated with the Externalizing Problems scale ($r = .37$, $p < .01$). The Thought Problems scale was moderately and positively associated with the Internalizing Problems ($r = .44$, $p < .01$) and Externalizing Problems ($r = .44$, $p < .01$) scales. The Attention Problems scale was moderately and positively associated with the Internalizing Problems scale ($r = .34$, $p < .05$) and the Externalizing Problems scale ($r = .44$, $p < .01$). All of the CBCL/ 6-18 scales demonstrated strong and positive correlations with the Total Problems scale with correlations ranging from .58 to .83 ($p < .01$). There was no significant correlation between the CBCL/ 6-18 scales and age ($p > .01$).

Table 13

Means, Standard Deviation, Range, Median, Skewness, and Kurtosis for CBCL/ 6-18 T-Score Scales (N = 54)

Scale	Mean	Median	SD	Range	Skew	Kurtosis
Internalizing Problems	64.8	66.0	7.9	48-88	.11	.51
Externalizing Problems	55.0	55.0	9.3	40-75	.19	-.88
Total Problems	63.4	63.0	7.4	47-78	-.10	-.54
Social Problems	64.4	63.0	8.3	50-84	.52	.20
Thought Problems	66.9	67.0	8.1	51-83	-.19	-.82
Anxious/Depressed	65.9	65.0	9.2	50-93	.60	.52
Withdrawn/Depressed	63.1	62.5	9.3	50-96	1.36	2.36
Attention Problems	64.7	63.0	10.0	51-96	1.33	1.61
Rule Breaking Behavior	54.6	52.0	5.8	50-71	1.56	1.53
Somatic Complaints	59.3	58.0	7.4	50-80	.76	-.01
Aggressive Behavior	58.3	57.5	8.1	50-81	.84	.37
Administration Age (years)	13.3	13.4	3.4	6.08-18.92	-.26	-.83

Note. SD = Standard Deviation

Table 14

Percent of Sample Obtaining Mean T-Scores Within the Borderline Clinical Range and the Clinically Significant Range on the CBCL/ 6-18 (N = 54)

Scale	Sample % with mean T-Score 65- 69	Sample % with mean T-score ≥ 70	Total % with mean T-score $\geq$ 65
Internalizing Problems	33.3	27.7	61.0
Externalizing Problems	7.4	5.6	13.0
Total Problems	12.9	25.9	38.8
Social Problems	16.7	25.9	42.6
Thought Problems	16.7	44.4	61.1
Anxious/Depressed	24.1	27.8	51.9
Withdrawn/Depressed	16.7	18.5	35.2
Attention Problems	22.2	16.7	38.9
Rule Breaking Behavior	3.7	5.6	9.3
Somatic Complaints	14.8	9.3	24.1
Aggressive Behavior	14.8	5.6	20.4

Table 15

Bivariate Pearson Correlations for CBCL/ 6-18 Scales and Administration Age

Scale	1	2	3	4	5	6	7	8	9	10	11	12
1. Total	1.00											
2. Internalizing Problems	.83**	1.00										
3. Externalizing Problems	.79**	.51**	1.00									
4. Social Problems	.69**	.69**	.37**	1.00								
5. Thought Problems	.67**	.44**	.44**	.41**	1.00							
6. Anxious/Depressed	.67**	.88**	.40**	.64**	.37**	1.00						
7. Withdrawn/Depressed	.58**	.75**	.33*	.44**	.23	.52**	1.00					
8. Attention Problems	.63**	.34*	.44**	.38**	.41**	.20	.18	1.00				
9. Rule Breaking Behavior	.62**	.35**	.82**	.25	.29**	.20	.37**	.36**	1.00			
10. Somatic Complaints	.70**	.72**	.41**	.54**	.41**	.52**	.43**	.43**	.28**	1.00		
11. Aggressive Behavior	.77**	.46**	.95**	.42**	.44**	.38**	.29*	.44**	.74**	.40**	1.00	
12. Administration Age (years)	-.03	.09	-.15	.17	.10	.12	-.02	-.16	-.16	.09	-.11	1.00

* $p < .05$; ** $p < .01$

Research Question Two Results

The second research question utilized examinations of the mean, median, standard deviation, and range from the obtained T-scores on the SRS. The classification of SRS T-scores differs from that of the CBCL/ 6-18. SRS T-scores greater than 76 are considered to fall within the severe range and are strongly associated with a clinical diagnosis of autistic disorder, Asperger's Syndrome, or severe cases of Pervasive Developmental Disorder (PDD). They suggest a severe interference in everyday social interactions (Constantino & Gruber, 2005, pp. 15-16). SRS T-scores in the range from 60-75 are considered to fall within the mild to moderate range. Scores within this range indicate deficiencies in reciprocal social behavior that are clinically significant and are "resulting in mild to moderate interferences in everyday social interactions" (Constantino & Gruber, 2005, p. 15). A review of the SRS mean T-scores (Table 16) indicated mean T-scores fell within the clinically significant range for the Total Score ($M = 80.6$), Autistic Mannerisms ($M = 81.2$), Social Communication ($M = 77.7$), and Social Cognition ($M = 77.4$) scales. Mean T-scores fell within the mild to moderate range for the Social Awareness ($M = 69.6$) and Social Motivation ($M = 75.3$) scales. The percentage of individuals in the sample who obtained a T-score ≥ 76 (severe range) was 61.11% ($n = 33$). Twenty subjects obtained a score within the mild to moderate range which accounted for 37.04% of the sample. Table 17 provides an overview of the percentages of the sample that obtained a score within the mild to moderate and severe ranges.

A bivariate correlation matrix (Table 18) examining the SRS scales and the age of administration indicated that the five SRS treatment scales were highly and positively correlated with the SRS Total score with Pearson's correlations ranging from .66 to .80 ($p < .01$). The Autistic Mannerisms scale demonstrated moderate to strong positive correlations with the other

SRS treatment scales with correlations ranging from .49 to .56 ($p < .01$). The Social Motivation scale demonstrated a moderate and positive association with the Social Cognition ($r = .41, p < .01$) and Social Communication ($r = .55, p < .01$) scales. The Social Motivation scale did not demonstrate statistical significance with the Social Awareness scale and was weakly correlated ($r = .25$). The Social Communication scale demonstrated a moderate and positive correlation with the Social Awareness scale ($r = .37, p < .01$), but a strong and positive association with the Social Cognition scale ($r = .53, p < .01$). A moderate and positive correlation was found between the Social Awareness and Social Cognition scales ($r = .40, p < .01$). There was no significance between the SRS scales and age ($p > .01$).

Table 16

Means, Standard Deviation, Range, Median, Skewness, and Kurtosis for SRS Scales (N = 54)

Scale	Mean	Median	SD	Range	Skew	Kurtosis
Total	80.6	78.0	10.2	58-102	.19	-.63
Social Awareness	69.6	70.0	11.1	37-88	-.76	1.03
Social Cognition	77.4	75.0	10.7	54-99	.25	-.40
Social Communication	77.7	76.5	11.0	57-105	.26	-.32
Social Motivation	75.3	73.0	11.3	49-109	.36	.33
Autistic Mannerisms	81.2	80.0	13.6	58-111	.43	-.25
Administration Age (years)	13.3	13.4	3.5	6.08-18.92	-.21	-.83

Note. SD = Standard Deviation

Table 17

Percent of Sample Obtaining Mean T-Scores Within the Mild to Moderate and Severe Ranges on the SRS (N = 54)

Scale	Sample % with mean T-score within Mild To Moderate Range (T-scores 60-75)	Sample % with mean T-score within Severe Range (T-scores ≥ 76)
Total	7.4	90.7
Social Awareness	51.9	29.6
Social Cognition	44.4	50.0
Social Communication	38.9	55.6
Social Motivation	53.7	40.7
Autistic Mannerisms	29.6	66.7

Table 18

Bivariate Pearson Correlations for SRS Scales and Administration Age

Scale	1	2	3	4	5	6	7
1. Total	1.00						
2. Social Awareness	.66**	1.00					
3. Social Cognition	.77**	.40**	1.00				
4. Social Communication	.80**	.37**	.53**	1.00			
5. Social Motivation	.70**	.25	.41**	.55**	1.00		
6. Autistic Mannerisms	.79**	.41**	.56**	.49**	.53**	1.00	
7. Administration Age (years)	-.04	-.07	-.11	.05	.01	-.06	1.00

** $p < .01$

Research Question Three Results

The third research question was concerned with comparing the T-scores from the CBCL/ 6-18 scales with the T-scores from the SRS scales to determine whether a relationship existed between the two rating scales. It was hypothesized that the Social Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and the Attention Problems CBCL/ 6-18 scales would yield at least moderate concurrent correlations with the Total SRS score. Significant correlations between the Somatic Complaints, Rule-Breaking Behaviors, and Aggressive Behaviors CBCL/ 6-18 scales with the Total SRS score were not expected. A bivariate correlation matrix was used to depict the strength and relationships between variables. Bivariate Pearson correlations for the CBCL/ 6-18 and SRS measures are depicted in Table 19.

Table 19

Pearson Correlations for CBCL/ 6-18 and SRS scores (N = 54)

Scale	SRS Total Problems	SRS Social Awareness	SRS Social Cognition	SRS Social Communication	SRS Social Motivation	SRS Autistic Mannerisms
Internalizing Problems	0.54*	0.22	0.30	0.40*	0.58*	0.48*
Externalizing Problems	0.35	0.29	0.32	0.20	0.10	0.31
Total Problems	0.57*	0.37	0.39*	0.35	0.36	0.57*
Social Problems	0.49*	0.16	0.26	0.43*	0.34	0.55*
Thought Problems	0.43*	0.28	0.31	0.23	0.18	0.60*
Anxious/Depressed	0.43*	0.11	0.21	0.31	0.48*	0.40*
Withdrawn/Depressed	0.44*	0.17	0.16	0.35	0.65*	0.31
Attention Problems	0.38	0.35	0.35	0.14	0.16	0.43*
Rule Breaking Behavior	0.28	0.24	0.25	0.20	0.16	0.18
Somatic Complaints	0.41*	0.20	0.31	0.27	0.28	0.39*
Aggressive Behavior	0.37	0.29	0.33	0.26	0.09	0.32

* $p < .003$

Tests of significance based on bivariate Pearson's correlations (r) were conducted for each of the SRS and CBCL/ 6-18 scales. Threshold levels of significance for correlation coefficients were adjusted for multiple comparisons by using a Bonferroni correction. The Bonferroni correction is a statistical adjustment for the multiple comparisons (Field, 2000). In the current study, there were 17 comparisons involved in the primary hypothesis (eleven scales from the CBCL/ 6-18 and six scales from the SRS). The Bonferroni correction provides an adjusted alpha level and is calculated by dividing the alpha level by the number of comparisons (Field, 2000). It is customary for an alpha level of 0.05 to be used (Stevens, 2002). For the current study, the calculated adjusted alpha level is $p = .003$ per test ($.05/17$).

The magnitude of the relationship between the CBCL/ 6-18 and SRS was determined by Rubin's (2010) correlation coefficient guidelines which described correlations in the range of .10 - .30 as weak correlations; .30-.50 as moderate correlations; and correlations greater than .50 as strong. Based on bivariate Pearson correlations in Table 19, several statistically significant relationships were evident.

Age and the SRS and CBCL/ 6-18 scales. There were no statistically significant associations between age and the SRS scales or age and the CBCL/ 6-18 measures ($p > .01$). A weak association was found between the CBCL/ 6-18 scales and age with correlations ranging from -.16 to .17 ($p < .01$). Similarly, weak correlations were found between the SRS scales and age with correlations ranging from -.06 to .05 ($p < .01$).

