CHARACTERISTICS OF ADOLESCENT AND ADULT FEMALES WITH AUTISM SPECTRUM DISORDERS AND NORMAL-RANGE INTELLECTUAL ABILITIES: AN EXPLORATORY STUDY

by

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ABSTRACT

This study compared females and males with an autism spectrum disorder (ASD) and normal intelligence to explore sex differences in onset and trajectory of ASD symptoms as well as developmental tasks and social functioning. Personality traits were also studied, as was the presence of psychiatric problems. Twenty-one females and 21 males with ASD between the ages of 13 and 35 years of age participated in the study. Although these 42 individuals are the "participants," their parents provided important information about development of symptoms and functioning that the individuals with ASD may not have recalled. Both participants and parents of participants completed comprehensive structured interview and rating scales that evaluated ASD symptoms and social-behavioral functioning. Parents also completed a symptom report form, and participants with ASD completed an IQ test to determine eligibility for the study and a personality test.

Results show that parents of female participants noticed ASD symptoms at a later age than parents of males (e.g., sensory symptoms and abnormal social interactions) and reported these to professionals at a later age (i.e., around 7 years for females compared to 3 years, 9 months for males). Professionals, often the child's pediatricians, also showed a tendency to normalize the behaviors of females with ASD more often than males, and did not refer females as often for follow-up evaluations. Despite all of this, no differences were found in the ages at which an ASD diagnosis was made for both sexes, which was

on average about 10 years, 9 months. Parents of females reported a more fluctuating symptom presentation than did parents of males, and also reported greater improvement over time. Despite this, female participants reported more distress over social difficulties than males, and this seemed to be consistent over time. Parents of females tended to notice their daughters having more frustration and anger than parents of males, and also observed them to engage more in self-injurious behaviors. Personality testing further showed that the older female participants endorsed more psychological problems than the younger females or the males, including problems with anxiety and depression.

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CHAPTER I

INTRODUCTION

According to the Centers for Disease Control (CDC), more males are diagnosed with autism spectrum disorders (ASD) than females; in fact, the ratio is reported to be 4.6 to 1 (Centers for Disease Control and Prevention, 2012). The prevalence rate for females is even less clear than it is for males, especially in cases of normal intelligence. The CDC has set as the "ideal" age for collecting prevalence data at 8 years of age; however, for children who are not identified until much later, the age is not so ideal. Females are especially at risk for being missed in surveillance studies given research that has shown females are often diagnosed with ASD at older ages than males (Begeer et al., 2013; Giarelli et al., 2010; Goin-Kochel, Mackintosh, & Myers, 2006; Kopp & Gillberg, 1992; Siklos & Kerns, 2007). Females may also be misdiagnosed with other disorders, such as obsessive-compulsive disorder, communication disorder, attention-deficit hyperactivity disorder (ADHD), or eating disorders (in the presence of highly unusual or restrictive eating habits) (Kirkovski, Enticott, & Fitzgerald, 2013; Kopp & Gillberg, 1992).

A delay in an accurate diagnosis of ASD often results in a delay in services and stress for the individual being misunderstood (and stress for others, in particular, parents, siblings, and teachers) (Begeer et al., 2013; Simone, 2010). Adding to the problem is the fact that females in the general population are identified more often than males with internalizing disorders (e.g., Crick & Zahn-Waxler, 2003). This puts females with ASD at

high risk for developing psychiatric conditions such as anxiety disorders and depression. Although psychiatric comorbidity and personality characteristics have been studied in males and females with ASD and normal intelligence, oftentimes researchers have included more male participants and sometimes only males (e.g., Backner, Clark, Jenson, Gardner, & Kahn, 2013). The aim of this study is, therefore, intended to gather information that will fill in some of the gaps when it comes to understanding how core symptoms of ASD are manifested in females with normal intelligence (e.g., social interaction and restricted repetitive behaviors) and what the trajectory of these problems is like compared to males, and what differences there are in terms of females and males performing activities of everyday life in school and at home and in the community.

Early Development in Children with ASD

In studies of the early development of children with an ASD, parents have reported that they initially recognized abnormalities in their child's development between the ages of 12 and 24 months (Chawarska, Paul, Klin, Hannigen, Dichtel, & Volkmar, 2007; De Giacomo & Fombonne, 1998; Siklos & Kerns, 2007; Siperstein & Volkmar, 2004). Some of the most frequently observed problems are reported by parents to be in the areas of communication and social development (Chawarska et al., 2007; De Giacomo & Fombonne, 1998; Howlin & Moore, 1997; Landa, Holman & Garrett-Mayer, 2007; Siklos & Kerns, 2007; Siperstein & Volkmar, 2004). These areas are also the ones where parents notice more regressions, that is, decreases in eye contact, joint attention, social smiling, use of gestures, and vocalizations after a period of normal development (e.g., Landa et al., 2007; Ozonoff et al., 2010). Other developmental concerns that parents

tend to notice include attention deficits, hyperactivity, and disturbed patterns of sleeping or eating (Chawarska et al., 2007; De Giacomo & Fombonne, 1998).

It has also been suggested that there are certain developmental problems that, when presented along with ASD, may serve as an additional “red flag” and increase parental awareness regarding their child’s developmental abnormalities (i.e., intellectual disability, severe communication deficits, delays in motor development, and frequent medical problems such as seizures) (Chawarska et al., 2007; De Giacomo & Fombonne, 1998; Siklos & Kerns, 2007). Such findings explain why either females or males with normal intelligence and milder ASD symptoms may not be diagnosed until later in life, although these may apply more so to females given their early social and language advantages in comparison to males.

Although many children with ASD exhibit developmental abnormalities from an early age, some do not display significant symptoms until later in childhood. Siklos and Kerns (2007) found that 10.7%, or 6 out of 56 children in their study were not diagnosed with ASD until after the age of 10. Likewise, Kopp and Gillberg (1992) reported that all 6 females in their sample were diagnosed after the age of 6, with 4 of the girls in this sample not receiving a diagnosis until they were 8 years old or older. In a study by Lugnegard, Hallerback, and Gillberg (2011), the average age of diagnosis for the sample of adults with Asperger’s Disorder was 19 years old, with 52% of participants in their 20s or older before receiving a diagnosis. This implies that many individuals with ASD are being “missed” despite increased public awareness about autism and widespread acknowledgement that early interventions are critical for good outcomes among individuals with ASD. Unfortunately, neither Kopp and Gillberg (1992) nor Siklos and

Kerns (2007) described what characteristics may explain why the children in their studies were identified so late.

Lugnegard and colleagues (2011) have proposed that as core symptom severity decreases, the likelihood of a late diagnosis increases. This is likely because it is more difficult for clinicians to diagnose an ASD with certainty when these delays are not as severe (De Giacomo & Fombonne, 1998). Research has also suggested that characteristics such as severe cognitive impairment, significant delay in reaching developmental milestones, and presence of a co-occurring medical problem were the primary predictors of a lower age of recognition of ASD symptoms among parents (De Giacomo & Fombonne, 1998). Consequently, children who do not present with significant cognitive impairment or developmental delays, and who have been healthy so as not to warrant further examination or raise concern, seem to be at an increased likelihood of receiving a delayed diagnosis.

In addition to child factors that influence the age and likelihood of ASD diagnosis, other researchers have observed social factors that impact the diagnostic process as well. Russell, Steer, and Golding (2011) report that males appear to be more likely than females to obtain a diagnosis of ASD. Additionally, mothers who are young, mothers with a history of depressive symptoms around the time of onset of their child's ASD symptomatology, and mothers of first-born children appear less likely to follow-up on their own concerns about their child's development, including seeking a diagnosis.

Sex Differences in ASD Symptomatology

Until recently, research investigating sex differences in the symptomatology of ASD has been limited, and the majority of studies examining ASD symptomatology have

studied participants who are exclusively or overwhelmingly male (Hartley & Sikora, 2009; Tsakanikos, Underwood, Kravariti, Bouras, & McCarthy, 2011). In fact, in a 2007 New York Times article, autism researcher Ami Klin describes females with ASD as "research orphans" (Bazelon, 2007). Because autism research has focused so heavily on males, it has been suggested that what we know about ASD is mostly applicable to males (Kirkovski et al., 2013; Tsakanikos et al., 2011; van Wijngaarden-Cremers, van Eeten, Groen, Van Durzen, Oosterling, & Van der Gaag, 2013).

Some researchers have suggested that perhaps one primary reason that ASD is diagnosed more frequently in males is that clinicians are not as inclined to look for ASD in females given the perception that females are less likely to be affected than males. For instance, clinicians may be unsure of what to look for in females (Baron-Cohen, Lombardo, Auyeung, Ashwin, Bhismadev, & Knickmeyer, 2011; Giarelli et al., 2010; Siklos & Kerns, 2007). Another potential explanation is that males and females with ASD may display different symptom presentations, with females showing more subtle symptoms (e.g., fewer overt atypical behaviors and better social and communicative skills), therefore being less likely to receive a formal ASD diagnosis (Kirkovski et al., 2013; Kopp & Gillberg, 1992; Mandy, Chilvers, Chowdhury, Salter, Seigal, & Skuse, 2012; Tsakanikos et al., 2011).

There has been relatively little research published that investigates early play behaviors and social development of females with ASD. However, some clinicians have reported that females with ASD and normal intelligence seem to develop more age-appropriate skills in play and social development than males, and even in cases where there are special interests (e.g., horses) these are perceived to be more socially and

developmentally appropriate than males with ASD who are reported to have more unusual interests (e.g., modes of transportation, specialized areas of science or technology) (see Atwood 2007; Atwood, Grandin, Bolick, & Faherty, 2006; Nichols, Moravcik, & Tetenbaum, 2009). Females have also been found to be less likely than males to display conduct problems during early childhood; therefore, even some of the behaviors that would normally raise concerns about abnormal development are not noticed or the importance is minimized, even by parents and teachers (Mandy et al., 2012).

Other studies have shown that females with ASD may actually display greater social and communication deficits during early childhood in comparison to their male peers (e.g., Carter et al., 2007; Hartley & Sikora, 2009). However, Hartley and Sikora found that male toddlers with ASD had more restrictive, repetitive, and stereotyped behaviors than females with ASD. No sex differences were observed in social reciprocity. These researchers concluded that when controlling for age and cognitive functioning, there were similar symptom patterns between males and females and noted that observed differences were subtle. Carter et al. (2007) found that male toddlers with ASD had better language, social development, and motor skills than their female counterparts, but it is important to consider that these results were obtained via parent report. The authors cautioned that parents of females may have higher expectations for their daughters' communication and social skills than parents would typically have for their male children. Consequently, an expectation bias may have led parents of females to rate their daughters disproportionately lower in these areas in comparison to parents of males.

Finally, some studies have concluded that males and females with ASD have similar symptomatology during childhood (e.g., Anderson, Gillberg, & Miniscalco, 2013; Giarelli et al., 2010; Lai et al., 2011; Van Wijngaarden-Cremers et al., 2013). Anderson and colleagues (2013) suggest that sex differences may not have been observed among their preschool-age sample because the females identified at those early ages may have had greater impairment, including cognitive and language delays, compared to females with normal intelligence who are identified later in life. Giarelli and colleagues (2010) found that even among males and females who display similar autistic symptoms in early childhood, males are more likely than females to receive a formal ASD diagnosis. Indeed, Lai and colleagues (2011) further noted that while there were no significant differences with regard to core ASD symptoms in males and females during childhood, important differences were observed in their sample during adulthood. Namely, adult females with ASD displayed fewer ASD symptoms on the Autism Diagnostic Observation Schedule (ADOS) despite the fact they described themselves on self-report measures to have considerable symptoms. Lai et al. further suggest that females with ASD have better self-awareness and self-referential cognitive abilities than males with ASD, and have developed better compensatory strategies to help them fit in socially. However, these researchers further explained that constantly having to make an effort to fit in may play a role in females with ASD feeling more stressed and having more anxiety symptoms than males.

Recent research has shown that among children and adolescents with ASD, females may actually display greater difficulty with response inhibition and impulse control (Lemon, Gargaro, Enticott, & Rinehart, 2011). Such research findings yield

important implications for females with ASD. These researchers explain that such difficulties with impulse control tend to be associated with increased behavior problems. In the context of ASD, such deficits may also lead to impairments in appropriate social conduct, particularly when in a high state of arousal, such as anxiety.

Finally, a recent meta-analysis conducted by van Wijngaarden-Cremers et al. (2013) suggests that while no significant differences between males and females were observed as far as the core symptoms of ASD prior to 6 years of age, some differences in symptomatology were observed in older children as well as adolescents and adults. Specifically, these researchers noted that among participants with ASD over 6 years of age, males displayed more severe symptoms of repetitive and stereotyped behaviors than females as measured by a variety of instruments across different research studies. However, females and males displayed similar ASD symptomatology in the areas of communication and social interaction. Based on the results of this meta-analysis, the researchers suggest that females with ASD may represent a different phenotype than males with ASD, that is, females displaying fewer repetitive and stereotyped behaviors. These and other researchers also suggest the possibility of a sex bias in the identification and diagnosis of ASD in females; when females display similar ASD symptomatology, they are less likely than males to receive an ASD diagnosis (Cheslack-Postava & Jordan-Young, 2012; Dworzynski et al., 2012).

Changes in ASD Symptomatology with Increasing Age

Other research has shown that females with ASD and normal intelligence tend to develop normally early in life but show increasing behavioral abnormalities and social difficulties as they approach adolescence and adulthood. McLennan, Lord, and Schopler

(1993) found that in early childhood, females with ASD showed less severe deficits in the areas of early social and communicative behavior in comparison to their male counterparts; however, in adolescence and adulthood, females with ASD displayed substantially more severe social deficits than males. In fact, these researchers reported that all female participants struggled with reciprocal social interaction after the age of 10, while some of the male participants were able to form friendships and relationships to some degree. Holtmann and colleagues (2007) also noted that deviant social behavior appeared to be more likely in females over age 11 in comparison to younger females with ASD.

Although little research has investigated social behavior in females with ASD, some clinicians have noted that females with ASD are more likely than males to develop "coping and camouflaging mechanisms" in order to function successfully with peers in social situations (Attwood et al., 2006; Attwood, 2007; Dworzynski et al., 2012; Nichols et al., 2009). For instance, females with ASD may "camouflage" their social deficits by displaying good behavior, being polite to others, and remaining on the periphery in social situations. Additionally, these females are typically able to develop some reciprocal conversation skills and learn to use appropriate affect and gestures in various situations. Based on their clinical experience, some authors have suggested that such social skills are artificial and contrived, as these females are simply following a social script rather than utilizing their own intuition and abilities to determine how to behave in social situations (Attwood et al., 2006; Attwood, 2007; Nichols et al., 2009), likely because they lack the skills to do so. Consequently, when unexpected events occur that deviate from these

social scripts, females with ASD who rely on these artificial strategies appear more likely to make errors and experience social difficulties.

Although females with ASD may display increasingly apparent behavioral atypicalities and social difficulties as they reach adolescence and adulthood, it may remain difficult for clinicians to consider ASD as a viable diagnosis. One prominent clinician who writes about Asperger's Disorder, Tony Attwood (2007), states that females with ASD often fail to meet one of the core criteria for ASD, that is, the failure to develop age-appropriate peer relationships. While females with ASD may, in fact, develop some friendships, Attwood explains that there are key differences in the quality of these friendships in comparison to relationships observed among females who do not have Asperger's. However, this difference is often missed by clinicians who are involved in the diagnostic process.

A critical question remains as to whether females with ASD experience social difficulties to a greater degree as they get older. Some researchers have suggested that as females approach adolescence and adulthood, they are expected to engage in social activities in which high rates of social behavior are expected (e.g., verbal communication and sharing of interests) in comparison to males who may engage in activities that are social but require a lesser degree of verbal communication and social engagement (e.g., playing sports; McLennan et al., 1993). For adolescent females, "surface" social skills are no longer sufficient to help them be successful in social situations, and expectations arise for females to develop closer relationships where they confide in another person and not just talk to someone or participate in joint activities where they end up being together in social situations (Holtmann et al., 2007; Koenig & Tsatsanis, 2005).

Researchers and clinicians have also hypothesized that as females with ASD get older, they begin to develop a greater sense of self-awareness, that is, they begin to recognize how they are different from nonaffected peers. This increasing self-awareness may contribute to a host of negative experiences, including social isolation and increasing frustration, anger, anxiety, and depression (Koenig & Tsatsanis, 2005; Kuuisikko et al., 2008). Although males with ASD are also likely to experience increased self-awareness as they get older, Lai et al. (2011) noted that females' self-referential cognitive abilities may be better developed; therefore, they may be more sensitive to negative perceptions of their social abilities by others. According to Bazelon (2007), prominent autism researchers, including Lainhart and Lord, have found that females with ASD often have a strong desire to build appropriate social relationships; however, when they are repeatedly unsuccessful in their attempts, they sometimes develop severe symptoms of anxiety and depression. These symptoms, in turn, can lead to inappropriate behaviors that further set these females apart from their unaffected peers (e.g., their lashing out verbally or physically and crying for no known reason).