SRS Total Score and the CBCL/ 6-18 scales. The SRS Total Score was strongly and positively correlated with the CBCL/ 6-18 Internalizing Problems ($r = 0.54$, $p < .01$) and the Total Problems ($r = 0.57$, $p < .01$) scales. Moderate and positive correlations were found between the SRS Total Score and

the CBCL/ 6-18 Externalizing Problems ($r = 0.35, p < .05$), Social Problems ($r = 0.49, p < .01$), Thought Problems ($r = 0.43, p < .01$), Anxious/Depressed ($r = 0.43, p < .01$), Withdrawn/Depressed ($r = 0.44, p < .01$), Attention Problems ($r = 0.38, p < .01$), Aggressive Behavior ($r = 0.37, p < .01$), and Somatic Complaints ($r = 0.41, p < .01$) scales. A weak positive correlation was found between the SRS Total Score and the Rule Breaking Behavior scale ($r = 0.28, p < .05$). Following Bonferroni corrections, the associations between the CBCL/ 6-18 Externalizing Problems, Rule Breaking Behavior, and Aggressive Behavior scales no longer proved significant with the SRS Total Score ($p > .003$).

SRS Social Awareness and the CBCL/ 6-18 scales. A moderate and positive correlation was found between the SRS Social Awareness scale and the CBCL/ 6-18 Total Problems ($r = 0.37, p < .01$) and the Attention Problems ($r = 0.35, p < .01$) scales. A weak and positive correlation was found between the SRS Social Awareness scale and the CBCL/ 6-18 Externalizing Problems ($r = 0.29, p < .05$), Thought Problems ($r = 0.28, p < .05$), and the Aggressive Behaviors ($r = 0.29, p < .05$) scales. None of the CBCL/ 6-18 scales proved significant with the SRS Social Awareness scale following the Bonferroni correction ($p > .003$).

SRS Social Cognition and the CBCL/ 6-18 scales. Moderate and positive correlations were found between the SRS Social Cognition scale and the CBCL/ 6-18 Internalizing Problems ($r = 0.30, p < .05$), Externalizing Problems ($r = 0.32, p < .05$), Total Problems ($r = 0.39, p < .01$), Thought Problems ($r = 0.31, p < .05$), Attention Problems ($r = 0.35, p < .05$), Somatic Complaints ($r = 0.31, p < .05$), and Aggressive Behavior ($r = 0.33, p < .05$) scales. None of the CBCL/ 6-18 scales proved to be significant following the Bonferroni correction criteria ($p < .003$).

SRS Social Communication and the CBCL/ 6-18 scales. A moderate and positive correlation was found between the SRS Social Communication and the CBCL/ 6-18 Total Problems ($r = 0.35, p < .01$), Internalizing Problems ($r = 0.40, p < .01$), Social Problems ($r = .43, p < .01$), Anxious/Depressed ($r =$

0.31, $p < .05$), and Withdrawn/Depressed ($r = 0.35$, $p < .01$) scales. With Bonferroni corrections, the CBCL/ 6-18 Internalizing Problems and Social Problems scales demonstrated significant associations ($p < .003$).

SRS Social Motivation and the CBCL/ 6-18 scales. The SRS Social Motivation scale was strongly and positively correlated with the CBCL/ 6-18 Internalizing Problems ($r = 0.58$, $p < .01$) and the Withdrawn/Depressed ($r = 0.65$, $p < .01$) scales. The SRS Social Motivation scale was moderately and positively correlated with the CBCL/ 6-18 Total Problems ($r = 0.36$, $p < .01$), Social Problems ($r = 0.34$, $p < .05$), and Anxious/Depressed ($r = 0.48$, $p < .01$) scales. There was a weak and positive correlation between the SRS Social Motivation and Somatic Complaints scale ($r = 0.28$, $p < .05$). The relationship between the SRS Social Motivation and CBCL/ 6-18 Internalizing Problems, Anxious/Depressed, and Withdrawn/Depressed scales proved significant with the Bonferroni corrections ($p < .003$).

SRS Autistic Mannerisms and the CBCL/ 6-18 scales. Strong and positive correlations were found between the SRS Autistic Mannerisms scale and the CBCL/ 6-18 Total Problems ($r = 0.57$, $p < .01$), Social Problems ($r = 0.55$, $p < .01$), and Thought Problems ($r = 0.60$, $p < .01$) scales. The SRS Autistic Mannerisms scale was moderately and positively correlated with the CBCL/ 6-18 Internalizing Problems ($r = 0.48$, $p < .01$), Anxious/Depressed ($r = 0.40$, $p < .01$), Withdrawn/Depressed ($r = 0.31$, $p < .05$), Attention Problems ($r = .43$, $p < .01$), Somatic Complaints ($r = 0.39$, $p < .01$), and Aggressive Behavior ($r = 0.32$, $p < .05$) scales. The CBCL/ 6-18 Externalizing Problems, Withdrawn/Depressed, and Aggressive Behaviors scales did not demonstrate a significant association with the SRS Autistic Mannerisms scale following the Bonferroni correction ($p > .003$).

Research Question Four Results

The fourth research question dealt with examining which CBCL/ 6-18 scales would be more predictive of an elevated (higher) SRS Total T-score. Separate

multiple linear regression methods (hierarchical and stepwise) were conducted with the SRS Total Score as the criterion variable. In a hierarchical multiple linear regression analysis, the predictors are chosen by a review of past research that has utilized good methodology (Field, 2000). In a stepwise multiple linear regression analysis, the statistical software program selects the order in which the predictors are entered into the model based upon mathematical criteria. The program searches for the predictor (out of the ones entered) that best predicts the outcome variable (Field, 2000).

Multiple linear regression (hierarchical method). As stated previously, in a hierarchical multiple regression analysis, the predictors are selected based on past work and the experimenter decides which order to enter predictors into the model (Fields, 2000). As a general rule, the known predictors from prior research are entered into the model first (in order of their importance in predicting the outcome) before entering any new predictors into the model (Fields, 2000). It was originally hypothesized from previous research using the CBCL with children with autism that the CBCL Social Problems, Thought Problems, and Withdrawn/ Depressed scales would be more highly elevated when compared to the other CBCL/ 6-18 scales (Biederman et al., 2010; Bolte et al., 2003; Duarte, et al., 2003; Luteijn et al., 2000; Mazefsky et al., 2010; & Noterdaeme et al., 1999). However, descriptive statistics from the current study revealed that the mean T-score from the CBCL/ 6-18 Anxious/Depressed scale was greater than the CBCL/ 6-18 Social Problems scale and the Withdrawn/Depressed scales, although still within the standard deviation range. Additionally, the mean T-score from the CBCL/ 6-18 Attention Problems scale was greater than that of the Withdrawn/Depressed and Social Problems scales, although still within the standard deviation range. Therefore, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales were entered in the first step and the Anxious/Depressed and Attention Problems scales were entered in the second step for the hierarchical multiple linear regression

analysis. This decision is consistent with the current study's hypotheses that the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales would be more highly associated with the SRS scales than the CBCL/ 6-18 Anxious/Depressed and Attention Problems scales. The results of the hierarchical multiple linear regression analysis are depicted in Table 20.

Table 20

Summary of Hierarchical Multiple Linear Regression Analysis for Predicting SRS Total Score Using CBCL/ 6-18 Social Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and Attention Problems Scales (N = 54)

DESCRIPTIVE STATISTICS - - - - -

Variable	n	Mean	SD	Range
Social Problems	54	64.4	8.3	50-84
Thought Problems	54	66.9	8.1	51-83
Withdrawn/Depressed	54	63.1	9.3	50-96
Anxious/Depressed	54	65.9	9.2	50-93
Attention Problems	54	64.7	10.0	51-96
SRS Total Score	54	80.6	10.2	58-102

CORRELATION MATRIX - - - - -

	1	2	3	4	5	6
1. Social Problems	1.00	.41	.44	.64	.44	.49
2. Thought Problems		1.00	.23	.37	.41	.43
3. Withdrawn/Depressed			1.00	.52	.18	.44
4. Anxious/Depressed				1.00	.20	.43
5. Attention Problems					1.00	.38
6. SRS Total Problems						1.00

HIERARCHICAL MULTIPLE LINEAR REGRESSION - - - - -

Model Fit	R	R ²	R ² Adjusted	R ² Change
Model # 1 F[3,50] = 9.26; $p < .01$	.60	.36	.32	.36
Model # 2 F[5,48] = 5.91; $p < .01$	.62	.38	.32	.02

Variables in Equation	B	SE B	Beta	t-value	Significance of t
<u>Model #1</u>					
Social Problems	.33	.17	.27	2.10	.05
Thought Problems	.32	.16	.26	2.08	.04
Withdrawn/Depressed	.28	.14	.26	2.04	.05
Constant	19.82	11.70		1.69	.01
<u>Model #2</u>					
Social Problems	.24	.20	.19	1.23	.23
Thought Problems	.25	.17	.20	1.48	.15
Withdrawn/Depressed	.26	.15	.24	1.76	.09
Attention Problems	.17	.13	.17	1.32	.19
Anxious/Depressed	.08	.17	.07	.46	.65
Constant	15.94	12.10		1.32	.19

Note. SD = Standard Deviation. Model #1 = CBCL/ 6-18 Withdrawn/Depressed, Thought Problems, and Social Problems scales. Model #2 = Model #1, Attention Problems, and Anxious/Depressed scales. Constant = SRS Total T-score. B = Unstandardized beta coefficient. SE B = Standard Error of Beta. Beta = Standardized beta coefficient.

Results from the hierarchical multiple linear regression model indicated the predictor variables were not independently making a significant contribution to the model (Social Problems, $t(48) = 1.32$, $p > .01$; Thought Problems, $t(48) = 1.23$, $p > .01$; Withdrawn/Depressed, $t(48) = 1.76$, $p > .01$; Attention Problems, $t(48) = 1.32$, $p > .01$; and Anxious/Depressed, $t(48) = .46$, $p > .01$). Standardized betas indicated the number of standard deviations that the criterion (SRS Total Score) will change as a result of one standard deviation change in the CBCL/ 6-18 predictor variable (Field, 2000). A review of the standardized beta values for the CBCL/ 6-18 scales are: Social Problems = .19, Thought Problems = .20, Withdrawn/Depressed = .24, Attention Problems = .17, and Anxious/Depressed = .07. Thus, the Withdrawn/Depressed scale had more impact on the overall model. The Social Problems and Thought Problems scales contributed to the overall model nearly equally, followed by Attention Problems scale. The Anxious/Depressed scale had the least impact on the overall model.

Within the hierarchical model, the first model (which contained the Withdrawn/Depressed, Social Problems, and Thought Problems scales) accounted for 36% of the variance in the SRS Total score. The final model, which contained the aforementioned scales in addition to the Attention Problems and Anxious/Depressed scales, accounted for 38% of the variance in the SRS Total score. The R^2 change value of .02 for the final model suggested that the contribution of the Attention Problems and Anxious/Depressed scales did not account for much of the variance in the outcome. At each stage of the regression analysis, a summary of any variables that had not yet been entered into the model is provided. In this hierarchical model, the summary provided details of the variables that had been specified to be entered in subsequent steps (Field, 2000). Thus, inclusion of the Anxious/Depressed scale into the model would not have a significant impact on the model's ability to predict the SRS Total score, $t = .31$, $p > .05$. Additionally, inclusion of the

Attention Problems scale into the model would also not have significantly impacted the model's ability to predict the SRS Total score, $t = 1.29$, $p > .05$. Furthermore, the inclusion of the Anxious/Depressed and Attention Problems scales acted as suppressors to the overall model when examining the beta weights. Therefore, the most useful model predictive of the SRS Total score was the first model which consisted of the CBCL/ 6-18 Withdrawn/Depressed, Social Problems, and Thought Problems scales ($F, (3,50) = 9.26$, $p < .01$).