Sukhodolsky and colleagues (2008) further speculate that even when children with ASD understand how to behave in a socially appropriate manner with peers, severe anxiety can interfere with their intentions to have positive interactions. De Bruin and colleagues reached similar conclusions, stating that parents of children with an ASD and comorbid anxiety report more severe social difficulties in comparison to parents of children with ASD who do not display symptoms of anxiety (De Bruin, Ferdinand, Meester, de Nijs, & Verheij, 2007).

A recent study conducted by Sucksmith et al. (2013) reveals no differences in self-reported empathy scores between adult males and females with ASD; however, females were better able to accurately identify another person's emotions compared to males. These researchers went on to suggest that differences in male and female empathy and emotion recognition is likely to reflect higher social expectations of females in the real world; that is, if females with ASD are aware that they are expected to have higher emotional recognition than males, they may rate themselves as having lower empathy than males would to reflect their perceived deficits in this area. Additionally, if females with ASD perceive greater social expectations for themselves and are likewise highly motivated to fit in socially, Sucksmith et al. suggest that these females may begin to develop cognitive compensatory strategies to help themselves become more socially adept amongst their typically-developing peers.

The relationship between increasing self-awareness with age and increasing psychological and behavioral difficulties among individuals with ASD is an explanation that has been commonly offered by researchers, and it is seemingly quite logical. However, the relationships between these variables have not yet been directly studied.

Restrictive and Repetitive Behaviors

Restrictive and repetitive behaviors (RRB) are a core feature of ASD and may include such behaviors as strict adherence to routines, insistence on sameness, repetitive motor movements, restricted interests, or compulsive behaviors. Some research has suggested that RRB may be best described by two categories: "higher-order" behaviors, which include compulsive behavior, ritualistic behavior, insistence on sameness, and restricted interests; and "lower-order" behaviors, which include stereotypical and self-

injurious behavior (Cuccaro et al., 2003; Georgiades, Papageorgiou, & Anagnostou, 2010; Papageorgiou, Georgiades, & Mavreas, 2008; Szatmari et al., 2006). While lower-order restrictive and repetitive behaviors are found in various disorders, higher-order RRB may be unique to ASD (Cuccaro et al., 2003). Researchers have also suggested that the types of RRB that an individual displays may be related to cognitive functioning, adaptive functioning, and age. Higher-order behaviors appear to be related to higher cognitive and adaptive functioning, while lower-order behaviors may be related to lower cognitive or adaptive functioning (Cuccaro et al., 2003; Szatmari et al., 2006). Additionally, higher-order behaviors seem to be more common in older individuals with an ASD, while lower-order behaviors appear to be more common in younger individuals (Georgiades et al., 2010; Szatmari et al., 2006).

Research findings on the relationship between level of RRB and age have been mixed. Some researchers have observed overall improvement in RRB with age (Chowdhury, Benson, & Hillier, 2010; Esbensen, Seltzer, Lam, & Bodfish, 2009), while others have suggested that levels of RRB may remain steady into adulthood (Gillberg & Steffenberg, 1987). Several studies have concluded that no significant differences exist between males and females with relation to RRB symptomatology; however, these studies typically have many more males in their sample in comparison to females. One study concluded that females tend to display more severe self-injurious behavior (Esbensen et al., 2009). However, it is important to consider that this study had a fairly small proportion of females in the sample (i.e., 20.2%) as well as a high proportion of individuals with comorbid intellectual disabilities (i.e., 62.2%), both of which may impact the findings related to rates of self-injurious behavior in females. Other

researchers have pointed out the dearth of information on age-related changes in RRB in individuals with ASD throughout adulthood, and among females in particular (Chowdhury et al., 2010).

Stratis and Lecavalier (2013) suggest that certain RRB's can predict specific psychiatric symptoms. For instance, in their sample of parents of children with ASD, ritualistic and sameness behaviors were predictive of increased anxiety symptom severity in the children. Additionally, a significant relationship was observed between self-injurious behavior and anxiety symptom severity, but this relationship was moderated by the child's conceptual skills (as reported by their parent). More specifically, children with lower conceptual skills who had elevated levels of self-injurious behavior were significantly less likely to display severe symptoms of anxiety, while children with higher conceptual skills who had elevated levels of self-injurious behavior were significantly more likely to display severe symptoms of anxiety. Likewise, these researchers reported similar relationships between the above RRBs and depression symptom severity. Additionally, stereotypic behavior was observed to be a significant positive predictor of ADHD symptom severity, while ritualistic/sameness behavior was observed to be a significant positive predictor of Oppositional Defiant Disorder (ODD) symptom severity (Stratis & Lecavalier, 2013).

Comorbid Mood and Anxiety Disorders

Research has widely documented a higher prevalence of psychiatric symptoms among individuals with ASD (e.g., Ghaziuddin & Zafar, 2008; Hofvander et al., 2009; Hurtig et al., 2009; Mattila et al., 2010; Simonoff, Jones, Baird, Pickles, Happe, & Charman, 2013; Simonoff, Pickles, Charman, Chandler, Loucas, & Baird, 2008),

particularly mood and anxiety disorders (e.g., Cohen et al., 2010; Ghaziuddin & Zafar, 2008; Gillot & Standen, 2007; Hill, Berthoz, & Frith, 2004; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Lugnegard et al., 2011; Mazefsky, Folstein, & Lainhart, 2008; Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998; Shtayermman, 2008; Szatmari & McConnell, 2011; Weisbrot, Gadow, DeVincent, & Pomeroy, 2005). It is very important for clinicians and researchers to be aware of the increased prevalence of psychiatric symptoms within the ASD population, as these conditions may exacerbate autistic symptoms, contribute to overall impairment, and lead to a poorer prognosis (Ghaziuddin & Zafar, 2008; Kelly, Garnett, Attwood, & Peterson, 2008; Muris et al., 1998).

Many studies have shown an increased prevalence of clinically significant anxiety symptoms in individuals with ASD, including generalized anxiety, phobias, separation anxiety, social anxiety, and obsessive-compulsive disorder (Bellini, 2004; Gillott, Furniss, & Walter, 2001; Kim et al., 2000; Kuuisikko et al., 2008; Mazefsky et al., 2008; Melfsen, Walitza, & Warnke, 2006; Muris et al., 1998; Russell & Sofronoff, 2005; Sukhodolsky et al., 2008). It has been suggested that individuals on the autism spectrum may be particularly susceptible to severe symptoms of anxiety as a result of the many difficulties that accompany ASD, including impaired social understanding, communication difficulties, sensory issues, difficulties with transition and change, and impairments in executive functioning (Weisbrot et al., 2005). Individuals on the autism spectrum have been found to perceive relatively mundane stimuli as significant sources of stress, such as changes in the environment, anticipation/uncertainty, positive events, sensory or personal contact, and ritual-related stress (Gillot & Standen, 2007). Symptoms

of anxiety appear to be related to increased levels of autism symptomatology, including restrictive and repetitive behaviors (Guttmann-Steinmetz, Gadow, DeVincent, & Crowell, 2010) and sensory sensitivities (Ben-Sasson, Cermak, Orsmond, Tager-Flusberg, Kadlec, & Carter, 2008).

Symptoms of anxiety appear to be more severe in individuals with ASD who have higher cognitive and language abilities (Sukhodolsky et al., 2008; Weisbrot et al., 2005). Severity of anxiety has also been found to remain elevated as children with ASD get older (Gillot & Standen, 2007), or in some cases even increase (Dekeyzer, 2010; Kuuisikko et al., 2008). One possible explanation as to why anxiety would increase into adolescence and adulthood may be that children on the autism spectrum become progressively more aware of their impaired social and communication skills in comparison to their typically developing peers and consequently become self-conscious and apprehensive about their social competency (Koenig & Tsatsanis, 2005; Kuuisikko et al., 2008). Although they are more likely to display deficits in emotional processing skills, adults with ASD have been found to be able to accurately report their emotions on self-report measures (e.g., Hill et al., 2004; Ozsivadjian, Hibberd, & Hollocks, 2013), which lends further credence to the idea of higher self-awareness in individuals with ASD and normal intelligence.

Individuals with ASD also appear to be highly susceptible to severe psychiatric symptoms (Gadow, Devincent, Pomeroy, & Azizian, 2005; Sterling, Dawson, Estes, & Greenson, 2008), including symptoms of depression. In one study of adolescent males with Asperger’s Disorder, 25% of the sample reported chronic low mood/dysthymia (Green, Gilchrist, Burton, & Cox, 2000). Studies of adolescents and adults with ASD

have indicated that comorbid mood disorders occur in up to 50% of these individuals (Bradley, Summers, Wood, & Bryson, 2004; Ghaziuddin & Zafar, 2008; Hofvander et al., 2009). Symptoms of depression have also been reported to increase with age (Dekeyzer, 2010; Sterling et al., 2008) and with higher levels of social awareness (Sterling et al., 2008).

The results of a longitudinal study investigating psychiatric problems among adolescents with ASD (Simonoff et al., 2013) suggest that some social and familial variables may be related to the course of such symptoms. For instance, these researchers suggest that greater maternal mental health problems, greater family deprivation (as rated by parent report), and lower parent socioeconomic status (as rated by the researchers) are associated with greater emotional difficulties, such as anxiety and depression, at age 16. Additionally, attending a special school, rather than a traditional school setting, was associated with an improvement in behavior problems between ages 12 to 16; the authors speculate that children who attend special schools may experience higher levels of social support and less bullying. These authors also noted that ASD severity was not associated with increased psychiatric symptomatology.

Some evidence suggests that females may be particularly prone to experience mood and anxiety disorders. Such disorders are found with greater prevalence in typically developing females (e.g., Crick & Zahn-Waxler, 2003) when compared to males. Research has indicated that symptoms of depression and anxiety are more prevalent in females with ASD in comparison to males with ASD in early childhood (Carter et al., 2007; Hartley & Sikora, 2009) and adulthood (Cohen et al., 2010). Cohen and colleagues (2010) also found that self-injurious behaviors occur with higher severity in adult females

with autism in comparison to adult males with autism. These authors have further suggested that there may be a genetic predisposition for depression and anxiety in families with autism, which could explain the higher occurrence of self-injury and self-deprecation in females with ASD, particularly as they become older (i.e., adolescents and adults). It is also important to note that nearly all participants in the autism group in the Cohen et al. (2010) study were classified as intellectually disabled; consequently, we do not know whether these results would generalize to a population of females with ASD and normal-range cognitive abilities.

Personality Characteristics of Individuals with ASD

Research on personality profiles and characteristics in individuals with an ASD has been quite limited. One research study comparing temperament and personality traits in individuals with high ASD symptomatology, low ASD symptomatology, and typically-developing controls found that both ASD groups exhibited similar characteristics, while the characteristics exhibited by the typically developing control group were significantly different (De Pauw, Mervielde, Van Leeuwen, & De Clercq, 2011). The unique personality traits displayed by the ASD groups included low levels of the following characteristics: extraversion, emotional stability, benevolence, imagination, and conscientiousness. Another study on personality traits in adults with ASD found clinical profiles characterized by social isolation, depressed mood, interpersonal difficulties, rigidity/inflexibility, deficits in coping skills, and a lack of self- or other-awareness (Ozonoff, Garcia, Clark, & Lainhart, 2005). This personality profile is compatible with ASD as these disorders are characterized by the DSM-IV-Text Revision (APA, 2000).

Results from a study on personality characteristics of individuals with Asperger's Disorder found that the individuals tended to have higher levels of harm avoidance and lower levels of self-directedness, cooperativeness, novelty seeking, and reward dependence (Soderstrom, Rastam, & Gillberg, 2002). Soderstrom and colleagues concluded that their findings on personality traits matched well with the clinical picture of Asperger's Disorder. Other research has shown that adolescents and adults with Asperger's Disorder may have significantly higher symptoms of paranoia than individuals who are unaffected by ASD (Blackshaw, Kinderman, Hare, & Hatton, 2001), although other researchers have not replicated this finding (e.g., Backner et al., in press; Ozonoff et al., 2005).

Finally, another recent study showed that among young adults with Asperger's Disorder, males were significantly more likely than females with Asperger's to meet DSM-IV-TR criteria for an Axis II disorder (Lugnegard, Hallerback, & Gillberg, 2012). The most common personality disorders found within this research sample included Schizoid Personality Disorder, Obsessive-Compulsive Personality Disorder, and Avoidant Personality Disorder. Participants who met criteria for a personality disorder in this research study were more likely to have more severe ASD symptomatology and were also less likely to be employed, in either a regular or supported setting, than those who did not meet criteria for a personality disorder. Understanding the personality traits common to females with ASD may help practitioners to better recognize the emotional and interpersonal difficulties that this population tends to experience.

Self-Determination and Independence

Recent research has suggested that in many cases, adults with ASD and normal intelligence display a substantial discrepancy between their cognitive abilities and their adaptive skills (Bolte & Poustka, 2002; Carter et al., 1998; Lopata et al., 2012). Some researchers also suggest that this discrepancy may become greater with age (Bolte & Poustka; Carter et al.). Farley and colleagues have suggested that in adults with ASD, independence in daily living skills during adulthood is one adaptive behavior skill associated with better outcomes (Farley, McMahon, Fombonne, Jenson, Miller, & Gardner, 2009).

Individuals with ASD and normal intelligence tend to display relative strengths in the areas of conceptual skills (e.g., language and academic skills), as well as relative weaknesses in social skills (Kenworthy, Case, Harms, Martin, & Wallace, 2010; Lopata et al., 2012). Practical skills can also be an area of weakness, particularly for adults (Kenworthy et al., 2010). Among children with ASD, restrictive and repetitive behaviors have been shown to be associated with greater adaptive skill deficits (Lopata et al., 2012). However, among adolescents and adults, higher levels of ASD symptomatology in the areas of social and communication skills appear to be related to greater adaptive skill deficits in comparison to individuals who display fewer social and communication symptoms of ASD (Kenworthy et al., 2010). Finally, Kenworthy et al. reported their finding that age did not appear to be associated with differences in adaptive skills in adults with ASD.

It is important to consider the impact of employment on an individual's level of independence. Meaningful employment typically offers unique opportunities for personal

development, such as intellectual stimulation and additional opportunities for socialization. In one study of individuals with developmental disabilities receiving support services from the Oklahoma Department of Human Services, researchers found that individuals who were employed obtained significantly higher scores on measures of adaptive skills, whereas individuals who were unemployed obtained lower scores (Stephens, Collins, & Dodder, 2005). Additionally, when these individuals were followed over a multiyear period, significant increases were seen in adaptive skills among individuals who moved into an employment setting, and significant decreases in adaptive skills were observed in individuals who moved out of employment settings. Similar results were also seen when different levels of employment were studied (i.e., sheltered, supportive, and competitive employment); participants who were involved in more independent levels of employment displayed higher adaptive skill scores, whereas those who were involved in more sheltered employment displayed lower scores. However, it is also important to note that the majority of participants in the Stephens et al. study exhibited some level of intellectual disability.

The term “self-determination” has been used to refer to the process of maturing individuals to engage in various behaviors in order to determine which role or career they wish to take on as they enter adulthood. Such behaviors include goal setting, problem solving, decision-making, self-regulation, and self-advocacy (Wehmeyer, Shogren, Zager, Smith, & Simpson, 2010). Wehmeyer and Palmer (2003) found that students with intellectual or learning disabilities who were more self-determined by their last year of high school tended to have better outcomes after graduation, such as better employment with access to health and other kinds of benefits, greater financial independence (e.g.,

maintaining their own bank account, paying for their own necessities such as groceries), and increased likelihood of independent living. A recent review of literature (Cobb, Lehmann, Newman-Gonchar, & Alwell, 2009) found enough evidence to support the positive effects of self-determination and suggest that focused training and instruction in the area of self-determination is an effective intervention to improve adult outcomes for adolescents with disabilities.

Purpose of the Research

Purpose of the Study

The current study was designed to determine what, if any, differences exist between females and males with ASD and normal intelligence in terms of early ASD symptom development and manifestation, including age of recognition of ASD symptoms, early behaviors and developmental milestones, parents initiating the diagnostic process by expressing concerns to a professional, and age of first formal diagnosis; current ASD symptomatology and functioning, including current social/communication skills, restricted interests and repetitive behavior, and level of independence and functioning; school experiences, both academic and social/behavioral; presence of other problems, including psychological and psychiatric comorbidity; and personality characteristics.

Participants and Research Measures

Adolescent and adult females and males who have been identified with ASD and normal intelligence were recruited for the study. The ages of participants ranged from 13 to 35 years. All participants agreed to complete interviews and psychological testing, and

also had a parent who was willing to answer questions about their offspring's developmental history and behavior. In order to address questions about symptom development and manifestation, a structured interview form was developed for use with the parent. Parents were also asked to complete autism checklists and psychological measures regarding their offspring. Participants with ASD were also asked to participate in a structured interview and fill out various checklists and psychological tests. These measures are described below along with the specific research questions. Male and female participants were matched as a group for current age and level of cognitive functioning.

Research Questions

1. ***What are the differences between females and males in terms of onset of core autistic symptoms and symptom development (i.e., age of recognition of DSM-IV-TR criteria, age of participant when the parent first reported concerns to a professional, and age of initial ASD diagnosis)?*** This question was answered using data from the Structured Interview – Parent Form and the Structured Interview – Participant Self-Report Form.
2. ***What are the differences between females and males in terms of the attainment of major developmental milestones, including language, play/social interaction, motor skills, and toilet training?*** This question was answered using data from the Symptom Report Form – Parent Report.
3. ***What are the differences between females and males in terms of history of school achievement (e.g., academic or social/behavioral difficulties in elementary, middle, or high school)?*** This question was answered using data

from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.

4. ***What are the differences between females and males in terms of parent and participant self-reports of current social relationships and social impairment?*** This question was answered using data from the Social Responsiveness Scale – Adult Form and Adult Self-Report Form, and the Social Responsiveness Scale – School Age Form and School Age self-report items.
5. ***What are the differences between females and males in terms of parent and self-reports of current restricted interests and repetitive behaviors?*** This question was answered using data from the Repetitive Behavior Scale-Revised Informant Form and Self-Report items.
6. ***What are the differences between females and males in terms of parent and self-reports of current functioning and level of independence (e.g., amount and types of parent support provided, as well as the degree of self-reliance and responsibility in different environments including home, school, and work)?*** This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.
7. ***What are the differences between females and males in terms of parent and self-reports of current level of self-determination/career aspirations?*** This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.
8. ***What are the differences between females and males in terms of self- and parent reports of the presence and age of onset of comorbid psychiatric***

symptoms (e.g., anxiety, depression)? This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.

9. ***What are the differences between females and males in terms of personality characteristics?*** This question was answered using data from the MCMI-III/MACI.

Supplemental Questions

10. ***What are the qualitative differences between females and males in terms of onset of core autistic symptoms and symptom development (i.e., age of recognition of DSM-IV-TR criteria, age of participant when the parent first reported concerns to a professional, and age of initial ASD diagnosis)?*** This question was answered using data from the Structured Interview – Parent Form and the Structured Interview – Participant Self-Report Form.
11. ***What are the qualitative differences between females and males in terms of the attainment of major developmental milestones, including language, play/social interaction, motor skills, and toilet training?*** This question was answered using data from the Symptom Report Form – Parent Report.
12. ***What are the qualitative differences between females and males in terms of history of school achievement (e.g., academic or social/behavioral difficulties in elementary, middle, or high school)?*** This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.

13. ***What are the qualitative differences between females and males in terms of parent and participant self-reports of current social relationships and social impairment?*** This question was answered using data from the Social Responsiveness Scale – Adult Form and Adult Self-Report Form, and the Social Responsiveness Scale – School Age Form and School Age self-report items.
14. ***What are the qualitative differences between females and males in terms of parent and self-reports of current restricted interests and repetitive behaviors?*** This question was answered using data from the Repetitive Behavior Scale-Revised Informant form and Self-Report items.
15. ***What are the qualitative differences between females and males in terms of parent and self-reports of current level of independence (e.g., amount and types of parent support provided, as well as the degree of self-reliance and responsibility in different environments, including home, school, and work)?*** This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.
16. ***What are the qualitative differences between females and males in terms of parent and self-reports of current level of self-determination/career aspirations?*** This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.
17. ***What are the qualitative differences between females and males in terms of self- and parent reports of the age of onset of comorbid psychiatric symptoms (e.g., anxiety, depression)?*** This question was answered using data from the Structured Interview – Parent Form and Structured Interview – Participant Self-Report Form.

18. ***What are the qualitative differences between females and males in terms of personality characteristics?*** This question was answered using data from the MCMI-III/MACI.

Analyses

Independent samples *t*-tests and chi square analyses were used to analyze the data. Independent samples *t*-tests were used to examine group differences between males and females on continuous variables (e.g., assessment scores, ages, years of education, Likert scale data). Chi square analyses were used to examine differences between males and females on categorical variables (e.g., yes/no answers). Specific analyses for each research question were as follows:

1. Independent samples *t*-tests were conducted to examine potential differences between males and females in age of recognition, age that concerns were initially brought to a professional, and age of initial diagnosis.
2. Independent samples *t*-tests were conducted to compare differences in age ranges between males and females; chi square analyses were conducted to examine group differences in the presence or absence of regression patterns.
3. Chi square analyses were conducted to examine differences between males and females regarding history of school experiences (i.e., academic and social/behavioral).
4. Independent samples *t*-tests were conducted to examine differences between males and females in scores on the SRS-2 Adult Form (completed by parents of adult participants), the SRS-2 Adult Self-Report Form (completed by adult participants), and on the SRS-2 School Age Form – Parent Report (completed by

parents of adolescent participants). An item analysis was conducted to analyze SRS-2 School Age self-report items (completed by adolescent participants).

5. Independent samples *t*-tests were conducted to examine differences between males and females on the Repetitive Behavior Scale-Revised Informant report form (completed by parents). An item analysis was conducted to analyze data obtained from RBS-R self-report items (completed by participants).
6. Independent samples *t*-tests were used to examine differences between males and females on variables such as Likert scale data on level of needed support, as well as parent and self-ratings of self-reliance and responsibility. Chi square analyses were used to investigate whether there are differences between males and females in yes/no data on current job status.
7. Chi square analyses were used to investigate whether there are differences between males and females in yes/no data on observed behaviors indicating self-determination and career aspirations.
8. Chi square analyses were conducted to examine differences between males and females regarding presence or absence of comorbid conditions and psychiatric symptoms.
9. Independent samples *t*-tests were conducted to examine differences between males and females in personality characteristics (i.e., MCMI-III or MACI scores).

Supplemental questions for the current study contain primarily qualitative data and were answered using observational and descriptive methods.

CHAPTER II

METHODS

Recruitment

This study was approved by the Institutional Review Board of the University of Utah. Upon approval, the primary investigator (PI) contacted local licensed psychologists, as well as psychology faculty at local universities, in order to discuss the study and obtain approval to recruit participants at their sites. Additionally, informational flyers were distributed through various public locations throughout Northern Utah, including parent groups (e.g., the Utah Parent Center, the Autism Council of Utah), college and university disability resource centers, special schools for students with ASD, treatment centers (e.g., the University Neuropsychiatric Institute adolescent day treatment program, Autism Journeys), university autism research clinics, and waiting areas of private psychology clinics. The flyers contained information about the study, including requirements of participation, as well as the PI's contact information (see Appendix A).

At one recruiting site, the Utah Autism Research Program at the University of Utah, clients who had indicated that they were interested in participating in autism research were screened to determine whether they would meet criteria for the current study. Potential participants who appeared to meet criteria based on this initial screening were contacted via phone by the PI, given information about the study, and asked if they

would be willing to participate. Participants who indicated interest were guided through the process of setting up an appointment for participation with the PI; participants who declined were thanked for their time, and no further contact was made. Of the 42 participants in the current study, 14 were recruited through the Utah Autism Research Program, 9 through a research clinic at another local university, 7 through local psychologists, 5 through a local parent organization (the Autism Council of Utah), 4 through local university disability resource centers, 2 were referred based on their participation in a previous research study with similar inclusion criteria, and 1 was referred by another participant.

During initial phone or email contacts with potential participants, the PI discussed the study with the client, including the purpose of the research and the procedures involved in participation. During this initial discussion, the PI also confirmed that the participant with ASD was at least 13 years of age, was aware of his or her ASD diagnosis, and that both the child and a parent were willing to participate in the study. The PI was also available to answer any questions that the clients had about the study. If after this initial contact the clients wished to continue his or her participation in the study, the PI set up an appointment for research participation. All research appointments took place either at the participant's home or within a university research space, depending on which was more convenient for the participant and his or her parent.

Participants

To most effectively investigate symptoms of ASD as they present in females in comparison to males, both female and male participants were recruited. Subsequently, ASD symptomatology in females was compared to ASD symptomatology in males. The

two participant groups (i.e., female participants and male participants) were matched for age and level of cognitive functioning.

Participants were adolescent and adult females (aged 13-29 years), as well as adolescent and adult males (aged 13-35 years) who had been previously diagnosed with an autism spectrum disorder (i.e., Autistic Disorder, Asperger's Disorder, or Pervasive Developmental Disorder – Not Otherwise Specified) by a psychiatrist or psychologist using either the DSM-IV-TR (American Psychiatric Association, 2000) or ICD-10 (World Health Organization, 1992). All participants had been identified and diagnosed with ASD before the publication of the DSM-5 (American Psychiatric Association, 2013), when the criteria for ASD changed considerably.

As one of the primary purposes of this study was to compare symptomatology in females and males with normal intelligence, participants were recruited who had cognitive and verbal abilities within the average or above average ranges. Therefore, all participants had a Verbal Comprehension Index T score of at least 40 (or an IQ equivalent of 85 or higher) on a reliable and valid measure of cognitive ability (e.g., Wechsler Abbreviated Scales of Intelligence, Second Edition). During the recruiting process, one male participant was excluded due to having a verbal IQ score below the minimum standard score of 85 required for participation. Additionally, one other potential participant was excluded because although she met inclusion criteria for the study, her mother reported to the PI that she was unaware of her ASD diagnosis.

Data Collection Procedures

Prior to formally beginning the data collection phase, steps were taken to ensure that data collected by both researchers would be reliable. The primary investigator (PI)

and another graduate student in the same doctoral program collected all data, including data from the testing and comprehensive structured interview forms. To ensure that the graduate student who assisted the PI be as familiar with the interview questions, this person was involved in the development of the interview form and attended meetings with the PI's dissertation advisor. Additionally, the research assistant was provided with a copy of the interview to review and ask questions of the PI. Third, the PI and research assistant discussed the content of the interview and practiced the questions to ensure that both researchers became accustomed to phrasing the questions in the same manner. Finally, the PI and research assistant had frequent opportunities throughout the data collection phase to discuss the interviews and participant responses throughout the course of the study.

At the beginning of each data collection appointment, the PI reviewed the study with the participant and his or her parent, answered participant questions, and obtained informed consent for each participant and his or her parent. Consent forms were provided to parent participants. Additionally, assent forms were provided to adolescent participants (i.e., ages 13-17 years old) and consent forms were provided to adult participants (i.e., 18 years and older). For participants under the age of 18, parents were also asked to sign a separate parent permission form for their minor child to participate in the study (see Appendix B for consent, assent, and parent permission forms).

Once each participant provided his or her consent or assent to participate, he or she was screened to ensure that he or she met study criteria of a Verbal Comprehension Index T score of at least 40 (or an IQ equivalent of 85 or higher). All participants were administered the Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II;

Wechsler, 2011) two-subtest version. Obtaining a consistent measure of cognitive ability for all participants to confirm that the individual's intellectual ability was within the required range for participation was necessary to ensure the validity of the results of this study.

Upon satisfactory completion of the cognitive screening assessment, the participant with ASD completed a self-report interview, social/behavioral rating scales, and measure of personality. The parent participants also completed a parent report interview, social/behavioral rating scales regarding their child's current behavior and ASD symptomatology, and a symptom report form detailing their child's development. The PI or a trained, graduate-level research assistant administered all measures for the current study. All forms were checked for completeness prior to the end of the session, and participants were asked to complete any items that were left blank.

In almost all cases, the participants and their parent completed all assessment measures within one session. However, a second assessment session to complete the assessment measures was scheduled in some cases. Each assessment session took approximately 2-3 hours per participant/parent dyad. As compensation for his or her participation, each participant with ASD was offered $10 in cash. Parents were also asked if they were interested in receiving a copy of any future studies published as a result of the current research project. All parents indicated interest in this; therefore, the PI will be responsible for sending copies of the article to the parents either via postal or electronic mail. All data obtained from participants and parents were entered into a database for analysis. As data were entered, all identifying information for participants was removed.

The data for 19 parent/participant dyads were obtained by the PI alone, whereas data for the remaining 23 dyads were obtained by the PI in conjunction with a trained, graduate level research assistant. While the participants were completing the cognitive assessment and structured interview, the parent completed the rating scales and then met with the PI for the structured interview and symptom report form (giving time for the participant to complete the last component to the assessment, the SRS-2 and RRB rating scales and personality test).

To investigate the possibility whether there were any differences in parent interview data based on whether they were collected by the PI or the research assistant, *t*-tests were conducted on all variables obtained during interviews with parents. Out of 36 variables examined from this data set, *t*-tests indicate that significant differences were present between researchers on four of these variables (i.e., age of onset of obsessive compulsive behaviors, age of onset of attention problems, the presence of significant emotional and behavioral problems at any point during the child's schooling, and the presence of emotional and behavioral problems specifically during elementary school; all *p*s $< .05$). However, it should be noted that no differences between researchers were observed in the data for the remaining 31 variables obtained from the parent interview data.

Instruments

Measures for Study Eligibility

The *Wechsler Abbreviated Scale of Intelligence – Second Edition* (WASI-II; Wechsler, 2011) is a brief measure of cognitive ability. In the current study, it was administered to all participants to confirm that their cognitive ability fell within the

average to above-average ranges (i.e., average or above-average verbal comprehension). The WASI-II is administered individually by a qualified examiner and is appropriate for individuals between the ages of 6 and 69. The WASI-II consists of four subtests: Vocabulary, Block Design, Similarities, and Matrix Reasoning. For the purposes of this study, the two-subtest version was administered in order to obtain a FSIQ score, with *T* scores providing estimates of an individual's verbal and perceptual abilities. The two-subtest version consists of the Vocabulary and Matrix Reasoning subscales and required approximately 15 minutes to administer. The two-subtest version provides an adequate estimate of general intellectual ability (Wechsler, 2011).

Average split half reliability coefficients for the two-subtest version (FSIQ-2) ranged from .93 for the child sample (ages 6-16) and .94 for the adult sample (ages 17-90). These reliability coefficients are comparable to the four-subtest version of the WASI-II as well as other widely used cognitive assessments (i.e., the WISC-IV for the child sample and the WAIS-IV for the adult sample). Test-retest reliability coefficients for the two-subtest version were also acceptable, with an average reliability coefficient (Corrected r^2) of .89 and .94 for the child and adult samples, respectively. Finally, interscorer agreement for the Vocabulary and Matrix Reasoning subtests was also high (i.e., .95 and .99, respectively), which suggests that the WASI-II can be reliably scored by various examiners (Wechsler, 2011).

The WASI-II has also been shown to be a valid measure of cognitive ability. For instance, all WASI-II subtests are moderately correlated with each other (correlation coefficients generally ranging from .4 - .7), which demonstrates adequate convergent validity. This suggests that all subtests are products of general intelligence, which plays

an important role in many different abilities. However, subtests measuring similar constructs (e.g., Vocabulary and Similarities) were more highly correlated with each other than with subtests reflecting different abilities (e.g., Block Design). This suggests that these pairs of subtests measure common skill areas (e.g., Vocabulary and Similarities both measure verbal comprehension) and indicates that the WASI-II has adequate discriminant validity. Finally, concurrent validity has been demonstrated in studies comparing the WASI-II with the WISC-IV (for children ages 6-16) and with the WAIS-IV (for individuals 16-90). For child participants, the two-subtest version of the WASI-II yielded a correlation (Corrected r^2) of .85 with the WISC-IV. For older adolescents and adults, the WASI-II yielded a correlation (Corrected r^2) of .86 with the WAIS-IV (Wechsler, 2011).

Study Measures

The *Structured Interview – Parent Form* and *Structured Interview - Participant Form* were developed for the current study. The structured interview asks parents and participants with ASD to provide information within several areas, including family history; diagnostic history information; school experiences (both academic and social) in elementary, middle, and high school; and perceptions of the participant's current functioning (see Appendices C and D). The interview contains items extracted from existing ASD assessment measures, including the Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994), as well as a structured interview previously used by Farley (2009). Additionally, some items were created by the researchers to address aspects of development and current functioning among individuals with an ASD that are unique to this study. Each participant with ASD and his or her parent completed a structured

interview with the PI or research assistant, so that each participant had two completed interviews (i.e., one Parent Form and one Participant Self-Report Form) to provide comprehensive information regarding his/her family, school, and diagnostic history, as well as his/her current level of functioning.

The *Symptom Report Form* is a parent report form developed for the current study (see Appendix E). This form was intended to provide a detailed picture of which typical behaviors or skills as well as which autism symptoms the participant with ASD displayed and at which ages. The primary purpose of this instrument is to obtain detailed information of symptom trajectory across each participant's development. These forms also contain items asking parents to recall typical developmental milestones (e.g., walking, toileting, using single words, using phrase speech) and the ages at which they first occurred, as well as any observed losses of language or other skills (e.g., social behavior, motor skills) in their child. This instrument was given as a supplement to the Structured Interview – Parent Form, and the examiner verbally explained how to complete each section of the form and remained present as the parent completed the form to answer questions.

The Symptom Report Form contains some items extracted from existing ASD measures, including the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994), the Social Responsiveness Scale (Constantino & Gruber, 2005), and the Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003). For each item, a series of boxes represents various age ranges at which that skill or symptom was observed. The examiner marked boxes corresponding to the age ranges that the parent reported by drawing a line through them. Such a reporting system allowed researchers to

note when each skill or symptom began to occur, how long it was displayed, and whether it was a current or past behavior.