Multiple linear regression (stepwise method). The second regression analysis used was that of a stepwise multiple linear regression analysis. In stepwise multiple linear regression, the predictor variables are entered according to their statistical contribution in explaining the variance in the criterion variable. It is designed to find the most parsimonious set of predictors that are most effective in predicting the criterion variable (Stevens, 2002). For this analysis, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales were entered as the predictor variables. It was hypothesized that these scales would be of the most importance based on prior research (Biederman, et al., 2010; Bolte, et al., 2003; Duarte, et al., 2003; Luteijn, et al., 2000; Mazefsky, et al., 2010; & Noterdaeme, et al., 1999). The results from the stepwise multiple linear regression analysis are shown in Table 21.

Table 21

Summary of Stepwise Multiple Linear Regression Analysis for Predicting SRS Total Score Using CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed Scales (N = 54)

DESCRIPTIVE STATISTICS - - - - -

Variable	n	Mean	SD	Range
Social Problems	54	64.4	8.3	50-84
Thought Problems	54	66.9	8.1	51-83
Withdrawn/Depressed	54	63.1	9.3	50-96
SRS Total Score	54	80.6	10.2	58-102

CORRELATION MATRIX - - - - -

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
1. Social Problems	1.00	.41	.44	.49
2. Thought Problems		1.00	.23	.43
3. Withdrawn/Depressed			1.00	.44
4. SRS Total Problems				1.00

STEPWISE MULTIPLE LINEAR REGRESSION PREDICTING SRS TOTAL SCORE - - - - -

Step	Variable(s) in Equation	Model Fit	R	R ²	R ² Adj.	R ² Change
1.	Social Problems (.49; t = 4.05; p < .01)	F[1,52] = 16.41; p < .01	.49	.24	.23	.24
2.	Social Problems (.38; t = 2.96; p = .01) Thought Problems (.28; t = 2.16; p = .04)	F[2,51] = 11.11; p < .01	.55	.30	.28	.06
3.	Social Problems (.27; t = 2.01; p = .05) Thought Problems (.26; t = 2.08; p = .04) Withdrawn/Depressed (.26; t = 2.04; p = .05)	F[3,50] = 9.26; p < .01	.60	.36	.32	.05

Stepwise multiple regression analysis results indicated the overall model fit of the three predictors (CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales) significantly improved the ability to predict the SRS Total T-score ($F, (3,50) = 9.26, p < .001$). The final model containing the three CBCL/ 6-18 scales accounted for 35.7% of the variance in the Total SRS T-score. A review of the contributions from each of the CBCL/ 6-18 scales indicated that the Social Problems scale accounted for 24% of the total variance in the SRS Total score. The Thought Problems scale accounted for an additional 6% variance in the SRS Total score above and beyond the Social Problems scale. Furthermore, the Withdrawn/Depressed scale accounted for approximately an additional 6% total variance in the SRS Total score above and beyond the Social Problems and Thought Problems scales.

Summary

Several analyses were conducted for this study. First, descriptive statistics for the CBCL/ 6-18 and the SRS were reviewed to examine the profile of mean T-scores in a sample using children with HFA. To assess for outliers in the sample, a review of the descriptive data and a visual inspection of the histograms of T-scores was conducted. There were no statistically significant outliers found in the current study. A review of the descriptive statistics indicated that none of the mean or median T-scores from the CBCL/ 6-18 scales fell within the clinically significant range (T-scores ≥ 70). Borderline clinical range scores (T-scores 65-69) were found for the mean and median T-scores for the Thought Problems and Social Problems scales. The median T-score for the Internalizing Problems scale also fell within the borderline clinical range. The mean T-scores from the Total SRS Score, Autistic Mannerisms, Social Cognition, and Social Communication scales fell within the severe range (T-scores ≥ 76). The SRS Social Awareness and Social Motivation mean T-scores fell within the mild to moderate range (T-scores 60-75). Second, bivariate Pearson's

correlations were conducted to examine the association between the CBCL/ 6-18 and the SRS. Prior to analyzing the Pearson's correlations for the third research question, the multivariate assumptions of collinearity were examined. This was completed by examining the correlations between the CBCL/ 6-18 and SRS scales. Results indicated a statistically strong and positive correlation between the CBCL/ 6-18 Rule Breaking Behavior and Aggressive Behavior scales ($r = .74, p < .01$). This relationship held true even when adjusted for the Bonferroni correction. Therefore, the CBCL/ 6-18 Rule Breaking Behavior and Aggressive Behavior scales were not included in further multivariate analyses. There were no strong ($r > .70$) associations between the SRS treatment scales. Thus, the SRS treatment scales were not strongly related to each other suggesting that they were measuring distinct constructs on the SRS. Additionally, a review of the collinearity statistics revealed acceptable tolerance values (tolerance < 0.2) and VIF values ($VIF > 10$).

A review of the bivariate Pearson's correlations revealed that the SRS Total Score was strongly and positively correlated with the CBCL/ 6-18 Internalizing Problems, Total Problems, and Social Problems scales (with Bonferroni correction; $p < .003$). The SRS Total Score was moderately and positively correlated with the CBCL/ 6-18 Thought Problems, Anxious/Depressed, and Withdrawn/Depressed scales when Bonferroni adjustment was applied ($p < .003$). There was a weak and positive association between the Total SRS and CBCL/ 6-18 Somatic Complaints scale ($p < .003$) with Bonferroni correction. When the Bonferroni adjustment was applied, the SRS Autistic Mannerism scale demonstrated the most statistically significant correlations ($p < .003$) with the CBCL/ 6-18 scales, followed by the SRS Social Motivation, Social Communication, and Social Cognition scales. The SRS Social Awareness scale did not demonstrate statistically significant associations with the CBCL/ 6-18 scales when corrected with the Bonferroni adjustment ($p > .003$).

Multiple linear regression analyses of both the hierarchical and stepwise

methods were conducted to examine which predictor variable(s) would be most diagnostically informative in screening for a possible autism spectrum disorder. With regards to the hierarchical regression analysis, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales were entered into the first block and the Anxious/Depressed and Attention Problems scales were entered into the second block. The results of the hierarchical multiple linear regression analysis revealed a significant model with the Withdrawn/Depressed, Thought Problems, and Social Problems scales. This model accounted for 36% of the total variance in the SRS Total score. Further analysis revealed that the CBCL/ 6-18 Attention Problems and Anxious/Depressed scales did not significantly contribute to the overall prediction of the SRS Total score.

The results of the stepwise multiple linear regression analysis revealed that the CBCL/ 6-18 Social Problems scale accounted for 24% of the total variance of the SRS Total score. The CBCL/ 6-18 Social Problems and Thought Problems scales together accounted for 30.4% of the total variance in the SRS Total score. A significant model emerged, which consisted of the CBCL/ 6-18 Social Problems, Withdrawn/Depressed, and Thought Problems scales. These three scales together accounted for 35.7% of the total variance of the SRS Total score.

CHAPTER V

DISCUSSION

This chapter provides an integrative summary and interpretation of results for the current study. Results related to the specific hypotheses will be presented first, as well as an explanation of individual findings. The findings will then be discussed in regards to past literature and implications. Lastly, the limitations of the study and future directions will be presented.

Summary of Results

Research Question One

The first research question was concerned with the review of obtained T-scores from the Child Behavior Checklist/ 6-18 Parent Form (CBCL/ 6-18; Achenbach & Rescorla, 2001) from a sample using school-aged children with a diagnosis of high functioning autism (HFA). It was hypothesized that the Thought Problems, Withdrawn/Depressed, Social Problems, Attention Problems, and Anxious/Depressed scales from the CBCL/ 6-18 would be at least one and a half standard deviations above the mean (e.g., T-scores ≥ 65) suggesting a score in the borderline clinical range.

Descriptive statistics revealed mean T-scores greater than 65 for the Thought Problems and Anxious/Depressed scales. Sixty-one percent ($n = 33$) of the participants obtained a T-score of 65 or greater on the Thought Problems scale. Twenty eight participants obtained a T-score greater than 65 on the Anxious/Depressed scale which accounted for 51.85% of the total sample. None of the mean CBCL/ 6-18 T-scores fell within the clinically significant range (e.g., T-score ≥ 70) or more than two standard deviations above the mean T-score of 50. The elevated T-scores on the Thought Problems and Anxious/ Depressed scales were consistent with prior research using previous versions of the CBCL with individuals with autism (Biederman et al., 2010; Bolte et al., 2003; Duarte et al., 2003; Noterdaeme et al., 1999; Mazefsky et al., 2010).

An unexpected finding in the current study involved the mean CBCL/ 6-18 Social Problems T-score which failed to reach the borderline clinical range although the mean T-score was less than one point from falling within this range ($M = 64.4$; $SD = 8$). This finding is not consistent with the findings by Biederman et al. (2010) and Mazefsky et al. (2010) that found mean T-scores for the Social Problems scale in the clinical range (e.g., 70 or above). Additionally, the mean T-score for the Withdrawn/Depressed scale ($M = 63.1$; $SD = 9.3$), while less than two points away from the borderline clinical range, was lower than 65 and not within the borderline clinical range. This finding was not consistent with previous studies which found this scale to be elevated (Biederman, et al., 2010; Bolte, et al., 1999; Luteijn, et al., 2000; Mazefsky et al., 2010; Noterdaeme, et al., 1999). Furthermore, the current study did not replicate the findings of several previous studies indicating elevated mean T-scores on the Attention Problems scale (Biederman et al., 2010; Bolte et al., 2003; Mazefsky et al., 2010; Noterdaeme et al., 1999). The mean T-score for the Attention Problems scale in the current study was less than one point away from falling within the borderline clinical range ($M = 64.7$; $SD = 10$). In summation, although the mean T-scores for the Social Problems, Withdrawn/Depressed, and Attention Problems scales were lower than expected, they missed reaching the borderline clinical range (e.g., T-score of 65) by no more than two points.

There are several possible reasons why the current sample's CBCL/ 6-18 T-scores were slightly lower than that of prior research. While the current sample composition was highly similar to that of the Pennsylvania (PA) autism group ($N = 78$) from Mazefsky et al.'s. (2010) study with respect to eligibility criteria, exclusion criteria, and overall intellectual functioning, there were a few differences. First, the mean age from the PA autism group from Mazefsky et al.'s study was 11.2 years ($SD = 2.3$) compared to 13.3 ($SD = 3.4$) for the current study. Second, the current study contained two, six year-old children whereas the youngest age in Mazefsky et al.'s study was eight years-old. Third, Mazefsky

et al.'s study was comprised of 85.5% males whereas the current study consisted exclusively of white males; however, there were no gender differences found between males and females in Mazefsky et al.'s study for the CBCL/ 4-18 scales (Mazefsky, n.d.). The mean CBCL/ 6-18 T-scores from the current study were lower than those found by Mazefsky et al. for the CBCL/ 6-18 Total Problems, Social Problems, Thought Problems, Withdrawn/Depressed, Attention Problems, and Rule Breaking Behavior scales. However, all the mean T-scores from the current study were similar to that of those found by Mazefsky et al. when considering the standard deviations. Although the differences in obtained scores cannot be attributed to the sample inclusion of females in Mazefsky et al.'s study, this assumption would require further examination with the CBCL/ 6-18 because Mazefsky et al.'s study used the CBCL/ 4-18 version (Achenbach, 1991). Furthermore, gender differences were not examined in prior studies examining the CBCL (Biederman et al., 2010; Bolter, et al., 1999; Duarte, et al., 2003; Luteijn, 2000; Noterdaeme et al., 1999).