The *Social Responsiveness Scale 2* (SRS-2; Constantino & Gruber, 2012) is a rating scale system to assess the presence and extent of social impairment in individuals with an ASD. The forms used in the current study included the Adult Form, Adult Self-Report Form, and School Age Parent Report Form. Additionally, school-age participants (i.e., between the ages of 13-18 years) were provided with items from the School Age Parent Form and asked to provide self-reports for each item. This was done in order to obtain important data directly from participants regarding their perceptions and awareness of their social functioning.

The SRS-2 Adult Form and Self-Report Form were administered to participants 19 years or older in the current study. The Adult Form was completed by an informant who has had ample opportunities to observe the social behavior of the individual with ASD in natural settings (e.g., mother, father, spouse, other relative, or close friend), while the adult with ASD completed the Adult Self-Report Form. For each item, the rater indicates whether the behavior is “not true,” “sometimes true,” “often true,” or “almost always true,” for the individual with ASD. This measure contains 65 items and takes approximately 15-20 minutes to complete. This measure yields a Total Score, five treatment subscale scores (Social Awareness, Social Cognition, Social Communication, Social Motivation, and Restricted Interests and Repetitive Behavior), and two subscales compatible with DSM-5 symptom domains (Social Communication and Interaction [SCI] and Restricted Interests and Repetitive Behavior [RRB]; Constantino & Gruber, 2012). These DSM-5-compatible treatment subscales represent the two domains of autism

spectrum disorder as they are outlined in the recently released DSM-5 (American Psychiatric Association, 2013).

The SRS-2 Adult and Adult Self-Report Forms have been recently developed. For the current study, the prepublication forms of these measures were obtained through a limited-use research licensing agreement. The adult versions of the Social Responsiveness Scale-2 correspond item-by-item to the School Age form, which was developed for children and adolescents. However, some of the items differ to a moderate extent in wording and/or content to reflect social situations and behaviors that are developmentally more appropriate for adults (see Constantino & Gruber, 2012 or Constantino & Todd, 2005 for specific information on adapted items). The Adult Form and Adult Self-Report Form were normed on a sample of 702 adults (323 males and 379 females) ranging in age from 18-89 years from 16 sites across multiple states. The authors describe the sample as “demographically diverse,” representing different racial and ethnic backgrounds, geographic regions, and parent educational level (Constantino & Gruber, 2012). Internal consistency for the SRS-2 Adult Form has been found to be highly acceptable, with alpha values ranging from .92 - .95, regardless of the target individual’s age, sex, or the respondent (i.e., self-report or report completed by mother, father, spouse, other relative, or nonrelated friend; Constantino & Gruber, 2012). Interrater reliability for the Adult Form is very strong, even when ratings provided by different individuals (e.g., a mother and a spouse) are compared, with correlations ranging from .69 - .95. Interrater reliability for the Adult Self-Report form is somewhat lower, with correlations ranging from .61 - .78. For this reason, the authors suggest that

self-report information be considered as supplemental to information provided by another rater using the Adult Form as best practice (Constantino & Gruber, 2012).

The SRS-2 School Age Parent Report Form was used in the current study for participants 18 and under. The School Age form is a widely used assessment tool to identify the presence and severity of social impairment in individuals with ASD. Like the Adult forms, the School Age form contains 65 items and takes approximately 15-20 minutes to complete. This measure also yields a Total Score, five treatment subscale scores, and two subscales compatible with DSM-5 symptom domains (Constantino & Gruber, 2012). According to the 2012 standardization sample, internal consistency of the SRS-2 School Age Parent Form is high, .95 for both males and females. Interrater reliability is also strong, with a coefficient of .61 for males and .60 for females (Constantino & Gruber, 2012).

The *Repetitive Behavior Scale-Revised* (RBS-R; Bodfish, Symons, Parker, & Lewis, 2000) is an informant-based rating scale used to assess a variety of restricted repetitive behaviors in an individual with an ASD. In the current study, participants were also provided with the RBS-R and asked to provide self-reports for each item in order to obtain important data directly from participants regarding their own restrictive, repetitive, and stereotyped behaviors. The RBS-R contains 43 items across six areas of behavior, including: (a) stereotyped behavior [apparently purposeless movements or actions that are repeated in a similar manner]; (b) self-injurious behavior [movement or actions that have the potential to cause redness, bruising, or other injury to the body, and that are repeated in a similar manner]; (c) compulsive behavior [behavior that is repeated and is performed according to a rule, or involves things being done “just so”]; (d) ritualistic behavior

[performing activities of daily living in a similar manner]; (e) sameness behavior [resistance to change, insisting that things stay the same]; and (f) restricted behavior [limited range of focus, interest, or activity]. Each item is rated on a four-point Likert scale ranging from 0 (behavior does not occur) to 3 (behavior occurs and is a severe problem). Responses for each item are summed to create a "total subscale score" for each of the six subscales, as well as an "overall score" for the entire measure. The RBS-R typically takes approximately 10-15 minutes to complete.

Internal consistency of the RBS-R has been reported at .93 (Esbensen et al., 2009). Esbensen and colleagues also reported high internal consistency among the subscales of the RBS-R, ranging from .74 to .89. All internal consistency estimates provided by this group of researchers were comparable between sexes, differences in psychotropic medication status, and for individuals with ASD with or without a comorbid intellectual disability.

The *Millon Clinical Multiaxial Inventory-III* (MCMI-III; Millon, Davis, & Millon, 1997) is an assessment of personality disorders and clinical syndromes. The MCMI-III is intended for individuals 18 years and older; in the current study, it was given to participants who were 19 years and older. The MCMI-III contains 175 true/false items at an eighth-grade reading level and typically takes between 20-30 minutes to complete. The MCMI-III contains 14 personality disorder scales that reflect Axis II DSM disorders (i.e., schizoid, avoidant, depressive, dependent, histrionic, narcissistic, antisocial, sadistic, compulsive, negativistic, masochistic, schizotypal, borderline, and paranoid). It also contains 10 clinical syndrome scales that reflect the DSM categories (i.e., anxiety, somatoform, bipolar/manic, dysthymia, alcohol dependence, drug

dependence, posttraumatic stress disorder, thought disorder, major depression, and delusional disorder) (Millon et al., 1997). Additionally, the MCMI-III contains five modifying scales that assist in detecting careless, confused, or random responding (i.e., disclosure, desirability, debasement, invalidity, and inconsistency).

Although a variety of other personality assessment instruments are available for use, the MCMI-III was selected for the current study for a variety of reasons, including soundness of test construction, acceptable psychometric properties, and an appropriate normative group. Recent research has suggested that the MCMI-III test construction is superior to other commonly utilized personality assessment instruments (Wise, Streiner, & Walfish, 2010). Specifically, these researchers have explained that test items on the MCMI-III were selected based on Millon's theory of personality, as well as acceptable statistical properties. This method of test construction has resulted in better psychometric properties than other commonly used measures of personality (Wise et al., 2010). Internal consistency of scales ranges from .66 (Compulsive) to .90 (Major Depression). Test-retest reliability, over a period of 5-14 days, ranges from .82 (Debasement) to .96 (Somatoform), with a median test-retest reliability coefficient of .91. Positive predictive power ranged from .30 (Masochistic) to .81 (Dependent). Finally, the sensitivity of the MCMI scales ranged from .44 (Negativistic) to .92 (Paranoid) (Millon, Millon, Davis, & Grossman, 2009).

Direct comparisons between the MCMI-III and other commonly used personality assessment instruments have indicated that the MCMI-III demonstrates highly acceptable levels of internal consistency (i.e., 78% of the scales on the MCMI-III obtained alpha coefficients greater than .80) and test-retest reliability (100% of the scales on the MCMI-

III obtained test-retest coefficients greater than or equal to .80; Wise et al., 2010). Wise and colleagues concluded that the MCMI-III was one of two personality measures that represent “clear improvements” over other, earlier measures; consequently, these researchers recommended that the MCMI-III be used more frequently in future research.

Another advantage of the MCMI-III is its alignment with DSM-IV official diagnostic constructs. New editions of the MCMI have reflected revisions of the DSM-IV, ensuring that the results of this assessment instrument remain meaningful from a diagnostic standpoint. Finally, the normative group for the MCMI-III matches the group used in the current study (i.e., an adult clinical sample, as opposed to community samples or university samples; Millon, Millon, Davis, & Grossman, 2009).

The *Millon Adolescent Clinical Inventory* (MACI; Millon, 1993) is an adolescent assessment of DSM-IV-related personality disorders and clinical syndromes intended for individuals 13-19 years old. In the current study, the MACI was given to participants between the ages of 13-18 years old. The MACI contains 160 true/false items at a 6th grade reading level and typically takes approximately 20 minutes to complete. The MACI contains 12 Personality Patterns scales that reflect Axis II DSM disorders (i.e., schizoid, avoidant, depressive, dependent, histrionic, narcissistic, antisocial, sadistic, compulsive, negativistic, masochistic, and borderline). It also contains eight Expressed Concerns Scales (i.e., identity confusion, self-devaluation, body disapproval, sexual discomfort, peer insecurity, social insensitivity, family discord, and childhood abuse), which highlight developmentally appropriate areas that are of particular concern to adolescents. Finally, the MACI also contains seven Clinical Syndrome scales that are commonly seen in adolescents (i.e., eating dysfunction, substance-abuse proneness, delinquent

predisposition, impulsive propensity, anxious feelings, depressive affect, suicidal tendency).

Additionally, the MACI contains three Modifying Indices to assess specific response styles (i.e., disclosure, desirability, and debasement) and one validity scale. Like the MCMI-III, the MACI also contains newly added Grossman Facet Scales, which highlight the most salient clinical domains that characterize the individual completing the measure in order to bring these areas to the attention of the clinician.

Recent research has indicated that the MACI has strong psychometric properties. Pinto and Grilo (2004) investigated the MACI with a population of 241 adolescent inpatient psychiatric patients and found that internal consistency for MACI scales ranged from .71 to .93, with the vast majority (i.e., 22 out of 27) having internal consistency coefficients of .80 or higher. The diagnostic efficiency of the MACI was variable between different disorders; in general, the MACI adequately predicted disorders within the same category, but did not predict specific diagnoses as accurately. These researchers suggest that the concurrent validity of the MACI is also acceptable, and concluded that the MACI is an accurate self-report measure, yet it is also advantageous to use this instrument in concert with other self-report measures. Finally, these researchers investigated the criterion validity of the MACI by comparing this instrument with patient clinical diagnoses and concluded that while criterion validity was good for most disorders, the criterion validity of some scales (i.e., depressive affect, substance use disorder, and delinquent predisposition) was higher than others (i.e., impulsive propensity and anxious feelings). One potential explanation regarding the lower criterion validity of

the MACI with regard to anxious feelings in this study is that anxiety disorders had a low base rate within this study group (Pinto & Grilo, 2004).

Data Analysis

For statistical analyses, data for participants were separated into two groups, female and male. No distinction was made by specific diagnosis (Autistic Disorder, Asperger's Disorder, or PDD-NOS) or referral source. However, for statistical analyses on personality characteristics and social responsiveness, participants were separated into age groups, as their age at the time of participation determined which measure they completed (i.e., participants aged 13-18 completed the MACI and their parents completed the SRS-2 School Age form, whereas participants aged 19 years and older completed the MCMI-III and their parents completed the SRS-2 Adult Form).

Data analysis was completed using the SPSS computer program, and the primary statistical analyses included independent samples *t*-tests and chi square analyses. The *t*-tests were conducted to examine differences between female and male participants on ASD symptomatology and personality characteristics. Independent samples *t*-tests were utilized because participants were not matched one-to-one across groups (i.e., males and females); however, the groups were matched overall on age and IQ. Chi square analyses were utilized to examine differences between males and females on categorical variables; for example, whether their parents reported any evidence of regression early in their development (yes or no), whether they experienced significant academic or social/behavioral difficulties during elementary, middle, or high school (yes or no), or whether they had previous or current work experience (yes or no).

CHAPTER III

RESULTS

Characteristics of Participants

A total of 42 participant/parent dyads participated in this study. Of these, 21 participants were female, and 21 were male. Of the 21 females who participated in the study, 20 identified as Caucasian, and 1 identified as Caucasian/American Indian. Four female participants were between the ages of 13-15 years, 5 were between the ages of 16-18 years, 9 were between the ages of 19-24 years, and 3 were 25 years or older (see Table 1). The average ages and cognitive scores for female participants are provided in Table 2. Seven females were diagnosed with Autistic Disorder, 10 were diagnosed with Asperger's Disorder, and 4 were diagnosed with PDD-NOS.

Sixteen female participants had their mothers serve as the informant, 2 females had fathers serve as the informant, 2 females had both parents serve as the informant (both filling out the forms and participating together in the interview), and 1 female had her adoptive mother as the informant. This participant had been adopted at birth, and consequently her mother was able to provide valid answers to all research questions concerning the participant's early development, behavior, and symptom patterns. Of female participants, 16 lived at home with one or both parents, 4 lived independently (2 in college dorms, and 2 in apartments), and 1 lived in an alternative supported living setting (i.e., a group home).

Table 1

Number and Percentage of Female and Male Participants by Age Group

	Females	Males
13-15 years old	4 (19%)	7 (33%)
16-18 years old	5 (24%)	6 (29%)
19-24 years old	9 (43%)	7 (33%)
25 years and older	3 (14%)	1 (5%)

Note. Data reflect responses from all participants (21 females, 21 males).

Table 2

Mean Ages and Cognitive Scores for Male and Female Participants

		Age (in years and months)	WASI-II Full Scale IQ Scores
Females	Mean	19 years, 6 months	108.14
	Standard Deviation	*(4 years, 5 months)*	*(14.94)*
Males	Mean	18 years, 5 months	111.86
	Standard Deviation	*(5 years, 2 months)*	*(13.63)*

Note. Data reflect responses from all participants (21 females, 21 males).

Of the 21 male participants in this study, all participants identified as Caucasian. Seven male participants were between the ages of 13-15 years, 6 were between the ages of 16-18 years, 7 were between the ages of 19-24 years, and 1 was 25 years or older (see Table 2). The average ages and cognitive scores for male participants are provided in Table 1 and were similar to those of female participants. Seven males had been diagnosed with Autistic Disorder, 11 had been diagnosed with Asperger's Disorder, and 3 had been diagnosed with PDD-NOS.

Eighteen male participants had their mother serve as the informant, 1 male had his father serve as the informant, and 2 males had both parents serve as the informant (both filling out the forms and participating together in the interview). Twenty male participants lived at home with one or both parents, while 1 participant lived independently with his wife and their children.

Four pairs of siblings were included in the participant pool for the current study. Three pairs of siblings were sister/brother dyads, and the remaining pair of siblings was a pair of sisters.

Results of Research Question 1

What are the differences between females and males in terms of onset of core autistic symptoms and symptom development (i.e., age of recognition of DSM-IV-TR criteria, age of participant when the parent first reported concerns to a professional, and age of initial ASD diagnosis)?

Age of Recognition

Parent reports of the age at which they first noticed abnormalities in their child's development were examined with an independent samples *t*-test. Parents of female participants reported noticing abnormal development at slightly later ages than parents of male participants; however, these differences were not significant: $t(29.42) = -1.24$, $p = .223$. As seen in Table 3, on average, parents of females reported first noticing a developmental problem when their child was 2 years, 5 months old, whereas parents of males reported first noticing a developmental problem when their child was 1 year, 8 months old.

Based on parents' report of which specific DSM-IV-TR criteria for Autistic Disorder that their children displayed, no significant sex differences were observed on any criterion (all p's $\geq .293$). In fact, parents generally reported that participants met very similar criteria for the disorder, regardless of their sex (see Table 4).

Additionally, no sex differences were observed in parent reports of regression, $\chi^2(1, 42) = 0.171$, $p = .679$. However, it should be noted that very few parents overall endorsed a history of regression for their children (i.e., 4 females and 3 males).

Table 3

Parent Reports of Early Concerns in Females and Males: Mean Ages (in Years)

	Age of Recognition	Age When Professional Alerted to Symptoms	Age of Formal ASD Diagnosis
Females			
Parent report	2 years, 5 months	6 years, 11 months*	10 years, 9 months
Males			
Parent report	1 year, 8 months	3 years, 9 months*	10 years, 9 months

Note. Data reflect responses from all participants (21 females, 21 males).
*Significant sex difference, $p < .05$.

Table 4

Number and Percentage of Females and Males Meeting ASD Criteria Per Parent Report

	Females No	Females Past	Females Current	Males No	Males Past	Males Current	*p* value
Social Interaction							
Problems in use of multiple nonverbal behaviors	3 (14%)	4 (19%)	14 (67%)	2 (10%)	4 (19%)	15 (71%)	.634
Failure to develop appropriate peer relationships	2 (10%)	3 (14%)	16 (76%)	1 (5%)	1 (5%)	19 (90%)	.549
Lack of shared enjoyment/ interest with others	9 (43%)	2 (10%)	10 (48%)	7 (33%)	3 (14%)	11 (52%)	.525
Lack of social reciprocity	4 (19%)	4 (19%)	13 (62%)	3 (14%)	0 (0%)	18 (86%)	.679
Communication							
Delay or absence of verbal language	13 (62%)	8 (38%)	0 (0%)	14 (67%)	7 (33%)	0 (0%)	.747
Deficits in starting/ sustaining conversations	5 (24%)	3 (14%)	13 (62%)	3 (14%)	4 (19%)	14 (67%)	.432
Stereotyped or repetitive use of language	10 (48%)	2 (10%)	9 (43%)	13 (62%)	3 (14%)	5 (24%)	.352
Lack of variety in play, not appropriate for developmental level	10 (48%)	7 (33%)	4 (19%)	8 (38%)	8 (38%)	5 (24%)	.533
Repetitive and Stereotyped Behavior							
Stereotyped or circumscribed interests	3 (14%)	4 (19%)	14 (67%)	1 (5%)	2 (10%)	18 (86%)	.293
Strict adherence to routines and rituals	8 (38%)	2 (10%)	11 (52%)	8 (38%)	3 (14%)	10 (48%)	1.000
Repetitive motor mannerisms	7 (33%)	4 (19%)	10 (48%)	5 (24%)	5 (24%)	11 (52%)	.495
Preoccupation with parts of objects	16 (76%)	2 (10%)	3 (14%)	13 (62%)	2 (10%)	6 (29%)	.317

Note. No=parents denied ever observing the symptom; Past=parents reported only observing the symptom in the past; Current=parents reported currently observing symptom. *P* values represent sex differences between “no” and “past/current” symptoms. Data reflect responses from all participants (21 females, 21 males).

First Professional Contact

According to an independent samples *t*-test, parents of females recalled that they first alerted a professional (e.g., pediatrician, psychologist) to their concerns regarding their child's development at significantly later ages than parents of males, $t(31.63) = 2.24$, $p = .032$. Parents of females, on average, reported first bringing their concerns about possible autism or other developmental problems to a professional's attention at 6 years, 11 months of age, which is 4 years later than when parents, on average, reported first noticing concerns about their child's development. Conversely, parents of males reported first bringing their sons to a professional at an average age of 3 years, 11 months of age, only 2 years after first noticing concerns (see Table 3). It should be noted that parents of 1 female participant and 1 male participant were unable to answer this question, as they did not take their children to be evaluated by a professional despite noticing abnormalities in their early development. Both of these participants were subsequently diagnosed with ASD in adulthood.

Age of Formal ASD Diagnosis

According to parent reports, no significant differences between females and males were observed in the average age of formal diagnosis, $t(40) = -0.02$, $p = .982$. In fact, females and males were reportedly diagnosed at virtually equivalent ages, with parents of both sexes indicating a mean age of first diagnosis at approximately 10 years, 9 months (see Table 3).

Based on parent report, the average age of formal ASD diagnosis for both female and male participants of 10 years, 9 months is substantially later than research shows that children at all levels of cognitive ability are typically diagnosed. Parents provided various

reasons for this apparent delay in diagnosis. Parents of both sexes reported that in some cases, they realized that their child was displaying developmental delays or abnormalities, but they did not know where to go for help. In other cases, parents reported that their child did not display significant difficulties until they reached adolescence or early adulthood, when educational and occupational environments became more challenging; this was also true for both sexes. However, parents of females more frequently reported that professionals (e.g., pediatricians) did not agree with their concerns or suggest further evaluation, in comparison to parents of males.

Symptom Development

Based on parent report, the majority of both female and male participants continued to display difficulties related to many DSM-IV-TR symptoms of ASD (see Table 4). Both females and males continued to display problematic levels of the following symptoms into adolescence and adulthood: problems in the use of multiple nonverbal behaviors (67% of females and 71% of males), failure to develop appropriate peer relationships (76% of females and 90% of males), lack of shared enjoyment or interest with others (48% of females and 52% of males), lack of social reciprocity (62% of females and 86% of males), deficits in starting and sustaining conversations with others (62% of females and 67% of males), stereotyped or circumscribed interests (67% of females and 86% of males), and repetitive motor mannerisms (48% of females and 52% of males).

In some areas, improvements in ASD symptoms were observed over time in participants of both sexes, in which participants were less likely to display difficulties continuing into adolescence and adulthood. Some of these areas include delay in verbal

language (0% females and 0% males), stereotyped or repetitive use of language (43% of females and 24% of males), lack of variety in play or leisure activities (19% of females and 24% of males), and preoccupation with parts of objects (14% of females and 29% of males).

Results of Research Question 2

What are the differences between females and males in terms of the attainment of major developmental milestones including language, play/social interaction, motor skills, and toilet training?

Parent reports of developmental milestones indicate that there were no significant differences between females and males in terms of early development in the areas of language (single word speech, two-word speech, phrase speech), motor (sitting, crawling, walking, climbing, sports/dance, and other activities), and self-care (toilet training during the day and at night; see Table 5). However, significant sex differences were noted in some motor skill areas; parents reported that males engaged in running ($t(40) = -2.17$, $p = .036$) at significantly earlier ages than females; bike riding also approached significance ($t(34) = -1.94$, $p = .054$).

Results of Research Question 3

What are the differences between females and males in terms of history of school achievement (e.g., academic or social/behavioral difficulties in elementary, middle, or high school)?

Table 5

Age of Achieving Early Developmental Milestones

	0-12 months		13-24 months		2 years		3 years	
	Females	Males	Females	Males	Females	Males	Females	Males
Communication								
Single Words	61.9%	38.1%	23.8%	42.9%	9.5%	4.8%	4.8%	14.3%
Two Words	23.8%	14.3%	47.6%	47.6%	14.3%	19.0%	14.3%	9.5%
Phrase Speech	9.5%	9.5%	33.3%	14.3%	14.3%	28.6%	33.3%	33.3%
Motor								
Sitting	95.2%	95.2%	4.8%	4.8%	0%	0%	0%	0%
Crawling	85.7%	95.2%	9.5%	0%	4.8%	4.8%	0%	0%
Walking	38.1%	38.1%	52.4%	57.1%	9.5%	4.8%	0%	0%
Running	0%	23.8%	61.9%	66.7%	28.6%	4.8%	4.8%	0%
Climbing	14.3%	42.9%	57.1%	33.3%	4.8%	9.5%	9.5%	0%
Riding bike	0%	0%	0%	0%	0%	9.5%	0%	0%
Sports/Dance	0%	0%	0%	0%	0%	0%	14.3%	4.8%
Other activities	0%	0%	0%	0%	4.8%	4.8%	4.8%	4.8%
Self-Care								
Toileting (day)	0%	0%	19.0%	9.5%	23.8%	23.8%	33.3%	28.6%
Toileting (night)	0%	0%	19.0%	9.5%	23.8%	14.3%	19.0%	33.3%

(continued)

Table 5 (*continued*)

	4 years		5+ years		*p* value
	Females	Males	Females	Males	
Communication					
Single Words	0%	0%	0%	0%	.201
Two Words	0%	4.8%	0%	4.8%	.287
Phrase Speech	9.5%	4.8%	0%	9.5%	.346
Motor					
Sitting	0%	0%	0%	0%	1.000
Crawling	0%	0%	0%	0%	.520
Walking	0%	0%	0%	0%	.802
Running	0%	4.8%	4.8%	0%	.036*
Climbing	0%	0%	4.8%	4.8%	.235
Riding bike	4.8%	19.0%	76.2%	61.9%	.054
Sports/Dance	9.5%	0%	57.1%	57.1%	.211
Other activities	4.8%	0%	52.4%	33.3%	.773
Self-Care					
Toileting (day)	14.3%	23.8%	9.5%	14.3%	.320
Toileting (night)	9.5%	14.3%	28.6%	28.6%	.455

Note. Each milestone included responses from all participants (21 female, 21 male), with the following exceptions: Climbing (19 females, 19 males), Riding Bike (17 females, 19 males), Sports/Dance (17 females, 13 males), Other Activities (14 females, 9 males). For nonresponses, parents indicated that they could not recall this information about their child.

Academic Performance

Based on parent reports during the structured interviews, no significant sex differences were observed in whether participants displayed significant academic difficulties during their schooling ($\chi^2(1, 42) = 0.096$, $p = .757$). As shown in Table 6, no significant sex differences were observed when different time periods were examined individually: elementary school ($\chi^2(1, 42) = 0.00$, $p = 1.000$), middle school ($\chi^2(1, 42) = 0.00$, $p = 1.000$), or high school ($\chi^2(1, 42) = 0.096$, $p = .757$).

When participant self-reports were examined, no significant sex differences were observed in the presence of significant academic problems at any point ($\chi^2(1, 42) = .618$, $p = .432$), or during specific time periods: elementary school ($\chi^2(1, 42) = .359$, $p = .549$), middle school ($\chi^2(1, 42) = .359$, $p = .549$), or high school ($\chi^2(2, 42) = 1.20$, $p = .549$). These data are also reported in Table 6.

School History: Social Experiences and Behavioral Problems

As shown in Table 7, parent reports of their child's history of emotional and behavioral difficulties during their schooling revealed no significant differences between males and females during elementary school ($\chi^2(1, 42) = .104$, $p = .747$), middle school ($\chi^2(1, 42) = .099$, $p = .753$), or high school ($\chi^2(1, 42) = .096$, $p = .757$).

Analyses of participant self-reports revealed that females were more likely to report emotional and behavioral difficulties (i.e., bullying, teasing, problems getting along with peers) throughout their schooling, with statistically significant sex differences observed in elementary school ($\chi^2(1, 42) = 4.20$, $p = .040$) and high school ($\chi^2(1, 42) = 5.56$, $p = .018$), and with middle school approaching significance ($\chi^2(1, 42) = 3.64$, $p =$

Table 6

Percentages of Female and Male Self- and Parent Reports of Academic Problems in Elementary, Middle, and High School

			Academic Problems: Elementary School	Academic Problems: Middle School	Academic Problems: High School
Females	Self-Reports	No	95.2%	90.5%	85.7%
		Yes	4.8%	9.5%	14.3%
	Parent Reports	No	71.4%	61.9%	52.4%
		Yes	28.6%	38.1%	47.6%
Males	Self-Reports	No	90.5%	95.2%	90.5%
		Yes	9.5%	4.8%	9.5%
	Parent Reports	No	71.4%	61.9%	57.1%
		Yes	28.6%	38.1%	42.9%

Note. Data reflect responses from all participants (21 females, 21 males).

Table 7

Percentages of Female and Male Self- and Parent Reports of Social/Behavioral Problems in Elementary, Middle, and High School

			Social/Behavioral Problems: Elementary School	Social/Behavioral Problems: Middle School	Social/Behavioral Problems: High School
Females	Self-Reports	No	57.1%	47.6%	66.7%
		Yes	42.9%	52.4%	33.3%
	Parent Reports	No	38.1%	42.9%	52.4%
		Yes	61.9%	57.1%	47.6%
Males	Self-Reports	No	85.7%	76.2%	95.2%
		Yes	14.3%	23.8%	4.8%
	Parent Reports	No	33.3%	38.1%	57.1%
		Yes	66.7%	61.9%	42.9%

Note. Data reflect responses from all participants (21 females, 21 males).

.057) (see Table 7). These females were more likely than males to report that they did not have many friends and were upset that they did not fit in with their peer group.

Results of Research Question 4

What are the differences between females and males in terms of parent and participant self-reports of current social relationships and social impairment?

Parent Reports

For participants aged 13-18 years, parents completed the SRS-2 School-Age parent report form. Based on parent reports of their children's social behavior, no significant differences were observed (see Table 8).

Parents of participants aged 19 years and older completed the SRS-2 Adult Form to provide ratings of their adult child's social behavior. Among parent reports of adult participants, parents of females rated their daughters as displaying higher levels of restricted interests and repetitive behaviors than parents of males; this difference approached statistical significance, $t(18) = 1.893$, $p = .075$. No other significant sex differences were observed (see Table 8), although parents of females also rated their daughters approximately five to eight points higher than parents of males on most SRS-2 subscales. While this finding may highlight a true difference between females and males, it is important to consider the possibility of the effect of an "expectation bias," as suggested by previous researchers (e.g., Carter et al., 2007).

Adult Participant Self-Reports

Participants aged 19 and older completed the SRS-2 Adult Self-Report Form to provide information regarding perceptions of their own social responsiveness. Data from

Table 8

Parent Reports: SRS-2 School Age and Adult Forms Mean Subscale Scores

	Social Awareness	Social Cognition	Social Communication	Social Motivation	Restricted Interests/Repetitive Behavior Total Score	Social Communication & Interaction Total Score	SRS-2 Total Score
School-Age Form							
Female M	67.44	71.22	77.89	73.22	81.78	76.44	78.11
(SD)	*(15.87)*	*(7.52)*	*(14.23)*	*(14.56)*	*(19.30)*	*(13.03)*	*(13.92)*
Male M	73.46	69.69	76.54	72.08	75.23	76.15	76.85
(SD)	*(10.37)*	*(9.98)*	*(12.20)*	*(11.15)*	*(8.25)*	*(9.84)*	*(8.69)*
p value	.336	.702	.814	.836	.360	.953	.795
Adult Form							
Female M	60.50	63.75	65.33	64.17	68.83	64.58	65.58
(SD)	*(13.17)*	*(10.03)*	*(10.36)*	*(10.03)*	*(11.26)*	*(9.82)*	*(10.18)*
Male M	60.00	56.75	60.00	58.38	60.00	59.75	59.88
(SD)	*(9.46)*	*(9.91)*	*(9.17)*	*(8.77)*	*(8.33)*	*(7.57)*	*(7.99)*
p value	.927	.142	.254	.201	.075	.255	.199

Note. Data reflect responses from all participants (21 females, 21 males).

these assessments were scored and analyzed using the adult form norms for the SRS-2. No significant differences were observed between males and females according to participant self-reports (see Table 9).

Results of Research Question 5

What are the differences between females and males in terms of parent and self-reports of current restricted interests and repetitive behaviors?

Some significant sex differences were observed in parent reports of restrictive and repetitive behavior. For instance, parents of females were more likely than parents of males to report that their daughters engaged in significant repetitive behaviors of a self-injurious nature, including hitting, biting, scratching, or picking at oneself, $t(26.65) = -3.29$, $p = .003$. However, parents of males were more likely than parents of females to report that their sons engaged in ritualistic behaviors, including following rigid routines while performing activities of daily living; this difference between females and males indicates a trend that, with a larger sample size, may approach statistical significance, $t(40) = 1.42$, $p = .164$. Parents rated their children very similarly, regardless of sex, within the areas of stereotyped behavior, compulsive behavior, sameness behavior, or restricted behavior (see Table 10).

Results of Research Question 6

What are the differences between females and males in terms of parent and self-reports of current functioning and level of independence (e.g., amount and types of parent support provided, as well as the degree of self-reliance and responsibility in different environments including home, school, and work)?

Table 9

Participant Self-Reports: SRS-2 Adult Self-Report Form Mean Subscale Scores

	Social Awareness	Social Cognition	Social Communication	Social Motivation	Restricted Interests/Repetitive Behavior Total Score	Social Communication & Interaction Total Score	SRS-2 Total Score
Female M	59.33	63.42	62.83	62.92	68.50	63.58	64.83
(SD)	*(9.42)*	*(11.12)*	*(11.51)*	*(11.73)*	*(11.89)*	*(11.20)*	*(11.42)*
Male M	53.00	57.38	59.75	60.13	65.75	59.13	60.38
(SD)	*(9.59)*	*(8.93)*	*(6.86)*	*(11.52)*	*(10.58)*	*(8.17)*	*(8.63)*
p value	.161	.216	.506	.606	.604	.348	.361

Note. Data reflect responses from all participants (21 females, 21 males).

Table 10

Parent Reports: Repetitive Behavior Scale-Revised (RBS-R) Mean Subscale Scores

	Stereotyped Behavior	Self-Injurious Behavior	Compulsive Behavior	Ritualistic Behavior	Sameness Behavior	Restricted Behavior	Overall Score
Female M	3.33	2.81	4.48	3.76	7.67	2.71	24.86
(SD)	*(3.33)*	*(2.64)*	*(4.60)*	*(4.62)*	*(7.87)*	*(3.04)*	*(23.10)*
Male M	2.19	0.76	5.14	5.81	7.29	3.62	24.81
(SD)	*(2.06)*	*(1.09)*	*(3.86)*	*(4.73)*	*(6.60)*	*(3.32)*	*(17.02)*
p value	.189	.003*	.614	.164	.866	.363	.994

Note. Data reflect responses from all participants (21 females, 21 males).
*Significant sex difference, $p < .05$.

Parental Support

Parent reports of the level of support they currently provide for their child, and within which areas, were obtained during the Structured Interview. In ratings of the amount of support that parents reported providing for their child, no significant sex differences were observed, $t(40) = .69$, $p = .495$. Likewise, when self-report data concerning the amount of parental support provided to female and male participants were analyzed, no significant sex differences were observed, $t(40) = .79$, $p = .436$.