There were also demographic differences found in the other studies which may have contributed to the differences in obtained scores from the current study. The mean age of the child in Luteijn et al.'s (2000) PDD-NOS/ADHD group was 8.8 years with an age range of 5-12 years of age. Duarte et al.'s (2003) Brazilian study included children ages 4-11 with a mean age of 7.4 years. The mean of Bolte et al.'s (1999) study was 11.3 years; however, their sample included children as young as four years of age.

The method in which the participants were recruited in several of the previous studies differed from that of the current study. Several studies included participants referred from a mental health clinic which could suggest that these participants had undiagnosed or unrecognized comorbid psychiatric disorders (Biederman, et al., 2010; Duarte et al., 2000; Luteijn, 2000). The participants from the current study, as well as Mazefsky et al.'s (2010) PA autism group, were recruited through other methods such as conferences and media

ads and were not necessarily referred by a mental health agency. Furthermore, the presence of a comorbid psychiatric condition, such as depression or an anxiety disorder, was an exclusionary criterion.

Another possible explanation for the differences in scores could be that prior research using the CBCL (with the exception of Biederman et al., 2010) used the Achenbach (1991) version of the CBCL (CBCL/ 4-18; Duarte, et al, 2003; Luteijn, et al., 2000; Mazefsky et al., 2010; Noterdaeme et al., 1999). Furthermore, Bolte, et al. (1999) used the German version of the CBCL/ 4-18 and Duarte et al. (2003) used the Brazilian (Portuguese) version. In addition to an updated normative sample, the CBCL/ 6-18 differs from the CBCL/ 4-18 in that it includes six new items. A review of these new items indicate that three of the items are included on the Rule-Breaking Behavior scale, two are included on the Attention Problems scale, and one item is included on the Attention Problems scale. The two items included on the Attention Problems scale are "Fails to finish things he/she starts" and "Inattentive or easily distracted." The new CBCL/ 6-18 Withdrawn/Depressed item states "There is very little he/she enjoys." Achenbach and Rescorla (2001) state that "most children's scores would rank at nearly the same level on the new and 1991 versions" and "if a child's functioning has not changed much between assessments on the 1991 and new versions of a form, the children's syndrome score should be equivalent to about the same percentiles and T-scores on each version" (p. 166).

The lower scores on the CBCL/ 6-18 Attention Problems scale, when compared to previous studies, may be a result of the eligibility requirements and study expectations for the participants in the current sample. The participants in the current study were part of a larger research study in which the participants were required to complete several hours of neuropsychological tests and be able to remain attentive and comply with directions in order to complete computerized tests while lying still inside a MRI scanner to complete a functional magnetic resonance imaging (fMRI) study.

The lower than expected mean T-scores for the CBCL/ 6-18 Social Problems and Withdrawn/Depressed scales may be attributed to the sample composition. The eligibility criteria for the participants in the current study excluded the diagnosis of certain comorbid psychiatric conditions such as depression and anxiety disorder. Second, the difference could possibly be related to an interpretation bias of the parents (mainly mothers), who may perceive maladaptive behaviors exhibited by their sons differently than that of other individuals who have regular contact with the child (such as fathers or teachers). This difference in perception may be attributed to the fact that the mother is typically the primary caretaker of children and as such, may be more accustomed to the behavioral concerns demonstrated by their child with autism. This could influence the severity of the rating provided by the individual. This is an area that has had little research and it may be valuable to investigate parental differences in CBCL/ 6-18 ratings, as comparing parent and teacher ratings, using a sample of children with autism.

The CBCL/ 6-18 Internalizing Problems scale consists of the Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints scales. A review of the Pearson's correlations revealed that these scales were strongly and positively correlated with the Internalizing Problems scale. The CBCL/ 6-18 Externalizing Problems scale is comprised of the Rule Breaking Behavior and Aggressive Behavior scales. A strong and positive association between these scales was also found in the current study. All of the CBCL/ 6-18 scales were strongly and positively correlated with the CBCL/ 6-18 Total Problems scale. There was not a significant correlation between the CBCL/ 6-18 scales and administration age in this sample. This is an expected finding since the CBCL/ 6-18 T-scores are based on age norms. These findings are consistent with Achenbach's and Rescorla's (2001) results from the standardization of the CBCL/ 6-18 suggesting that, broadly speaking, the results from the current sample using the CBCL/ 6-18 with a school-aged children with autism seem to be measuring

behavior constructs in a manner similar to that of the general (non-autistic) population.

Research Question Two

The second research question was concerned with the profile of T-scores from the Social Responsiveness Scale Parent Form (SRS; Constantino & Gruber, 2005) using a sample of school-aged children with HFA. It was hypothesized that the T-scores from the SRS Total Score and the five treatment scores (Social Awareness, Social Cognition, Social Communication, Social Motivation, and Autistic Mannerisms) would be at least one standard deviation above the mean (e.g., T scores > 60) and not within the normal range.

Descriptive statistics revealed mean T-scores were greater than 60 for all of the SRS scales. Thirty-three participants (61.11%) from the entire sample obtained a SRS Total T-score of greater than 76, which is considered to fall within the severe range (Constantino & Gruber, 2005). The mean T-score from all five of the SRS Treatment scales were greater than 69.

There was only one participant whose SRS Total T-score was less than sixty (T = 58). This individual's scores fell below the sample's mean for all of the SRS scales with the exception of the Social Awareness scale. Constantino and Gruber (2005) indicated that "rarely, children with very mild, high functioning autism spectrum conditions, may be rated in the upper end of this (average) range (55T to 59T)" (p.11). This individual met both the ADOS-G and ADI-R criteria for autism in order to be eligible for the study. Additionally, further investigation into this participant's scores revealed that his mean CBCL/ 6-18 T-scores fell within the standard deviation range. Thus, although the overall responses from the individual who completed the SRS on this individual's behalf were lower than the sample mean, the fact that he met the ADOS-G and ADI-R criteria provides supportive evidence that he has an autism spectrum disorder.

There were no significant correlations ($p > .01$) found between the T-scores from the SRS scales and age with correlations ranging from $-.06$ to $.05$. The five

SRS treatment scales were strongly and positively associated with the Total SRS T-score with correlations ranging from .66 to .80 ($p < .01$). Moderate to strong statistically significant correlations ($p < .01$) were found between the five treatment scales, with the exception of the association between the Social Awareness and Social Motivation scales. This would suggest that the participants' parents did not observe their sons exhibiting increased symptoms of social anxiety or inhibition as their child's difficulty with identifying verbal and nonverbal social cues increased. A possible explanation for this finding is that the child with autism may not display outward signs of anxiety or social inhibition because they have failed to pick up on social cues from others in the first place. Consequentially, they fail to respond to the verbal and/or nonverbal feedback from others in order to adjust their social demeanor to match the context of the social situation (Bellini, 2004).

Research Question Three

The third research question focused on the relationship between the CBCL/ 6-18 and SRS scales. It was hypothesized that a moderate and positive relationship would be present between the T-scores from the CBCL/ 6-18 Social Problems, Thought Problems, Withdrawn/Depressed, Anxious/Depressed, and Attention Problems scales and the SRS Total T-score. On the other hand, it was hypothesized that there would not be a significant relationship between the T-scores from the CBCL/ 6-18 Somatic Complaints, Rule-Breaking Behavior, and Aggressive Behavior scales and the SRS Total Score.

Bivariate correlations (Bonferroni adjusted) revealed statistically significant ($p < .01$) strong and positive correlation between the SRS Total Score and the CBCL/ 6-18 Total Score. The CBCL/ 6-18 Total score accounted for 32.49% of the variability in the SRS Total Score. Thus, to an extent, the CBCL/ 6-18 is measuring an aspect of behavioral symptoms commonly associated with the diagnosis of an autism spectrum disorder. An examination of the relationship among the

CBCL/ 6-18 and SRS scales revealed moderate to strong relationships among the scales from the two instruments.

A moderate and positive relationship between the SRS Total Score and the CBCL/ 6-18 Social Problems, Thought Problems, Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints scales was demonstrated in the current study. A statistically significant ($p < .01$) but small positive relationship was found between the SRS Total Score and the CBCL/ 6-18 Attention Problems scale. A statistically significant and large positive relationship (Bonferroni adjusted) was found between the SRS Total Score and the CBCL/ 6-18 Total Problems and Internalizing Problems scales ($p < .01$).

A review of the relationship between the SRS treatment scales and the CBCL/ 6-18 scales revealed that the SRS Autistic Mannerisms scale demonstrated moderate to large positive correlations (Bonferroni adjusted) with the CBCL/ 6-18 Social Problems, Thought Problems, Anxious/Depressed, Attention Problems, Somatic Complaints, Internalizing Problems, and Total Problems scales. The SRS Autistic Mannerisms scale assesses observed stereotypical behaviors or highly restricted interests. Items include, "When under stress, show rigid or inflexibility patterns of behavior that seem odd", "Shows unusual sensory interest", "Has more difficulty than other children with changes in routine", "Thinks or talks about the same thing over and over", "Is regarded by peers as strange or odd", "Can't get mind off of something once he/she starts thinking about it", "has an unusually narrow range of interests", "touches others in an unusual way", and "Does extremely well at a few tasks, but does not do as well at most other tasks" (Constantino & Gruber, 2005). Although no one specific stereotypical behavior or repetitive behavior is specific to autism, several studies have found a pattern of multiple restricted repetitive behaviors that can best distinguish autism from other disorders (Bodfish, Symons, Parker, & Lewis, 2000). Szatmari, et al. (2006) indicated that unlike motor stereotypies and compulsions (which are often found in other psychiatric conditions), certain repetitive and restricted

behaviors, such as unusual preoccupations, unusual attachments, and circumscribed interests, may be of particular importance in autism. Lam, Bodfish, and Piven (2008) reported the adverse impact of stereotypical behaviors and restricted interests on social and behavioral functioning in individuals with autism. Furthermore, Bellini (2004) indicated that the presence of anxiety in children with autism often increases the frequency and intensity of repetitive and stereotypical behaviors. Thus, it is not surprising that the Autistic Mannerisms scale demonstrated a moderate to strong correlation with the CBCL/ 6-18 scales, which is a measure of emotional and behavioral dysfunction/ distress.

The SRS Social Cognition scale was moderately and positively associated with the CBCL/ 6-18 Total Problems scale. Moderate and positive correlations were also found between the SRS Social Communication and the CBCL/ 6-18 Social Problems and Internalizing Problems scales. These supportive findings make sense in that having a deficit in one's ability to interpret social cues would likely result in observed problematic behaviors such as anxiety, depression, and overall quality of social interactions with others (Bellini, 2004).

The SRS Social Motivation scale was moderately and positively associated with the CBCL/ 6-18 Anxious/Depressed and Internalizing Problems scales. The SRS Social Motivation scale was at a strong level and positively associated with the CBCL/ 6-18 Withdrawn/Depressed scale. This is an expected result given that the items from these scales measure very similar constructs. The SRS Social Motivation scale measures the extent to which an individual is generally motivated to engage in social interactions and assesses a person's observed level of social anxiety, social inhibition, and expression of empathy in social interactions (Constantino & Gruber, 2005). The CBCL/ 6-18 Withdrawn/Depressed scale includes items such as, "rather be alone", "withdrawn", "shy, timid", "enjoys little", "won't talk", and "secretive."

One area that that demonstrated a significant moderate correlation with the SRS Total Score surprisingly is the CBCL/ 6-18 Somatic Complaints scale. While

there was a strong association between these two scales and this finding suggests a need for further investigation, it is noteworthy to mention that the current sample contained only 54 participants and only 24.1% of the sample obtained a T-score greater than 65 for the CBCL/ 6-18 Somatic Complaints scale. That withstanding, this association was slightly stronger than that between the SRS Total Score and the CBCL/ 6-18 Attention Problems scale. The CBCL/ 6-18 Somatic Complaints scale accounted for 16.81% of the variance in the SRS Total score compared to 14.44% of the variance accounted for by the Attention Problems scale. The CBCL/ 6-18 Somatic Complaints scale measures behavioral issues related to the body and signals to the body that there is some level of discomfort, such as headaches, dizziness, aches/pains, nausea, stomachaches, eye problems, skin problems, and nightmares. Thus, the Somatic Complaints scale is intended to measure observed or reported physical complaints with no medical basis for the physical discomfort/ distress. Therefore, the scale is more of a measure of psychosomatic concerns in individuals. The CBCL/ 6-18 Somatic Complaints scale was also moderately correlated with the SRS Autistic Mannerisms scale. Although, the mean Somatic Complaints T-score from the current study did not fall within the borderline clinical range, there are some reasons why the Somatic Complaints score would be moderately associated with the Total SRS scales and Autistic Mannerisms scales.

First, an unusual pattern of hypersensitivity and/or hyposensitivity to sensory perception and reaction, in addition to sensory-perceptual abnormalities, have long been associated with autism spectrum disorders (Tsuji et al., 2009). Royeen and Lane (1991) suggested the term 'sensory defensiveness' in describing a tendency to react negatively (or with alarm) to sensory input that is generally considered harmless or non-irritating. This reaction is often viewed by others as acting in a hypersensitive or an over-responsive nature. Pfeiffer, Kinnealey, Reed, and Herzberg (2005) found a relationship between hypersensitivity and anxiety and depression, in addition to hyposensitivity and depression, among

adolescents with an autism spectrum disorder. Second, the presence of physical discomfort would likely cause an individual to have difficulty concentrating, attending, and desiring to engage in social interactions. To some degree, chronic or acute physical discomfort would likely contribute to feelings of nervousness, worry, or anxiety in children.

Research Question Four

Research question four sought to determine which CBCL/ 6-18 scales would be more predictive of an elevated (higher) SRS Total T-score in a sample using children with HFA. Based on prior research using the CBCL with individuals with autism (Biederman et al., 2010; Bolte et al., 2003; Luteijn et al., 2000; Mazefsky et al., 2010; Noterdeame et al., 1999) it was hypothesized that the CBCL/ 6-18 Social Problems, Thought Problems, Withdrawn/Depressed scales would be more highly elevated than the other CBCL/ 6-18 scores. Therefore, these scales would predict an elevated SRS Total T-score and thus account for more shared variance in the SRS Total Score. The results from the current study indicated that the mean T-score for the Social Problems and Thought Problems scales were lower than that found by Mazefsky et al.'s PA and Virginia (VA) autism groups. More significantly is a comparison of the sample percentage obtaining scores at or above the borderline clinical range. The percentage of the current sample obtaining a score within this range for the Social Problems scale was 42.6% compared to 71.2% found by Mazefsky et al. Similarly, the percentage of scores that fell at or above the borderline clinical range for the Thought Problems scale was 61.1% for the current study and 82.4% for the study conducted by Mazefsky et al. The mean T-score from the CBCL/ 6-18 Withdrawn/Depressed scale was slightly lower for the current study; however, only 35.2% of the current sample obtained a score at or greater than the borderline clinical range compared to 55.5% found in Mazefsky et al.'s study. A direct comparison of this nature could not be conducted with the other studies reviewed because frequencies were

not reported in their analyses (Biederman, et al., 2010; Bolte, et al., 2003; Luteijn, et al., 2000, Noterdaeme, et a., 1999).

It is unclear as to why these percentages differed between the two samples. The mean Communication and Social Total algorithm score from the Autism Diagnostic Observation Schedule-Generic (ADOS-G; Lord et al., 2000) for the current sample was 13.8 (S.D. = 3.3) with a range of scores from 7 to 22. The ADOS-G cut-off score for an autism classification is an algorithm score of 12. This is the sample eligibility cut-off score for participants in Mazefsky et al.'s (2010) study. Thus, the overall severity of autistic symptomology between the two sample groups was relatively similar. A possible hypothetical explanation for the lower CBCL/ 6-18 scores obtained in the current sample may be attributed to the possibility that the children in the current sample received an earlier diagnosis of an autism spectrum disorder, and as such, received more effective behavioral interventions earlier than did the participants in Mazefsky et al.'s autism group. This is purely speculative in nature as there are no data to support this claim as the current data are archival and this information was either not collected or made available. However, examining the differences in age of diagnosis and the impact of early behavioral interventions with respect to CBCL/ 6-18 scores would add additional support for the use of the CBCL/ 6-18 with individuals on the autism spectrum.

The T-score for the CBCL/ 6-18 Anxious/Depressed scale was similar to that of Mazefsky et al.'s (2010) PA and VA autism groups, as was the percentages of children obtaining scores at or above the borderline clinical range. A plausible explanation for this observation is that individuals with an autism spectrum disorder frequently present with other psychiatric disorders, the most common of which being anxiety or depression (Klin, 2004). Several researchers have noted the high clinical prevalence of anxiety in individuals with an autism spectrum disorder (Atwood, 1998; Kim et al., 2000; Tantum, 2000). Kim et al. (2000) reported that anxiety is more prevalent in children with an autism spectrum

disorder than in the general population. Particularly, the researchers found that 13.6% of the children with HFA in their sample scored more than two standard deviations above the mean on a measure of anxiety (Kim et al., 2000). A similar conclusion was found by Green, Gilchrest, Burton, and Cox (2000) who found that children with Asperger's Syndrome were more likely to have experienced symptoms of anxiety than children identified with a conduct disorder. In fact, 35% of the children with Asperger's Syndrome in their study also met the diagnostic criteria for generalized anxiety disorder. Additionally, individuals with an autism spectrum disorder may experience symptoms of anxiety due to agitation over changes in routines, a need for sameness, sensory sensitivities, and/ or social skill deficits (Bellini, 2004; Grandin, 1995; Howlin, 1998; Williams, 1994).

The current sample's mean T-score from the CBCL/ 6-18 Attention Problems scale was greater than that of the mean T-scores from the Withdrawn/Depressed scale. This finding was similar to that found by Mazefsky et al. (2010). However, whereas Mazefsky et al. found that 64.1% of their sample met or exceeded the score to be considered in the borderline clinical range, only 38.9% of the current sample fell within this classification range. Elevations on the Attention Problems scale were not entirely unexpected. Difficulties with inattention and hyperactivity are common in children with an autism spectrum disorder, especially HFA. Several studies have indicated that 50-80% of children with an autism spectrum disorder also met diagnostic criteria for attention deficit hyperactivity disorder (ADHD; Frazier et al., 2001; Gadow, Devincent, Pomeroy, & Azizian, 2005). Biederman, Newcorn, and Sprich (1991) reported that children on the autism spectrum often have comorbid diagnoses of ADHD and anxiety disorder. Another explanation for why children with an autism spectrum disorder may exhibit attentional difficulties has to do with their engagement in stereotypical behaviors (Pliszka, Swanson, & Carlson, 2003). Children engaging in a high degree of stereotypes cannot be attentive to other things. The children in the current study were rated by their parents as engaging in a high

degree of stereotypical behaviors, as evidenced by the elevated SRS Autistic Mannerisms scale.

Additional support for observed attentional difficulties in children with an autism spectrum disorder is provided by Garago, Rinehart, Bradshaw, Tonge, and Sheppard (2011). Garago et al. indicated that some of the more consistently observed behaviors in high functioning autism are in fact core features of neuropsychiatric disorders, such as ADHD. Furthermore, there are many examples of ADHD being comorbid with other frontostriatal disorders, such as obsessive compulsive disorder, oppositional defiant disorder, conduct disorder, and Tourette's disorder. These disorders are also commonly observed in children with autism (Garago et al., 2011).

A review of the Pearson's correlations coefficients (r) revealed that that the CBCL/ 6-18 Social Problems scale accounted for 24.01% of the variance in the SRS Total score. The CBCL/ 6-18 Withdrawn/Depressed accounted for 19.36% of the variance in the Total SRS score. The CBCL/ 6-18 Thought Problems and Anxious/Depressed scales both accounted for 18.49% of the variance in the Total SRS Score followed by 16.81% shared variance between the Somatic Complaints and SRS Total Score. The CBCL/ 6-18 Attention Problems scale accounted for 14.44% of the shared variance with the SRS Total Score. As mentioned previously, the Total Problems scale from the CBCL/ 6-18 (which is comprised of all the CBCL/ 6-18 scales) explained 32.49% of the variance in the SRS Total score. Constantino, et al. (2003) found that all of the subscales from the CBCL/ 4-18 (Achenbach, 1991) accounted for 43% of the variance in SRS scores. Furthermore, Constantino et al. indicated that the CBCL/ 4-18 Attention Problems and Social Problems scales contributed most to the total variance in SRS scores. These results are not consistent with the current study, however; there may be some explanations for this difference. First, the sample size was much larger in the Constantino, et al. study. Their study was completed on 219 pairs of male twins who did not have an autism spectrum diagnosis. Second, Constantino et al., indicated that the SRS

and CBCL/ 6-18 measures were not collected simultaneously, occurring up to two years apart for any given twin pairs.

Despite these methodological differences, the study by Constantino, et al. (2003) provided evidence for the relationship between the SRS and the CBCL, particularly the CBCL Social Problems and Attention Problems scales. As a result of their finding, in conjunction with the supportive evidence from prior studies examining the CBCL profile using individuals with autism (Biederman et al., 2010; Bolte et al., 2003; Duarte et al., 2003; Luteijn et al., 2000; Noterdaeme et al., 1999; Mazefsky et al., 2010), the multiple linear regression analyses were conducted in the current study to determine which CBCL/ 6-18 scales would be more predictive of an elevated SRS Total Score and therefore more diagnostically informative of an autism spectrum disorder.

A hierarchical multiple linear regression analysis was conducted in which the Social Problems, Thought Problems, and Withdrawn/Depressed CBCL/ 6-18 scales were entered in the first step based on prior research using the CBCL. The Anxious/Depressed and Attention Problems CBCL/ 6-18 scales were entered in the second step based on prior research indicating these scales were also found to be elevated in prior research using individuals with autism.

A stepwise multiple linear regression analysis was also employed to determine which predictor variables and combinations would best predict an elevated SRS Total score. In this method, the statistical software used (*SPSS version 19*) begins with a model that includes only a constant and then adds single predictors to the model based on the value of the score statistic. The value with the most significant score statistic is added to the model and this procedure continues until none of the remaining predictors have a significant impact on the regression model ($p < .05$; Field, 2000). For this analysis, the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales were used based on prior research.

The results of the hierarchical multiple linear regression analysis indicated that the model consisting of the CBCL/ 6-18 Withdrawn/Depressed, Thought Problems, and Social Problems scales accounted for 36% of the total variance in the SRS Total score. The addition of the CBCL/ 6-18 Attention Problems and Anxious/Depressed scales did not statistically contribute to the overall prediction model as they accounted for less than 3% of the total variance of the SRS Total score within the model. The results of the stepwise multiple linear regression analysis revealed that the model that consisted of the CBCL/ 6-18 Social Problems, Thought Problems, and Withdrawn/Depressed scales accounted for 35.7% of the total variance in the SRS Total score. In this model, the Social Problems scale contributed most to the overall model, accounting for 24% of the total variance of the SRS Total Score. The Thought Problems scale accounted for an additional 6% total variance above and beyond what the Social Problems scale. Lastly, the Withdrawn/Depressed scale accounted for an additional 6% of total variance above and beyond the Social Problems and Thought Problems scales together.