Self-Reliance and Responsibility

During the structured interview, parents provided ratings of their child's level of self-reliance, as well as qualitative information regarding the responsibilities that their child has on a regular basis. No significant sex differences were observed in parent ratings of self-reliance, $t(40) = -0.64$, $p = .525$. There were also no sex differences observed in the employment history of participants based on parent ratings, $\chi^2(3, 42) = 1.77$, $p = .623$.

Participants also provided self-reports of their own levels of self-reliance and employment history. No sex differences were observed in self-reports in either area: self-reliance $t(40) = .13$, $p = .896$, or employment history ($\chi^2(3, 42) = 2.17$, $p = .539$).

Results of Research Question 7

What are the differences between females and males in terms of parent and self-reports of current self-determination/career aspirations?

During the Structured Interview, parents and participants were asked whether the participant had made any decisions regarding which role or career they wanted to take on

as an adult. No significant sex differences were observed in parent reports ($\chi^2(1, 42) = .171$, $p > .05$) or in self-reports ($\chi^2(1, 42) = .123$, $p > .05$).

Results of Research Question 8

What are the differences between females and males in terms of self- and parent reports of the age of onset of comorbid psychiatric symptoms (e.g., anxiety, depression)?

Psychiatric Symptoms: Interview Reports

During structured interviews, participants and their parents were asked about whether the participant had experienced serious psychiatric symptoms at any point in their lives, including anxiety, depression, self-harm, anger/frustration, aggressive behavior, obsessive-compulsive behaviors, attention problems, bipolar symptoms, or psychotic symptoms (see Table 11). Parents of females were significantly more likely to report serious episodes of anger/frustration than parents of males, $\chi^2(1, 42) = 4.73$, $p = .030$. No statistically significant sex differences were observed in parent reports of their child's psychiatric symptoms in other psychiatric symptom areas.

In self-report interviews, participants were asked to report on their own histories of psychiatric symptoms. Female participants were significantly more likely than male participants to report symptoms of anxiety ($\chi^2(1, 42) = 8.40$, $p = .004$), depression ($\chi^2(1, 42) = 10.71$, $p = .001$), and thoughts or previous attempts to self-harm ($\chi^2(1, 42) = 10.71$, $p = .001$). Statistically significant sex differences were not observed in participant self-reports in other psychiatric symptom areas.

Table 11

Percentage of Participants Reporting Psychiatric Symptoms

	Anxiety	Depression	Self-Harm (Thoughts or Attempts)	Anger/ Frustration	Obsessive-Compulsive	Attention Problems	Aggression	Bipolar	Psychotic
Females									
Self-Report	100%*	91%*	62%*	62%	71%	52%	62%	0.5%	0.5%
Parent Report	91%	71%	57%	91%**	86%	67%	67%	1%	1%
Males									
Self-Report	67%	43%	24%	67%	71%	52%	57%	0.5%	0.5%
Parent Report	76%	48%	33%	62%	86%	76%	52%	0%	1%

Note. Data reflect responses from all participants (21 females, 21 males).
*Significant sex difference on self-report, $p < .05$.
**Significant sex difference on parent report, $p < .05$.

Age of Onset of Psychiatric Symptoms

During structured interviews, parents and participants were also asked about the age of onset of any psychiatric symptoms that they reported ever having experienced during their lifetime. Based on parent report, no significant sex differences were observed (see Table 12). Likewise, no significant sex differences were observed in participant self-reports of age of onset of various psychiatric symptoms (see Table 13).

Results of Research Question 9

What are the differences between females and males in terms of personality characteristics?

All participants completed one of the Millon clinical scales. Participants who were 13-18 years old (i.e., 9 females, 13 males) completed the MACI; participants who were 19 years and older (i.e., 12 females, 8 males) completed the MCMI-III.

Adolescent Participants: MACI

Modifying indices. Participant data from the MACI Modifying Indices are presented in Table 14. All participants obtained a Reliability scale score of 0, which indicates that each participant provided valid assessment responses. On the Desirability scale, which measures an individual's tendency to present themselves in a socially appropriate or attractive manner, females scored significantly higher than males, $t(20) = -3.00$, $p = .007$.

Personality pattern scales. Many personality patterns appeared quite similar between males and female participants (see Table 15). However, some significant sex differences were observed in personality patterns on the MACI. Female participants had

Table 12

Psychiatric Symptoms: Sex Differences in Age of Onset (Parent Report)

	Anxiety	Depression	Self-Harm	Obsessive-Compulsive	Attention Problems
Females					
Number Reporting	19	15	12	18	14
Mean Age of Onset (in years)	6 years, 4 months	12 years, 2 months	14 years, 5 months	5 years, 9 months	5 years, 1 month
SD Age of Onset (in years)	2 years, 11 months	4 years, 10 months	6 years, 9 months	4 years, 1 month	2 years, 4 months
Males					
Number Reporting	16	10	7	18	15
Mean Age of Onset (in years)	6 years, 9 months	12 years, 2 months	15 years, 3 months	5 years, 6 months	6 years, 4 months
SD Age of Onset (in years)	4 years, 8 months	3 years, 9 months	7 years, 8 months	4 years, 5 months	5 years, 2 months
p value	.737	1.000	.800	.876	.408

(continued)

Table 12 (*continued*)

	Anger	Aggression	Bipolar	Psychotic
Females				
Number Reporting	19	14	2	2
Mean Age of Onset (in years)	5 years, 10 months	5 years, 11 months	10 years, 0 months	8 years, 0 months
SD Age of Onset (in years)	4 years, 3 months	4 years, 2 months	4 years, 3 months	5 years, 11 months
Males				
Number Reporting	13	10	0	2
Mean Age of Onset (in years)	4 years, 2 months	4 years, 11 months	--*	18 years, 6 months
SD Age of Onset (in years)	3 years, 6 months	3 years, 3 months	--*	2 years, 1 month
p value	.261	.534	--*	.133

Note. The number of males in the bipolar group was 0; statistical tests could not be completed.

Table 13

Psychiatric Symptoms: Sex Differences in Age of Onset (Participant Self-Report)

	Anxiety	Depression	Self-Harm	Obsessive-Compulsive	Attention Problems
Females					
Number Reporting	21	19	13	15	11
Mean Age of Onset (in years)	8 years, 8 months	12 years, 1 month	13 years, 6 months	8 years, 1 month	9.27
SD Age of Onset (in years)	3 years, 11 months	4 years, 2 months	4 years, 2 months	6 years, 0 months	6.03
Males					
Number Reporting	14	9	5	15	11
Mean Age of Onset (in years)	8 years, 9 months	9 years, 1 month	17 years, 7 months	8 years, 0 months	7.18
SD Age of Onset (in years)	4 years, 1 month	4 years, 11 months	9 years, 0 months	3 years, 11 months	3.12
p value	.973	.106	.189	.972	.320

(continued)

Table 13 (*continued*)

	Anger	Aggression	Bipolar	Psychotic
Females				
Number Reporting	13	13	2	1
Mean Age of Onset (in years)	7 years, 6 months	9 years, 1 month	8 years, 6 months	12 years, 0 months
SD Age of Onset (in years)	4 years, 0 months	5 years, 9 months	12 years, 0 months	--*
Males				
Number Reporting	14	12	1	1
Mean Age of Onset (in years)	6 years, 5 months	8 years, 2 months	10 years, 0 months	12 years, 0 months
SD Age of Onset (in years)	2 years, 11 months	3 years, 6 months	--*	--*
p value	.426	.642	.935	--**

*No *SD*s calculated for groups with n=1.
**No *t* statistic calculated for groups with n=1.

Table 14

MACI Modifying Indices Scales: Participant Response Patterns

	Disclosure	Desirability	Debasement
Percent Females			
BR 0-34 (Lowest 15%)	33.3%	0%	22.2%
BR 35-74 (Middle 60%)	66.7%	33.3%	66.7%
BR 75-84 (High 15%)	0%	44.4%	11.1%
BR 85+ (Highest 10%)	0%	22.2%	0%
Percent Males			
BR 0-34 (Lowest 15%)	15.4%	7.7%	0%
BR 35-74 (Middle 60%)	76.9%	84.6%	92.3%
BR 75-84 (High 15%)	7.7%	7.7%	0%
BR 85+ (Highest 10%)	0%	0%	7.7%
Sex difference *p* value	.781	.007*	.383

Note. Nine females and 13 males completed the MACI.
*Significant at $p \leq .05$

Table 15

MACI Personality Pattern Scales: Participant Response Patterns

	Introversive	Inhibited	Doleful	Submissive	Dramatizing	Egotistic
Females						
Present BR 75-84	22.2%	11.1%	11.1%	11.1%	33.3%	0%
Prominent BR 85+	0%	11.1%	7.7%	33.3%	0%	0%
Males						
Present BR 75-84	30.8%	46.2%	0%	15.4%	7.7%	7.7%
Prominent BR 85+	7.7%	7.7%	7.7%	7.7%	0%	0%
Sex difference *p* value	.188	.341	.740	.898	.014*	.242

(continued)

Table 15 (*continued*)

	Unruly	Forceful	Conforming	Oppositional	Self-Demeaning	Borderline Tendency
Females						
Present BR 75-84	0%	0%	22.2%	0%	11.1%	0%
Prominent BR 85+	0%	0%	11.1%	0%	0%	0%
Males						
Present BR 75-84	0%	0%	0%	0%	0%	0%
Prominent BR 85+	0%	0%	7.7%	0%	0%	0%
Sex difference *p* value	.302	.981	.116	.654	.328	.713

Note. Nine females and 13 males completed the MACI.

significantly higher scores than males on the Dramatizing (i.e., histrionic) personality scale; this difference was statistically significant, $t(20) = -2.69$, $p = .014$. There was a trend towards significance for females to score higher on the Conforming (i.e., compulsive) personality scale, $t(20) = -1.64$, $p = .116$.

Expressed concern scales. Female and male participants also displayed similar patterns of expressed concerns on the MACI scales (see Table 16). Participants of both sexes generally reported low levels of concern in areas that are of particular relevance to adolescents, including Identity Diffusion, Self-Devaluation, Body Disapproval, Social Insensitivity, Family Discord, and Childhood Abuse.

Clinical syndrome scales. On the clinical syndrome scales, females and males again tended to have similar personality patterns (see Table 17). Participants of both sexes generally obtained low scores on the Eating Dysfunctions, Substance Abuse Proneness, Delinquent Predisposition, and Impulsive Propensity scales, and generally obtained more elevated scores on the Anxious Feelings and Depressive Affect scales. However, a trend toward statistical significance was noted for female participants to have somewhat higher scores on the Suicidal Tendency scale, $t(20) = -1.96$, $p = .064$, although it is important to note that no participants of either sex obtained elevated scores on this scale.

Adult Participants: MCMI-III

Random response indicators. All participants obtained Invalidity scores of 0, which indicates that all participants provided valid assessment data. Additionally, all participants obtained scores of six or less on the Inconsistency subscale, which suggests that inconsistency levels were low enough for all participants for their responses to be

Table 16

MACI Expressed Concerns Scales: Participant Response Patterns

	Identity Diffusion	Self-Devaluation	Body Disapproval	Sexual Discomfort	Peer Insecurity	Social Insensitivity	Family Discord	Childhood Abuse
Females								
Present BR 75-84	0%	0%	0%	0%	44.4%	0%	0%	0%
Prominent BR 85+	7.7%	11.1%	0%	33.3%	0%	0%	11.1%	11.1%
Males								
Present BR 75-84	0%	0%	0%	30.8%	30.8%	0%	0%	7.7%
Prominent BR 85+	0%	7.7%	0%	7.7%	30.8%	0%	7.7%	0%
Sex difference *p* value	.642	.757	.566	.833	.594	.727	.991	.440

Note. Nine females and 13 males completed the MACI.

Table 17

MACI Clinical Syndrome Scales: Participant Response Patterns

	Eating Dysfunctions	Substance Abuse Proneness	Delinquent Predisposition	Impulsive Propensity	Anxious Feelings	Depressive Affect	Suicidal Tendency
Females							
Present BR 75-84	0%	0%	0%	0%	55.6%	11.1%	0%
Prominent BR 85+	0%	0%	0%	0%	23.1%	15.4%	0%
Males							
Present BR 75-84	0%	0%	0%	7.7%	33.3%	33.3%	0%
Prominent BR 85+	0%	0%	0%	0%	53.3%	15.4%	0%
Sex difference *p* value	.295	.708	.366	.211	.769	.855	.064

Note. Nine females and 13 males completed the MACI.

considered valid in this manner as well (i.e., scores of 8-9 on this scale suggest that the responses provided are of "questionable" validity; scores of 10 or higher render the assessment invalid). Although none of the participants obtained problematic inconsistency scores, a trend towards statistical significance was observed for females to obtain somewhat higher scores than males on the inconsistency scale, $t(18) = -1.77$, $p = .094$.

Modifying indices. Participant data from the MCMI-III Modifying Indices are presented in Table 18. All participants obtained valid scores on the Disclosure Scale, indicating that they revealed an adequate amount of information about themselves to allow for assessment interpretation. On the Desirability Scale, 3 males (37.5%) obtained elevated scores in comparison to 1 female (8.3%); scores of male participants were significantly higher than scores of female participants on this scale, $t(18) = 2.10$, $p = .050$. Additionally, a trend towards statistical significance was also noted for females to score higher than males on the Debasement Index, $t(18) = -1.68$, $p = .110$.

Table 18

MCMI-III Modifying Indices Scales: Participant Response Patterns

	Disclosure	Desirability	Debasement
Percent Females			
BR 75+	--	1 (8.3%)	2 (16.7%)
Percent Males			
BR 75+	--	3 (37.5%)	0 (0%)
p value	.341	.050*	.110

Note. Twelve females and 8 males completed the MCMI-III.
*Significant sex difference, $p \leq .05$

Clinical personality pattern scales. Several sex differences were noted on the Clinical Personality Pattern Scales (see Table 19). Males obtained significantly higher scores than females on the Compulsive personality scale, $t(18) = 2.31$, $p = .033$. Two males (25%) obtained elevated scores on this scale, in comparison to none of the female participants (0%). On the other hand, females had significantly higher scores than males on the Masochistic/Self-Defeating personality scale, $t(18) = -2.63$, $p = .017$. Three females (25%) obtained elevated scores on this scale, in comparison to 1 male (12.5%). Additionally, trends towards statistical significance were noted for females to obtain higher scores than males on the Avoidant ($t(18) = -1.91$, $p = .072$), Depressive ($t(18) = -1.46$, $p = .163$), Dependent ($t(9.34) = -1.88$, $p = .092$), and Negativistic (passive-aggressive; $t(18) = -1.50$, $p = .152$) personality pattern scales. Further trends towards significance were observed for males to score higher than females on the Histrionic ($t(18) = 1.46$, $p = .161$) and Narcissistic ($t(18) = 1.86$, $p = .079$) personality pattern scales.

Severe personality pathology scales. A trend towards statistical significance was observed, with females scoring higher than males on the Borderline ($t(18) = -1.53$, $p = .145$) personality pathology scale. No significant sex differences were noted on the Schizotypal and Paranoid personality scales, as very few participants of either sex obtained elevated scores on these scales (see Table 20).

Clinical Syndrome scales. Sex differences were also noted in the Clinical Syndrome scales (see Table 21). A trend towards statistical significance was observed for females to score higher than males on the Anxiety scale, $t(18) = -1.50$, $p = .151$. It is interesting to note that the vast majority (91.7%) of adult females obtained elevated scores on the anxiety scale, in comparison to only 4 males (50%). Additionally, trends

Table 19

MCMI-III: Clinical Personality Pattern Scales: Participant Response Patterns

	Schizoid	Avoidant	Depressive	Dependent	Histrionic	Narcissistic	Antisocial
Females							
Present BR 75-84	8.3%	16.7%	16.7%	25%	0%	8.3%	8.3%
Prominent BR 85+	8.3%	16.7%	25%	25%	8.3%	0%	0%
Males							
Present BR 75-84	0%	12.5%	12.5%	12.5%	0%	12.5%	0%
Prominent BR 85+	12.5%	0%	0%	25%	37.5%	12.5%	0%
p value	.638	.072	.163	.092	.161	.079	.458

(continued)

Table 19 (*continued*)

	Sadistic	Compulsive	Negativistic	Masochistic
Females				
Present BR 75-84	0%	0%	8.3%	8.3%
Prominent BR 85+	0%	0%	0%	16.7%
Males				
Present BR 75-84	0%	0%	0%	12.5%
Prominent BR 85+	0%	25%	0%	0%
p value	.576	.033*	.152	.017*

Note. Twelve females and 8 males completed the MCMI-III.
**Significant sex difference, $p \leq .05$*

Table 20

MCMI-III Severe Personality Pathology Scales: Participant Response Patterns

	Schizotypal	Borderline	Paranoid
Females			
Present BR 75-84	2 (16.7%)	3 (25%)	1 (8.3%)
Prominent BR 85+	0 (0%)	0 (0%)	0 (0%)
Males			
Present BR 75-84	0 (0%)	0 (0%)	0 (0%)
Prominent BR 85+	0 (0%)	0 (0%)	0 (0%)
p value	.550	.145	.650

Note. Twelve females and 8 males completed the MCMI-III.

towards statistical significance were also observed for females to score higher than males on the Bipolar/Manic ($t(18) = -1.61$, $p = .126$), Dysthymia ($t(17.24) = -1.80$, $p = .089$), and Posttraumatic Stress Disorder ($t(18) = -2.05$, $p = .055$) clinical syndrome scales; however, few participants of either sex obtained elevated scores on these scales. Together, these findings suggest that the adult female participants in the current study may have a more complex clinical presentation than adult male participants.

Severe Clinical Syndrome scales. A trend towards statistical significance was also observed for females to score higher than males on the Major Depression severe clinical syndrome scale, $t(13.21) = -2.11$, $p = .055$. One third (33%) of adult female participants in the current study obtained elevated scores on this scale, in comparison to none of the adult male participants (0%). No participants, male or female, obtained elevated scores on the Thought Disorder or Delusional Disorder severe clinical syndrome scales (see Table 22).

Table 21

MCMI-III Clinical Syndrome Scales: Participant Response Patterns

	Anxiety	Somatoform	Bipolar: Manic	Dysthymia	Alcohol Dependence	Drug Dependence	Posttraumatic Stress Disorder
Females							
Present BR 75-84	83.3%	0%	8.3%	16.7%	0%	0%	0%
Prominent BR 85+	8.3%	0%	16.7%	0%	0%	0%	8.3%
Males							
Present BR 75-84	50%	0%	25%	0%	0%	0%	0%
Prominent BR 85+	0%	0%	0%	0%	0%	0%	0%
p value	.151	.141	.126	.089	.871	.291	.055

Note. Twelve females and 8 males completed the MCMI-III.

Table 22

MCMI-III Severe Clinical Syndrome Scales: Participant Response Patterns

	Thought Disorder	Major Depression	Delusional Disorder
Females			
Present BR 75-84	0 (0%)	1 (8.3%)	0 (0%)
Prominent BR 85+	0 (0%)	3 (25%)	0 (0%)
Males			
Present BR 75-84	0 (0%)	0 (0%)	0 (0%)
Prominent BR 85+	0 (0%)	0 (0%)	0 (0%)
p value	.502	.055	.207

Note. Twelve females and 8 males completed the MCMI-III.

Results of Supplemental Question 10

What are the qualitative differences between females and males in terms of onset of core autistic symptoms and symptom development (i.e., age of recognition of DSM-IV-TR criteria, age of participant when the parent first reported concerns to a professional, and age of initial ASD diagnosis)?

During structured interviews, parents were asked to provide information regarding which specific symptoms or unusual behaviors they first noticed to arouse concerns about their child's development. Parents of both male and female participants recalled first noticing odd or unusual behavior as one of the earliest signs of ASD. Common examples of such behavior for both sexes included extreme and/or excessive crying and tantruming, head banging, or in some cases unusually calm behavior; sleeping or eating difficulties; extreme rigidity; odd memorization of information (e.g., numbers and facts) at a very young age; and talking at length about unusual interests beyond their developmental

level. Parents of both sexes also reported that social delays (i.e., a lack of social skills or preferring to play alone) and communication difficulties (i.e., speech delays or difficulty with articulation) were also important early signs of unusual development. Parents of males appeared more likely than parents of females to report early sensory problems, particularly being upset when held or bothered by textures of certain foods and clothing; sensory problems were reported as an early sign by parents of 4 females (19%) in comparison to 9 males (43%).

The majority of parents of both sexes (i.e., 76% of females; 81% of males) reported that others (i.e., relatives or family friends) also noticed concerns regarding their child's development and made comments about their observations. These comments included a variety of issues, such as odd or unusual behavior, speech or overall developmental delays, lack of socialization, unusually good behavior, or comparing the behavior of the participant to another individual already diagnosed with ASD.

Very few parents of participants, of either sex, reported that their child had experienced a regression in skills when they were younger. Of the 4 female participants whose parents reported that they had displayed a regression in skills at a young age, 1 participant was reported to have regressed in the area of language only, another participant was reported to have regressed in the area of socialization only, 1 participant was reported to have regressed in both language and socialization, and 1 participant was reported to have regressed in the areas of socialization and motor skills. Of the 3 male participants whose parents reported that they had displayed a regression in skills at a young age, 2 of these participants reportedly regressed in the area of toileting. The third male participant reportedly displayed a severe global regression after recovering from a

serious illness; his mother recalled that he displayed a regression in a variety of skill areas, including language, socialization, motor, and feeding.

Parents were also asked to recall whether the professional appeared to agree with the concerns they expressed regarding their child's development. Parents of males were more likely than parents of females to report that the professionals they approached agreed with their concerns (33% of females in comparison to 62% of males). Conversely, parents of females were more likely than parents of males to report that professionals either did not agree with their concerns, or did not appear to know what the problem was (i.e., parents of 33% of female participants and 24% of male participants reported that professionals did not agree with their concerns; parents of 29% of female participants and 10% of male participants reported that professionals seemed unsure of what the problem may be). It is also important to note that 1 female participant and 1 male participant were diagnosed during adulthood, so these two participants were excluded from the current analysis.

Parents were also asked to report approximately how many professionals their child saw prior to being given a formal diagnosis of ASD. The information parents provided was quite variable, ranging from 1 professional to 30 professionals, and parents appeared to use different strategies to recall this information. For example, some parents appeared to report one professional contact per evaluation that their child received, while other parents attempted to recall every professional their child had seen related to their ASD (e.g., therapists, teachers, each member of an evaluation team). In many cases, parents also appeared to have difficulty recalling this information accurately. Therefore, the following data should be interpreted with a high degree of caution. Parents of females

reported seeing approximately half the number of professionals (*M* = 3.76; *SD* = 3.33) than parents of males (*M* = 6.30; *SD* = 5.59) prior to receiving a diagnosis of ASD.

Results of Supplemental Question 11

What are the qualitative differences between females and males in terms of the attainment of major developmental milestones including language, play/social interaction, motor skills, and toilet training?

While completing the Symptom Report Form for the current study, parents were given a list of early developmental milestones and asked to indicate an age range as to when their child began to display each milestone (i.e., 0-12 months, 13-24 months, 2 years, 3 years, 4 years, or 5 years+). In regards to milestones in the area of communication, parents of females were more likely than parents of males to report that their child was using single words within the first year of life (61.9% of females in comparison to 38.1% of males). By the end of the second year of life, participants of both sexes were reported to be about equally likely to have developed single word speech (see Table 5). No major sex differences were apparent in the development of two-word phrases. In the area of phrase speech, females again appeared to develop somewhat earlier than males; 42.9% of females were reportedly using phrase speech by the end of the second year of life in comparison to 23.8% of males (see Table 5).

As indicated in Table 5, when asked about motor milestones, parents reported similar patterns in the development of females and males in the areas of sitting, crawling, walking. Parents of males reported that their sons appeared to engage in some motor milestones at earlier ages compared to females, including running (23.8% of males were running in the first year of life, in comparison to 0% of females), climbing (47.4% of

males were climbing in the first year of life, in comparison to 15.8% of females), and biking (31.6% of males were biking before their fifth birthday, in comparison to 5.9% of females). For other sports/dance, of those participants who responded, most did not begin these activities until after their fifth birthday (see Table 5).

Finally, when asked about toilet training, similar patterns in development were again observed, although females may have been somewhat earlier (see Table 5). When asked about toilet training during the day, parents of females reported that 42.9% were toilet trained before their third birthday and 76.2% were toilet trained before their fourth birthday, whereas parents of males recalled that 33.3% were toilet trained before their third birthday and 61.9% were toilet trained before their fourth birthday. When asked about toilet training throughout the night, a similar pattern was observed; parents of females indicated that 42.9% had mastered night training before their third birthday and 61.9% had mastered it before their fourth birthday. Parents of males reported that 23.8% had mastered night training before their third birthday and 57.1% had mastered it before their fourth birthday.

As an additional part of the Symptom Report Form, parents were asked to complete a detailed form depicting which typical behaviors or skills as well as which autism symptoms the participant with ASD displayed and within which age ranges. The intended purpose of this form was to obtain comprehensive information regarding each participant's symptom trajectory over time. However, during the data collection phase, researchers noted that parents appeared to have difficulty recalling the level of detailed information that the questions required and subsequently experienced difficulty in completing the form accurately. Parents often reported that they were unable to recall

specific behaviors that their child had displayed as a young child. Due to the likely invalid nature of the information obtained on this section of the Symptom Report Form, these particular data were not analyzed for the current study.

Results of Supplemental Question 12

What are the qualitative differences between females and males in terms of history of school achievement (e.g., academic or social/behavioral difficulties in elementary, middle, or high school)?

Academic Performance

According to parent reports, many participants of both sexes (i.e., 52% of females and 38% of males) indicated that their children appeared to have positive academic experiences during their elementary school years. However, more parents of males reported that although their child was bright, he had difficulties with various aspects of formal schooling such as organization, low work completion, or difficulty with abstract concepts (i.e., 10% of females and 43% of males). Small numbers of both female and male participants experienced learning difficulties in the early grades according to parent reports, including difficulties learning to read, becoming easily “overwhelmed” with the pace of formal schooling, or requiring self-contained placements to access the curriculum (i.e., 24% of females and 19% of males).

As their children moved into middle school, parents of females were more likely to report that their daughters had a positive school experience (i.e., 33% of females and 14% of males), while parents of males were somewhat more likely to recall that their son was bright but experienced problems related to organization, work completion

(particularly when concerning a subject the participant was not interested in), or difficult relationships with teachers (i.e., 38% of females and 52% of males). Parents of both sexes were about equally likely to report academic problems during middle school. When asked to recall their children's academic experiences in high school, parents of both sexes were equally likely to report a variety of academic experiences, whether positive, negative, or noticing that their child was bright but experienced unique difficulties with important aspects of schooling (organization, work completion, etc).

During their elementary school years, the majority of participants of both sexes recalled having positive school experiences (i.e., 62% of females and 62% of males). Fewer participants recalled having difficulty with related academic issues (e.g., organization, lack of work completion), experiencing different skill levels between different subject areas (e.g., math being more difficult than reading), or experiencing global difficulties. However, as they moved into the upper grades, both males and females became more likely to recall experiencing some degree of academic difficulty. In both middle and high school, the number of participants reporting positive academic experiences decreased across both sexes. Instead, participants reported that they noticed increased struggles with organization, understanding abstract concepts, or maintaining positive relationships with their teachers. Additionally, female participants were more likely than male participants to report noticing performance differences between different subject areas, most commonly that math was more difficult for them than other academic subjects, such as reading (i.e., in high school, 33% of females reported this, in comparison to 5% of males). This finding may be related to female participants' reports of having a more difficult time understanding abstract concepts as they became older.

A few participants further reported that they changed from traditional to alternative school settings at various times throughout their schooling (33% of females and 38% of males); these results are described in Table 23. Some of these participants reported that such changes appeared to lead to an improvement in their academic performance. In some cases, participants recalled transitioning from a traditional school setting to a specialized setting (e.g., a charter school aimed primarily at serving students with ASD) and recalled that their school performance improved with teachers who were more knowledgeable about ASD and more willing to provide accommodations for their students. In other cases, participants reported transitioning from a traditional public school to a charter or private school with smaller class sizes, which also led to an improvement in academic performance. Regardless of the specific type of school that participants attended, their academic success appeared to be related to factors such as teacher understanding and flexibility (e.g., willing to provide accommodations or accept a variety of appropriate responses) and class size.

Table 23

Number of Female and Male Participants Who Changed from Public to Alternative School Settings

	Females	Males
Left public school for charter school	2	2
Left public school for private school	0	2
Left public school to home school	0	1
Left public school to take online classes	1	0
Left public school, but later returned	1	0
Other/multiple moves	3	3

Social/Behavioral Experiences

When asked about their child's social experiences during their elementary, middle, and high school years, the majority of parents of both sexes reported that their child had a small number of friends that they primarily spent time with at school, but further reported that they rarely or never socialized with peers after school hours (i.e., parents of 33% of females and 33% of males, based on high school reports). In other cases, parents reported that their child did not appear to have friends at school, but also that their child did not appear to be bothered by this apparent lack of social interaction. Finally, a small number of parents reported that their child appeared to have multiple friendships and maintain an adequate level of social interaction (i.e., parents of 10% of females and 10% of males, based on high school reports).

Regarding reports of teasing and social difficulty, parents recalled some degree of teasing, whether minor or severe, in approximately one third of female participants and one half of male participants in their elementary school years. These numbers remained fairly stable into middle school, although more parents of females (approximately half) than males (approximately one third) reported that their child experienced teasing. Numbers of parents reporting teasing during their children's high school years decreased for both sexes; however, there are some possible explanations for this decrease that are important to consider. First, some of the younger participants in the current study had not yet reached high school (i.e., they were 13 years old and still in junior high at the time of their participation), which would lead to an overall decrease in reporting for high school experiences. Additionally, some participants who experienced severe teasing and social

difficulty during elementary and middle school may have been more likely to move to an alternative setting for their high school years.

Similar to the impact of school setting on academic performance, many participants in the current study reported that their social experiences during their school years were influenced by the setting in which they attended school. For example, some participants reported leaving traditional school settings to attend alternative, charter, or private school settings or enroll in online classes due to the degree of teasing and social difficulty that they had experienced. In other cases, participants attending traditional school settings reported that they had a positive social/emotional experience within that setting if their peers and teachers were accepting and supportive. Regardless of the specific setting that participants attended, whether they had a positive experience appeared to depend primarily on the level of acceptance and support provided by others (e.g., peers, teachers).

When asked about behavioral difficulties, parents of 6 females (29%) and 7 males (33%) recalled that their child had a formal behavior intervention plan in place at some point during their schooling. Behavior intervention plans were commonly used to address behaviors such as aggression, tantrums, coping with stress, following directions, or work completion. Likewise, parents of 4 females (19%) and 4 males (19%) recalled that their child had been suspended from school at some point during their education. Commonly reported behavior problems resulting in suspension were similar for both sexes and primarily included aggression or making threats.

School Services

Parent reports indicate that 12 female participants (57.1%) and 16 male participants (76.2%) received special education services on an Individualized Education Plan (IEP) at some point during their schooling. Of these, 3 females and 5 males had an IEP in the early grades only, which was later discontinued. The remaining 9 females and 11 males continued to receive IEP services into the later grades. Additionally, 8 female participants (38.1%) and 3 male participants (14.3%) received 504 accommodations in the upper grades; 1 additional male was eligible for these services but refused them. It is important to note that in some cases, parents seemed to have difficulty recalling specifically which special education services their child received, if any. Finally, 3 females (14.3%) and 3 males (14.3%) participated in school-based gifted and talented programs (see Table 24).

Table 24

Number and Percentage of Female and Male Participants Receiving Various School Services

	IEP (Later Grades)	IEP (Early Grades)	504	Gifted Programs
Females	9 (43%)	3 (14%)	8 (38%)	3 (14%)
Males	11 (52%)	5 (24%)	3* (14%)	3 (14%)

**Note: One additional male was eligible for 504 accommodations but refused*

Results of Supplemental Question 13

What are the qualitative differences between females and males in terms of parent and participant self-reports of current social relationships and social impairment?

Parents reported that their children, regardless of sex, generally displayed moderate impairments in the areas of social awareness, social cognition, and social motivation; moderate to severe impairments in restricted interests and repetitive behavior; and severe impairments related to social communication and interaction. On the different subscales of the SRS-2, all mean differences between parent ratings of females and males were within seven points or less of each other, which suggests that parent ratings of female and male participants were clinically very similar.

Based on parent ratings, adult female participants obtained scores approximately nine points higher than adult male participants on the restricted interests and repetitive behavior subscale of the SRS-2. Parents of adult females may observe slightly greater social deficits in their children (within the mild to moderate range of impairment) than parents of adult males (within the normal to mild range of impairment).

The SRS-2 school-age form is typically utilized as an informant report measure, and therefore self-report norms are not provided for this instrument. For the current study, an item analysis was completed to examine participants' self-report data regarding their own social behaviors (see Appendix F for full item analysis results). In general, mixed results were observed between female and male school-age self-reports on this instrument. Although participants of both sexes provided similar responses to many items, male participants seemed to endorse more difficulties than female participants related to social responsiveness overall. For instance, more males than females endorsed

difficulties related to social cognition (e.g., taking things too literally, becoming upset in overwhelming situations, having strange or illogical reasons for their actions), social communication (e.g., difficulty with reciprocal conversations, unusual eye contact, “socially awkward” behavior, responding appropriately to mood changes in others, awareness of personal space), social motivation (feeling uncomfortable in social situations, preferring to be alone, avoiding initiating social interactions), and restricted interests/repetitive behavior (e.g., unusual sensory interests, difficulty with changes in routine, repeatedly thinking or talking about the same topics).

However, school-age female participants reported somewhat greater difficulty than males on certain items of the SRS-2 School-Age self-report items. For instance, females were more likely than males to report difficulty recognizing when others are taking advantage of them, difficulty recognizing emotions in others, not joining group activities unless prompted to do so, believing that others view them as odd, being teased frequently, and having less awareness of when they are talking too loud or making too much noise.