A comparison of the two regression analyses revealed that the hierarchical multiple linear regression analysis, which consisted of the Withdrawn/Depressed, Thought Problems, and Social Problems scales, accounted for 38% of the total variance in the SRS Total score. This analysis indicated that the Withdrawn/Depressed scale contributed most to the overall predictive model. The results of the stepwise multiple linear regression analysis indicated that the Social Problems, Thought Problems, and Withdrawn/Depressed scales accounted for 35.7% of the variance in the SRS Total score. This analysis revealed that the Social Problems scale accounted for 24% of the variance in the SRS Total score. Furthermore, there was very little additive explanatory power with the five-variable model (accounting for approximately 38% of the variance) compared to the three-variable model consisting of the Social Problems, Thought Problems, and Withdrawn/Depressed scales (accounting for approximately 36% of the variance in

SRS Total score. The hierarchical regression model and the three-variable stepwise regression model were similar in their findings. The hierarchical model provides more support to the findings of the overall study as it is theory driven rather than based on an examiner's interpretation of which variables to enter into the regression model. Therefore, elevated scores in the hierarchical model, which contains the Social Problems, Withdrawn/Depressed, and Thought Problems scales, warrant further investigation as they demonstrate evidence for predicting an elevated SRS Total Score, and consequentially, the potential for an autism spectrum diagnosis.

The findings from the current multiple linear regression analyses are consistent with the findings by Biederman et al. (2010) and Mazefsky et al. (2010). Biederman et al. concluded that the CBCL/ 6-18 Withdrawn/Depressed, Social Problems, and Thought Problems scales were the best independent predictors of an autism diagnosis in their sample using children with autism. Mazefsky et al. found that the Social Problems and Thought Problems scales from the CBCL/ 4-18 (Achenbach, 1991) were significant predictors of an autism diagnosis in their sample using children with HFA. Duarte et al.'s (2003) study found that the Thought Problems scale alone perfectly differentiated between their autism group and their control (e.g., typically-developing) group with 100% specificity. Noeterdaeme et al. (1999) concluded in their study using the CBCL/ 4-18 (Achenbach, 1991) with 34 children with autism that the Social Problems, Attention Problems, and Withdrawn scales were more highly elevated when compared to a group of children with a language impairment.

Conclusion

The present study examined the relationship between the CBCL/ 6-18 and the SRS using a sample of 54 school-aged males with HFA. Hypothesized results of research questions were met with mixed findings. Overall, the results of the current study provided additional preliminary support for the utility of the CBCL/ 6-18 to screen for an autism spectrum disorder, particularly among those

individuals on the higher functioning end of the spectrum. While promising, further studies replicating these findings using individuals with HFA is needed as nearly half of the participants in the study did not obtain T-scores greater than 65 for the Social Problems, Thought Problems, and Withdrawn/Depressed scales. Additionally, as autism is a spectrum disorder, it would be highly beneficial to determine if a similar profile of scores is obtained when used with individuals with autism who are lower functioning. The results of the current study found similarities and differences with prior research using the CBCL with individuals with an autism spectrum disorder (Biederman et al., 2000; Bolte et al., 2003; Duarte et al., 2003; Luteijn et al., 2000; Mazefsky, et al., 2010, & Noterdaeme et al., 1999).

This study also demonstrated preliminary evidence of the relationship between the broad band CBCL/ 6-18 rating scale and the narrow band (e.g., autism specific) SRS. Thus, this study supports the utility of the examination of the CBCL/ 6-18 profile for elevated scores on the Social Problems, Thought Problems, and Withdrawn/Depressed scales as a potential first level screen for an autism spectrum disorder in children. The study provides a supportive indicator for school psychologists to utilize the CBCL/ 6-18 in their screening and evaluation process. The current findings support the school psychologist's professional decision to engage in a more detailed follow-up assessment, or to refer a parent to an outside agency, for such a follow-up assessment, should a student obtain a similar CBCL/ 6-18 profile. This assessment could include the administration of the SRS and eventually a more comprehensive evaluation to determine the presence of an autism spectrum disorder. Furthermore, the relationship between the CBCL/ 6-18 and SRS scales, particularly the CBCL/ 6-18 Somatic Complaints scale and the SRS Autistic Mannerisms scale, may suggest that these two scales are assessing the individual's exaggerated responses to typical sensory stimulation. This sensory over-responsivity has been demonstrated in individuals with an autism

spectrum disorder (Baranek, et al., 2002; Dunn, Smith-Myles, & Orrs, 2002; Rogers & Ozonoff, 2005).

For the purpose of identifying children with autism who have been undiagnosed by pediatricians, previous school personnel, and other clinicians, a screening measure that alerts school psychologists to the need for further evaluation is important. However, the school psychologist would have to possess enough knowledge about milder forms of an autism spectrum disorder, such as HFA, Asperger's Disorder, or Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS) to know when to administer such a screening measure. In the absence of any screening measure that is 100% accurate, it is equally important for the school psychologist to know how to interpret the results rather than just rely on an obtained score for decision making. The low base rate of most disorders means that a screening measure with even very high sensitivity and specificity will correctly identify the disorder less than half the time (Clark & Harrington, 1999). The prevalence rate of autism is expected to occur in 1 in 110 children in the United States (Centers for Disease Control and Prevention, 2010).

Fombonne (2005) reviewed epidemiological studies of autism and related disorders and found the following conservative prevalence estimates: 13/10000 (autistic disorder), 21/10000 (PDD-NOS), and 2.6/10000 (Asperger's disorder). The U.S. Department of Education, Office of Special Education Programs (2005) reported that 292,638 students aged 6-21 years old were served under IDEA under the classification of autism in the year 2008. Autism is still considered a "low incident" disability; however, the U.S. Department of Education (2005) anticipates further increases in the number of children being identified with autism and subsequently being provided special education services. Thus, even with a base rate of 1%, then a measure with 90% specificity and sensitivity would result in a positive predictive value of less than 10%. Thus, less than 10% of individuals obtaining a score above an instrument's recommended cutoff would actually have autism. The Autism Behavior Checklist (ABC; Krug et al., 1980),

Asperger's Syndrome Diagnostic Scale (ASDS; Myles et al., 2001), and the Gilliam Autism Rating Scale-Second Edition (GARS-2; Gilliam, 2006) do not approach 90% sensitivity or specificity, thus all would result in lower prediction values. Therefore, much work is needed before individuals with HFA are rapidly and accurately identified so that proper educational and related services can be provided. The prevalence rate and wide range of behavioral symptoms expressed by individuals with an autism spectrum disorder make this proper identification difficult.

Within the school system, teachers often refer students for an evaluation or consultation based on observed problem behaviors displayed in the classroom. These behaviors often include inattentiveness, hyperactivity, difficulty concentrating, excessive worrying, work refusal, difficulty following directions, and difficulty interacting with peers. These symptoms are commonly exhibited and associated with an autism spectrum disorder as well as other childhood disorders, such as attention deficit/ hyperactivity disorder (ADHD), anxiety disorder, mood disorder, or language impairment. Therefore, it is important for school psychologists to be able to explore the causes of these behaviors in order to provide the most effective treatment and services. The results of the current study provide the school psychologist with the support to use the CBCL/ 6-18 as a brief screening instrument for this purpose in an effort to determine the possible presence of an autism spectrum disorder and the need for a more comprehensive evaluation. Furthermore, the relationship between the CBCL/ 6-18 Somatic Complaints scale and the SRS Autistic Mannerisms scale would suggest a need for the school system to initiate a comprehensive school-based occupational therapy evaluation to address unrecognized sensory needs of the child. It is imperative to mention that scores do not diagnose autism, or any other childhood disorder. For a diagnostic assessment to be valid, a comprehensive evaluation that consists of a parent interview focusing on current and past developmental and behavioral functioning, multiple observations of a child in

different settings, and a review of pertinent educational and medical records is essential. This takes considerable time and resources for school psychologists and clinicians. The efficiency of the CBCL/ 6-18 as a screening instrument for autism spectrum disorders would assist school psychologists, school administrators, and clinicians in making a reasonable decision in deciding whether allocating time and resources for such a comprehensive evaluation is warranted.

Limitations

Limitations are inherent in any research study. In this current study, only the Parent Forms of the SRS and CBCL/ 6-18 were used. Having multiple informants provide information on the behavioral functioning of a student in a variety of environments would only increase the school psychologist's clinical and professional interpretation of results. Furthermore, a comparison of responses from multiple informants would allow the school psychologist to avoid making erroneous and misleading diagnostic and eligibility decisions based on misleading and narrow findings. Constantino and Gruber (2005) recommend that "clinical assessments using the SRS involve reports from more than one source whenever possible, preferably a parent and a teacher or daycare provider" (p.14). Second, this current study only examined male participants. However, given that the prevalence rate of autism is higher in males than in females (APA, 2000); the study results should generalize to the majority of the autism population. An understanding of whether there would be a similar profile in females with HFA would be invaluable for school psychologists to further aid in the identification of females with an autism spectrum disorder. Third, the present study only examined Caucasians. While racial difference with respect to the presentation of an autism spectrum disorder has not been conclusive (Fombonne, 2003) rates of accurate identification and misidentification among minorities have been reported (Mandell et al., 2002, 2005, 2009). Fourth, there were no psychiatric or typically- developing control groups to compare the CBCL/ 6-18 and SRS profiles.

Comparing and contrasting the profile of CBCL/ 6-18 scores to that of other childhood disorders commonly mistaken for HFA, such as ADHD, language impairment, mood disorder, or anxiety disorder, would empower the school psychologist's confidence and expertise in assessing children with HFA. Lastly, the current study excluded individuals with comorbid psychiatric diagnoses and did not administer measures assessing for other psychiatric conditions such as depression or anxiety. Individuals with autism, particularly HFA, often have comorbid diagnoses of anxiety and/or depression (Bellini, 2004); therefore, the presence of a comorbid psychiatric disorder could influence CBCL/ 6-18 and SRS scores.

Directions for Future Research

Future research may want to focus on replicating the current findings with the Teacher Report Forms from the CBCL/ 6-18 and the SRS. This would be highly beneficial as it would provide additional information on the behavioral functioning of a child with an autism spectrum disorder within another natural setting (e.g., school) rather than the home environment, thus sharpening the utility of the CBCL/ 6-18 as an accurate screening measure for autism spectrum disorder. Exploring the effects of gender and race on the CBCL/ 6-18 and the SRS would provide support for generalization to specific groups. Additionally, replicating the current findings with children with autism who demonstrate lower cognitive abilities would provide additional insight into the effectiveness of the CBCL/ 6-18 as a screening instrument for the entire autism spectrum. The usefulness of the current study's findings would be improved if children with an autism spectrum disorder could be compared to children with other developmental and psychiatric conditions such as attention deficit hyperactivity disorder (ADHD), anxiety disorder, depression, speech and language impairment, and intellectual disability. Future research examining the sensory integration dysfunction and the CBCL/ 6-18 and SRS would broaden the utility of the instruments as a screening measure for more comprehensive evaluations. A comparison of how other commonly used broadband rating scales, such as the

Behavior Assessment System for Children-Second Edition (BASC-2; Reynolds and Kamphaus, 1992). An examination of possible CBCL/ 6-18 cut-off scores to decide when to refer for a more comprehensive evaluation may prove beneficial for school psychologists and other clinicians. Potentially examining raw scores rather than overall (i.e., total) scores could prove beneficial as it would alleviate concerns about the impact of age differences. Lastly, more supportive evidence for the utility of the CBCL/ 6-18 as a brief screening measure for ASD could be obtained by examining specific patterns and combinations of CBCL/ 6-18 scales with respect to the percentages of individuals who obtained scores greater than a T-score of 65. This could provide evidence of a profile of elevated CBCL/ 6-18 scales within the autism population.

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Appendix A

Permission Letter from Nancy J. Minshew, M.D.



University of Pittsburgh

*School of Medicine
Autism Research Program
An NICHD Autism Center of Excellence*

*Webster Hall – Suite 300
3811 O'Hara Street
Pittsburgh, PA 15213
Telephone 412-246-5850; Fax 412-246-5470*

February 18, 2011

Gurmal Rattan, PhD
Indiana University of Pennsylvania
251 Stouffer Hall
1175 Maple Street
Indiana, PA 15705-1082

Dear Dr. Rattan,

I give permission for Richard Glosser to use data from the National Institute of Child Health and Human Development (NICHD) research grant, conducted between the years 1998-2009, for which I was the Director. He may use this data for his dissertation titled "Examination Of The Relationship Between The Child Behavior Checklist 6/18 And The Social Responsiveness Scale Parent Forms Using Individuals With High Functioning Autism."

If I can be of further help, please feel free to contact me.

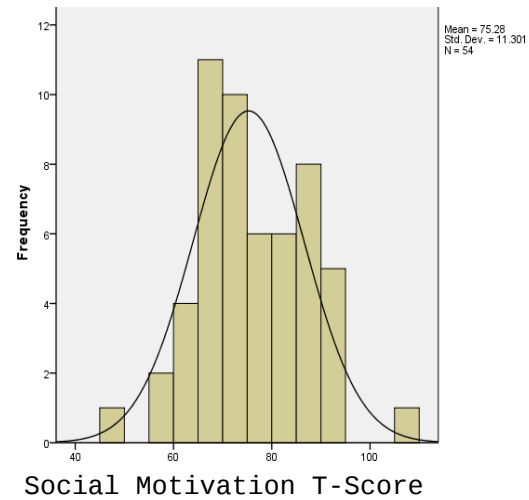
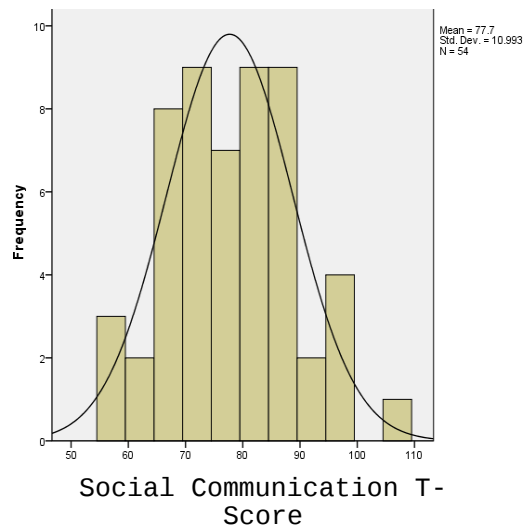
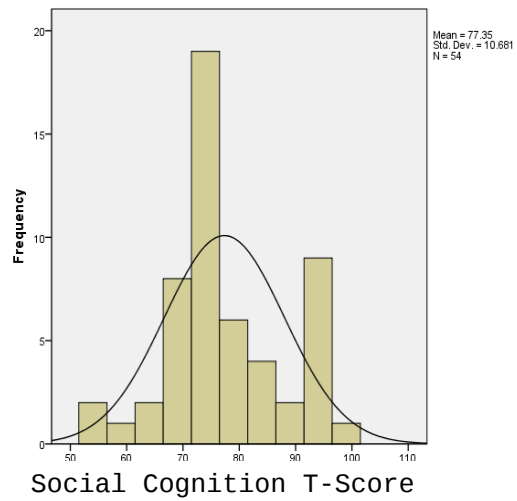
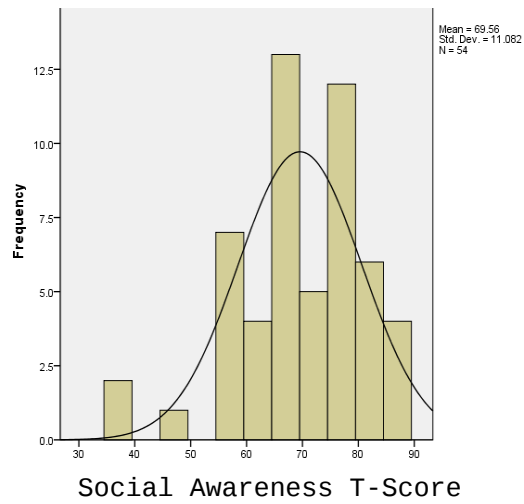
Sincerely,

A handwritten signature in cursive script that reads "Nancy Minshew".

Nancy J. Minshew, MD
Professor of Psychiatry & Neurology
University of Pittsburgh School of Medicine
Director, University of Pittsburgh's NIH Autism Center of Excellence (ACE)

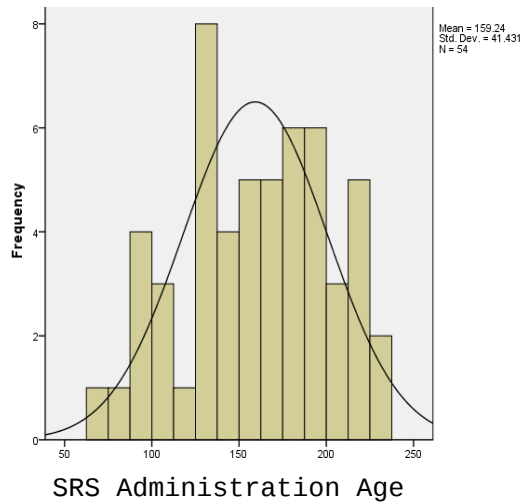
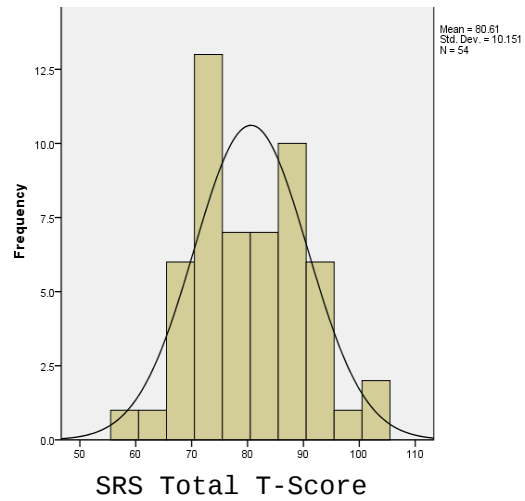
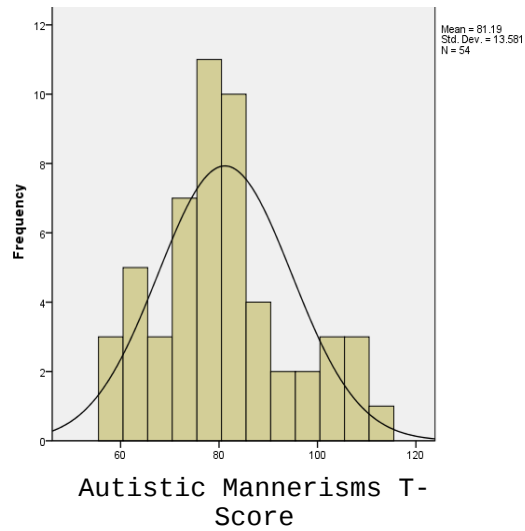
Appendix B

T-Score Distributions for SRS Social Awareness, Social Cognition, Social Communication, and Social Motivation Scales



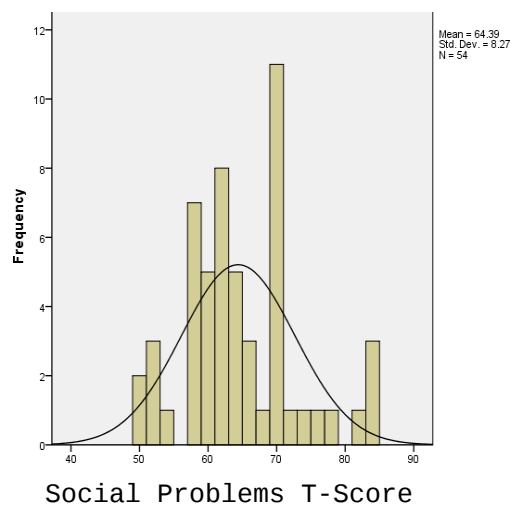
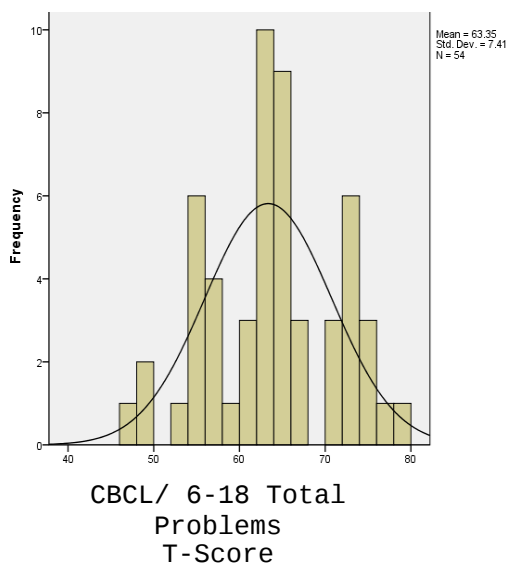
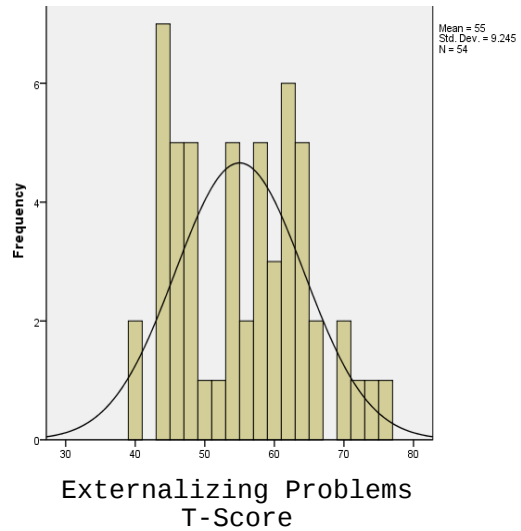
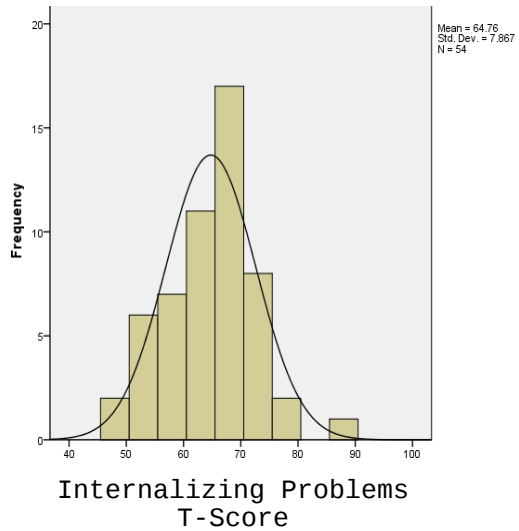
Appendix C

T-Score Distributions for SRS Autistic Mannerisms, SRS Total Score, and SRS Administration Age



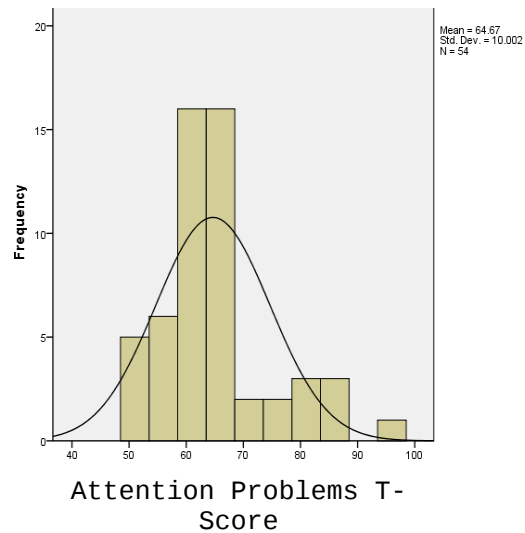
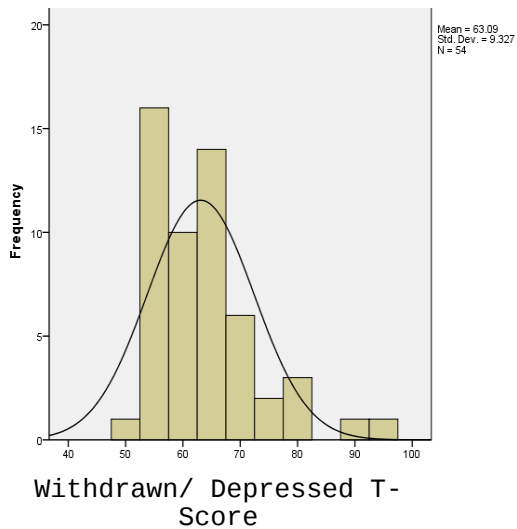
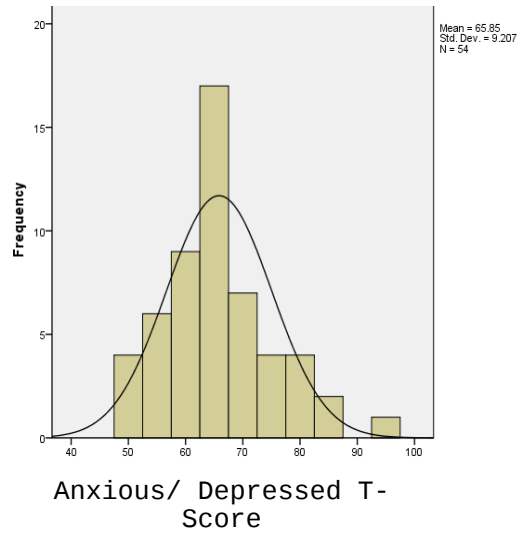
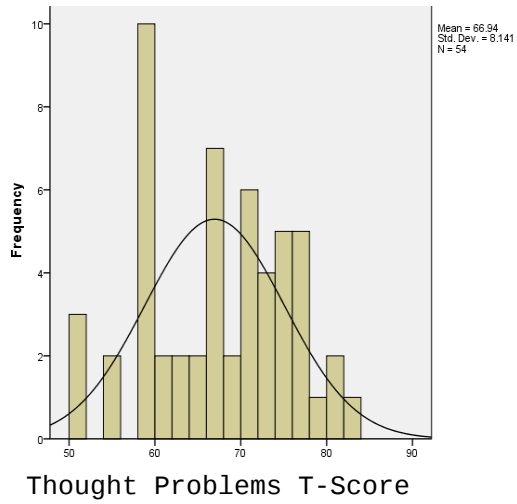
Appendix D

T-Score Distribution for the CBCL/ 6-18 Internalizing Problems, Externalizing Problems, Total Problems, and Social Problems Scales



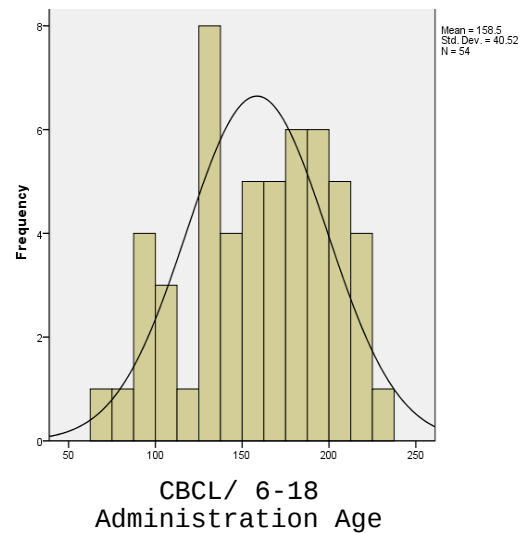
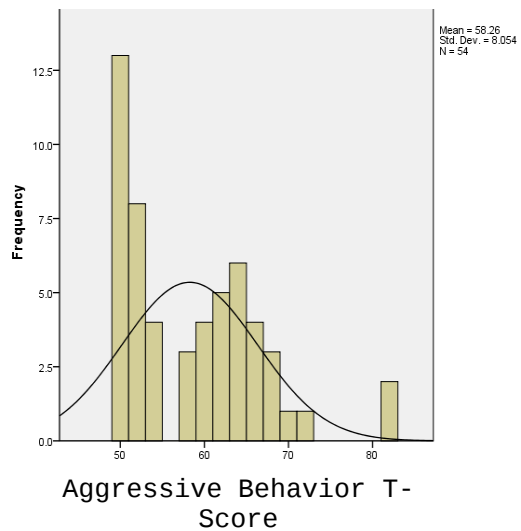
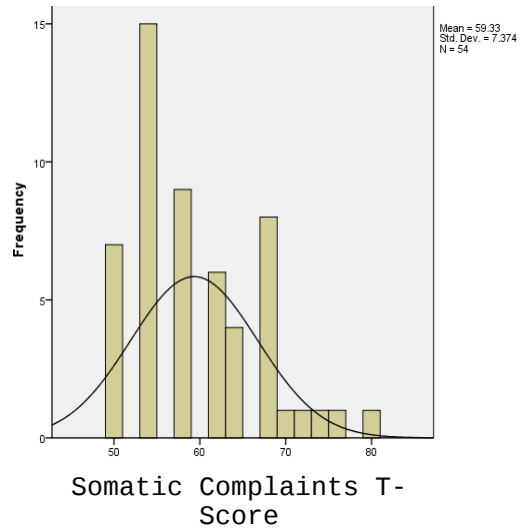
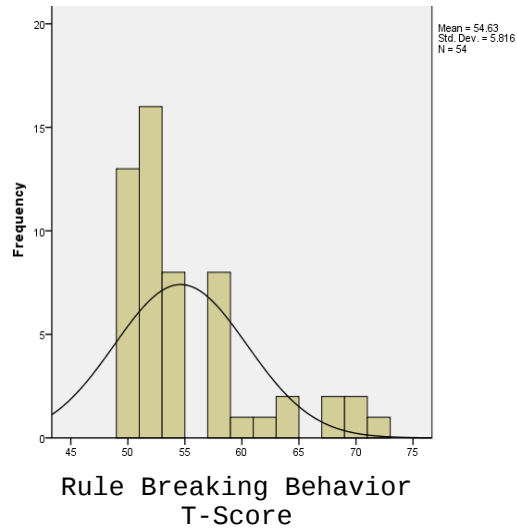
Appendix E

T-Score Distributions for the CBCL/ 6-18 Thought Problems, Anxious/Depressed, Withdrawn/Depressed, and Attention Problems Scales



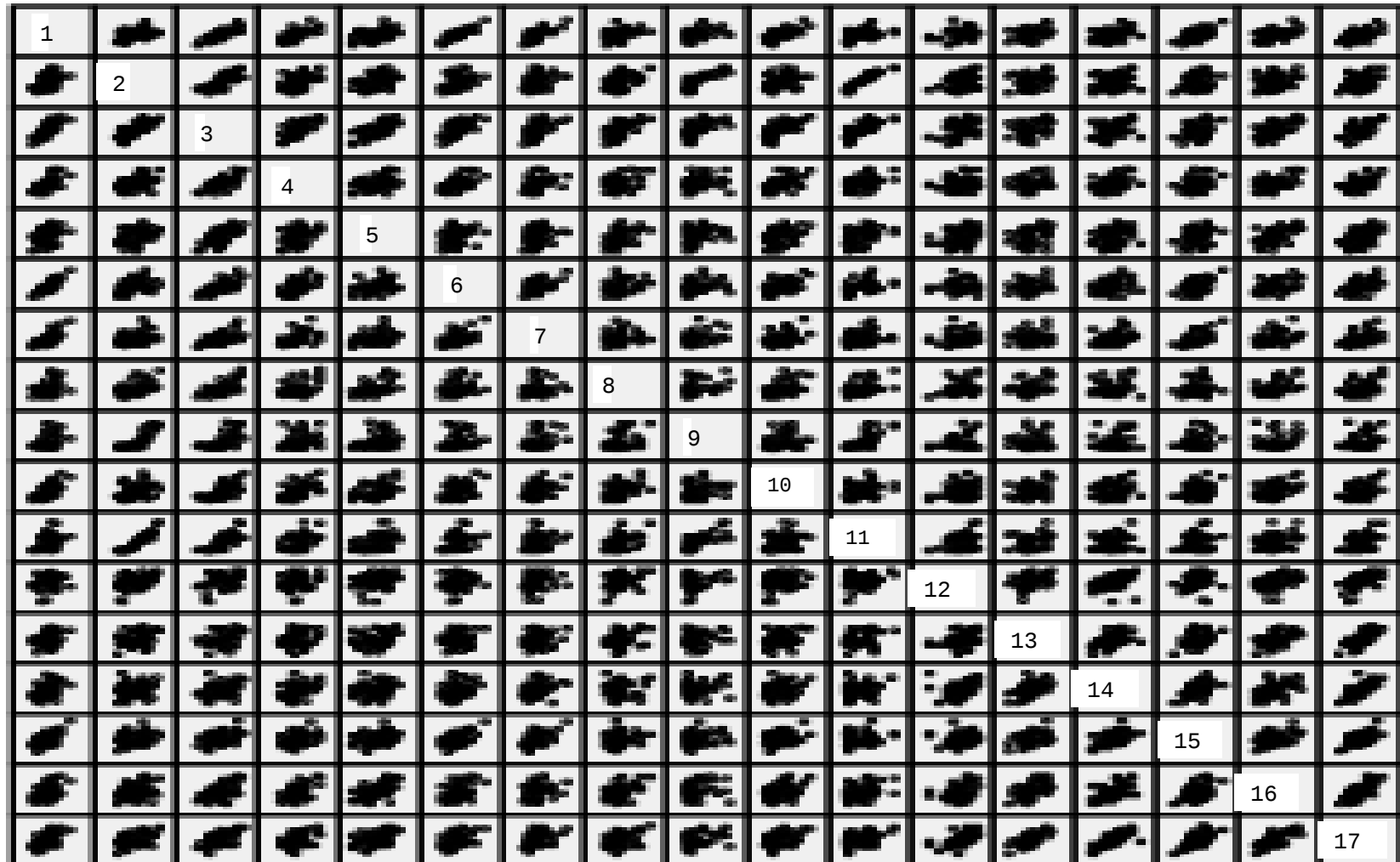
Appendix F

T-Score Distributions for the CBCL/ 6-18 Rule Breaking Behavior, Somatic Complaints, Aggressive Behavior, and CBCL/ 6-18 Administration Age



Appendix G

Bivariate Scatterplot Matrix of CBCL/ 6-18 and SRS Scales



1= Internalizing Problems; 2 = Externalizing Problems; 3 = Total Problems; 4 = Social Problems; 5 = Thought Problems; 6 = Anxious/ Depressed; 7 = Withdrawn/Depressed; 8 = Attention Problems; 9 = Rule-Breaking Behaviors; 10 = Somatic Complaints; 11 = Aggressive Behaviors; 12 = Social Awareness; 13 = Social Cognition; 14 = Social Communication; 15 = Social Motivation; 16 = Autistic Mannerisms; 17 = SRS Total