Similar to the parent reports of adult participants, the adult participant self-report results indicate that females consistently scored slightly higher than males on all SRS-2 scales (i.e., treatment subscales, DSM-V subscales, and total score); these differences ranged from females scoring an average of two points higher than males (on the Social Motivation subscale) to females scoring an average of six points higher than males (on the Social Awareness and Social Cognition subscales). Such differences would likely not represent substantial differences in clinical presentation between females and males; however, adult females tended to rate themselves as displaying mild deficits in many

areas, while adult males tended to rate themselves as within the normal range. Exceptions to this included the area of social awareness, in which both female and male participants rated themselves as being within the average range, and the area of restricted interests and repetitive behaviors, in which both females and males rated themselves as displaying moderate levels of impairment.

Results of Supplemental Question 14

What are the qualitative differences between females and males in terms of parent and self-reports of current restricted interests and repetitive behaviors?

The RBS-R is typically utilized as an informant report measure, and therefore, self-report norms are not provided for this instrument. However, participant self-report data were collected for the current study, and an item analysis was completed to examine participant self-report data regarding their own restricted interests and repetitive behaviors (see Appendix G for full item analysis results). In general, mixed results were seen regarding sex differences in participant responses to individual RBS-R items, and participants of both sexes provided similar responses to many items. However, some subtle sex differences were noted; these subtle differences may represent patterns of behavior that warrant further investigation.

For instance, in the area of stereotyped behavior, females were somewhat more likely to report mild to moderate problems related to sensory behaviors or repetitive head movements in comparison to male participants. On the other hand, male participants were somewhat more likely to report moderate to severe levels of repetitive behaviors involving objects (e.g., spinning objects, letting objects fall out of hands) than females, although participants of both sexes endorsed a variety of responses related to this item.

Male and female participants provided similar responses to items related to whole body movements, hand and finger movements, and locomotion. In the area of self-injurious behavior, females were more likely to endorse problems related to pulling or picking at skin or hair, whereas males were more likely to endorse mild levels of biting behavior (e.g., biting themselves on the hands, wrists, arms, lips, or tongue) in comparison to females. In the area of compulsive behavior, females and males generally responded very similarly to each item, with the exception of females being more likely than males to report higher levels of "completeness" behavior (e.g., must have doors open or closed, taking all items out of a container or area). A trend was noted towards female participants being more likely to endorse ritualistic behaviors related to communication/social interaction, leisure activities, travel/transportation, and self-care, whereas males appeared more likely to endorse higher levels of ritualistic behavior around eating and mealtimes. Finally, a trend was observed for females to endorse higher levels of sameness behavior in various areas in comparison to males, such as preferring that things remain in the same place, objecting to visiting new places, becoming upset if interrupted in what she is doing, liking the same music or videos played repeatedly, or insisting on using a particular door. However, a trend was observed for male participants to be more likely than females to endorse greater problems related to insisting that specific events take place at specific times. Participants of both sexes reported similar problems related to restricted behaviors and interests.

Results of Supplemental Question 15

What are the qualitative differences between females and males in terms of parent and self-reports of current functioning and level of independence (e.g., amount and types

of parent support provided, as well as the degree of self-reliance and responsibility in different environments including home, school, and work)?

During the structured interviews, parents reported a trend for females to display greater improvement in core ASD symptoms and behavior over time in comparison to males, who tended to display more stable symptomatology and behavior. Additionally, a trend was observed for parents of females to report greater fluctuations in their daughters' ASD symptomatology in comparison to parents of males. Such fluctuations in symptomatology were reportedly associated with situations of greater anxiety or stress. Again, parents of males tended to report that their symptomatology generally appeared to be fairly stable across various situations. Parents of females appeared more likely than parents of males to report that their children enjoyed higher levels of current social interaction, as defined by participation in regular social activities and having some current friendships.

When parents were asked about the amount of support that they currently provide for their offspring, parents reported providing similar types of support for their male and female children, including social/emotional, transportation, assistance or reminders to complete personal care tasks, shopping/errands, assistance with housework, supervision, and assistance/prompts to complete or organize their schoolwork. In terms of daily responsibilities, parents of all participants, regardless of sex, generally reported that their children's primary daily responsibilities included housework/chores, school, or employment.

Educational history was similar for both sexes. Nine female and 10 male participants had not yet completed middle or high school at the time of their participation

in the current study. Three females and 4 males received special education and related services through the age of 22; additionally, 9 female and 7 male participants continued their education beyond high school. No sex differences were observed in participant reports of the types of employment held, including formal outside employment; informal employment for neighbors, relatives, or family friends (e.g., babysitting, yard work); or no history of employment. Instead of paid employment, some participants reported maintaining consistent volunteer positions at various locations. The type of jobs participants held appeared to be primarily accounted for by their age and developmental level, rather than their sex. Both female and male participants reported holding a wide variety of occupations, such as cashiering or stocking at various retailers, custodial work, customer service, or working as an assistant in school or after-school program settings. Based on parent reports, most performance evaluations from outside jobs were generally positive, with a few exceptions involving becoming fatigued after long shifts, difficulty sustaining attention, working slowly, or having difficulty with social interaction.

Results of Supplemental Question 16

What are the qualitative differences between females and males in terms of parent and self-reports of current level of self-determination/career aspirations?

Information from parent reports suggests that females displayed a wider variety of potential future career goals, including work with animals (working for a veterinarian or at a zoo), helping professions (nursing, occupational therapy, psychology), education (teacher, assistant), library sciences, or the arts (writing, art, acting). Of male participants who indicated that they had made decisions about future adult/career roles (i.e., 17 out of 21 participants), a substantial proportion (47%) of them indicated interest in fields related

to computers (programming, computer science, computer tech, web design) or video games (programming or customer service), with other interests including engineering, aviation, and art. Parents of both sexes reported that many of their children (i.e., 67% of females and 57% of males) had future role and career aspirations that were "realistic" or "very realistic" for them to obtain. Even in cases where parents were unsure if their child would be able to fulfill the exact role that they wished to take on (e.g., elementary school teacher), they felt that their child would be able to obtain a position that is similar to their original goal and would still fulfill their desires (e.g., teacher's assistant or aide).

Results of Supplemental Question 17

What are the qualitative differences between females and males in terms of self- and parent reports of the age of onset of comorbid psychiatric symptoms (e.g., anxiety, depression)?

Psychiatric Symptom Histories

During structured interviews, parents were asked to provide descriptive information regarding any history of psychiatric symptoms that their child had experienced previously or currently. Significant sex differences were observed only in the area of anger and frustration; parents of females reported that their children had experienced more severe difficulties in this area compared to parents of males. Qualitative parent reports involved a wide variety of descriptions of such anger and frustration, including difficulty handling stress, responding negatively to unplanned or unexpected events, anger directed primarily at siblings, or anger that was present primarily when their children were younger that had improved with age.

In other symptom areas, subtle patterns were noted within qualitative parent reports that are worthy of discussion. For instance, when asked about symptoms of anxiety, a trend was observed for parents of females to report noticing anxiety centered around social situations, while parents of males more frequently reported that their child was upset by new or unfamiliar situations. When depression was endorsed, parents of both sexes reported various reasons for their child's depression, including negative social experiences, specific situations that their child had difficulty coping with, or a general depressive affect; other times, parents simply described the specific symptoms that their child experienced (e.g., low energy, sadness, irritability). Regarding history of self-harm, more parents of females than males reported that their child had experienced suicidal thoughts. For both sexes, a small number of parents reported that their child had made comments, taken some action, or been hospitalized due to a risk of self-harm.

When asked about obsessive-compulsive symptomatology, parents of both sexes endorsed a history of a wide variety of behaviors commonly associated with ASD. For instance, the behaviors that were most commonly endorsed by parents of both sexes included rigidity and strict adherence to routines or rituals; other behaviors that were endorsed included difficulty with change, restricted or repetitive interests, and a high need for organization/cleanliness. Parents of males and females were also equally likely to report a history of attention problems, and both sexes were reported to display similar symptom histories (e.g., approximately equal numbers of both sexes displayed difficulty with hyperactivity, inattentiveness, becoming easily distracted or losing focus, or problematic levels of "hyperfocusing"). Parent reports of aggression were also similar for both sexes; both females and males were more likely to display aggression towards

objects (e.g., breaking or throwing objects) or others (e.g., lashing out at siblings, parents, or other children) than harming themselves. However, it should be noted that reports of aggression directed towards a person, whether the participant themselves or another individual, were small in number across both sexes. These results are quite different than the results obtained by another recent study (Backner et al., in press), which found that more than half of participants displayed aggressive behavior. However, it should be noted that participants in the Backner study were adolescent males who were receiving inpatient psychiatric treatment at the time of their participation.

Finally, parents were asked to report on symptoms related to bipolar disorder and psychotic symptoms; parents of both sexes did not commonly endorse these symptom areas. Two parents of females reported that their daughters appeared to have some bipolar symptoms, namely rapid and dramatic changes in mood. One mother reported that her daughter's mood cycles "frequently" and also changes rapidly in response to stress, while another mother reported that her daughter's mood appears to cycle every 3 to 4 weeks. No parents of males endorsed similar symptoms. When asked about psychotic symptoms, parents of 2 females and 2 males reported that their child hears voices, sees things that are not there, or appears to have experienced hallucinations or delusions. The parent of 1 male reported that this had occurred only one time, while parents of the other participants indicated that such episodes had occurred multiple times.

Participants with ASD were also asked to provide qualitative reports regarding their own psychiatric symptom histories. When asked to provide information in these areas, several more females than males reported that their anxiety and depression were related to social situations (i.e., 33% of females compared to 5% of males). Additionally,

more females than males endorsed a history of suicidal thoughts (i.e., 38% of females compared to 14% of males), although the vast majority of these females also reported that they had never made plans to harm themselves and did not believe that they would ever act on such thoughts.

When asked to report on their own obsessive-compulsive behaviors, more females than males reported a high need for organization and needing items to stay in the "right" place. No major differences were noted between males and females for specific symptoms related to attention problems (e.g., hyperactivity, inattention, becoming easily distracted, problematic "hyperfocusing"). Additionally, female and male participants reported similar patterns of anger and aggression, although low numbers of both sexes reported a history of these symptoms. Among participants who endorsed a history of aggression, property destruction was more commonly described in comparison to aggression targeted towards themselves or others.

Similar to parent reports, few participants endorsed symptoms related to bipolar disorder or psychotic symptoms. One female and 1 male participant each reported that they had experienced symptoms similar to bipolar disorder; 1 female participant recalled being diagnosed with bipolar disorder while hospitalized for suicidal thoughts, and 1 male participant reported that his mood appears to cycle monthly. In the area of psychotic symptoms, 1 female reported hearing voices, experiencing hallucinations, and having "visitations" from people who have not been born yet. Additionally, 1 male participant recalled experiencing one delusional episode in the recent past, but no consistent symptom pattern.

Participants were also asked about their history of substance use. Very few participants endorsed any history of substance use, whether consistent or experimental (i.e., 3 females and 3 males). Of female participants, 2 participants endorsed some consistent pattern of substance use, whereas 1 reported a few instances of experimental use. All 3 male participants reported a few instances of experimental substance use, but no consistent pattern.

Age of Onset of Psychiatric Symptoms

For both sexes, parents reported first noticing symptoms related to anxiety, obsessive-compulsive behaviors, attention problems, anger, and aggression in their child's early school-age years (e.g., between 4-7 years of age), while symptoms of depression and self-harm generally began later (e.g., between 12-15 years of age) for both sexes. No parents of males reported symptoms related to mood cycling or bipolar disorder, while 2 parents of females reported that their daughters began to display such symptoms at various ages (i.e., 1 reported an age of onset of 7 years, while the other reported an age of onset of 13 years, for an average age of onset of 10 years). Small numbers of parents reported a history of any psychiatric symptoms for their child (i.e., 2 females and 2 males); subsequently, a large difference was observed between the average age of onset, with females displaying symptoms during childhood or early adolescence, while the males reportedly displayed symptoms later in adolescence. However, due to the small number of parents reporting such symptoms for their child, these differences did not reach statistical significance and must be interpreted with caution.

Although no significant sex differences were observed in participant self-reports of age of onset of various psychiatric symptoms, it should be noted that there was a large

difference in the number of participants endorsing symptoms in some psychiatric areas (i.e., 19 females endorsed symptoms of depression, in comparison to 9 males), which likely influenced the mean ages of onset reported. A trend towards significance was observed in self-reports of age of onset for depression, $t(26) = -1.68$, $p = .106$, in that males recalled first experiencing symptoms of depression approximately 3 years earlier than females. However, females recalled experiencing thoughts or attempts at self-harm approximately 4 years before male participants. Females also recalled experiencing symptoms of attention problems an average of 2 years later than males, and symptoms of both anger and aggression an average of 1 year later than males. Both sexes reported experiencing symptoms of anxiety and obsessive-compulsive behaviors at approximately the same ages.

Similar to their parents' reports, very few participants endorsed symptoms related to bipolar disorder or psychiatric episodes. Three participants (1 male, 2 female) recalled experiencing cycles in their mood in beginning in middle childhood, while 2 participants (1 male, 1 female) recalled experiencing psychiatric symptoms beginning in late childhood.

Results of Supplemental Question 18

What are the qualitative differences between females and males in terms of personality characteristics?

Adolescent Participants: MACI

Modifying indices. Most participants obtained Disclosure scale scores within the average range, suggesting that they self-disclosed an adequate amount of information

about themselves on this measure. However, some participants (i.e., 3 females and 2 males) yielded disclosure scores in the lowest 13%, and 1 male yielded a score within the highest 25%. On the Debasement scale, which measures an individual's tendency to present him- or herself in an overly negative manner, most participants scored within the average range, and there were no significant sex differences. On the Desirability scale, the vast majority of males (92%) obtained Base Rate (BR) scores within the low to middle/average ranges, and only 1 male (8%) obtained an elevated BR score. On the other hand, a minority of females (33%) scored within the low to middle/average ranges, and the majority of females (67%) obtained elevated BR scores.

Personality pattern scales. Both sexes tended to score within the average range on the following personality scales: Doleful, Egotistical, Unruly, Forceful, Oppositional, Self-Demeaning, and Borderline Tendency, suggesting that few participants of either sex possessed problematic levels of these characteristics. On the other hand, several participants (i.e., 43% of females and 23% of males) obtained elevated scores on the Submissive personality scale, which is characterized by difficulty asserting oneself, difficulty taking initiative, and increased dependency on others. Many participants, both female and male, had scores approaching the elevated range (e.g., 65 and over), suggesting that that majority of participants displayed noticeable characteristics of a submissive personality pattern. The significant statistical finding (females higher than males on Dramatizing personality scale) suggests that female participants in the current study were more likely than male participants to be highly verbal and conversational, socially appropriate or "charming," and more emotionally expressive. The trend towards significance on the Conforming scale (for females to be higher than males) indicates that

female participants in the current study may be somewhat more likely than male participants to present as very serious, to follow the rules, and to prefer order and routine while trying to avoid unpredictable situations. Males appeared to score somewhat higher than females on the Introversive and Inhibited personality scales, although neither of these analyses reached statistical significance. These scales indicate either a lack of desire for social contact, or a desire for social contact combined with a fear of forming relationships with others, respectively.

Expressed concern scales. Both sexes displayed low scores on the Identity Diffusion, Self-Devaluation, Body Disapproval, Social Insensitivity, Family Discord, and Child Abuse scales. A moderate number of participants (i.e., 33% of females and 38% of males) reported elevated levels of Sexual Discomfort, indicating some level of distress or confusion with their own thoughts and feelings about sex. Additionally, a substantial proportion of participants (i.e., 44% of females and 62% of males) reported elevated levels of Peer Insecurity, suggesting that they have a desire for approval from their peers and feel some degree of sadness or frustration over previous unsuccessful attempts to attain social acceptance.

Clinical Syndrome scales. Both sexes displayed low scores in the areas of Eating Dysfunctions, Substance Abuse, Delinquency, Impulsivity, and Suicidal Tendencies. Moderate numbers of both female and male participants obtained elevated scores on the Depressive Affect scale. Almost half of female participants (44%) and almost one third of male participants (31%) reported moderate to significant levels of depression based on their MACI responses. On the Anxious Feelings scale, the vast majority of participants of both sexes obtained elevated scores; almost all female participants (89%) and male

participants (77%) indicated moderate to significant levels of anxiety. Together, these findings indicate that a substantial proportion of the adolescent participants in this study, regardless of sex, displayed clinically significant symptoms of anxiety and depression.

Adult Participants: MCMI-III

Modifying indices. Adult male participants were more likely than female participants to provide assessment responses to present themselves in a socially appropriate or attractive manner. The trend towards significance for females to score higher than males on the Debasement Index suggests that adult female participants were more likely to present themselves in a negative manner.

Clinical personality pattern scales. Females scored significantly higher than males on the Masochistic/Self-Defeating personality scale, which suggests that female participants in this study may perceive themselves as being inferior to others or allow others to manipulate or take advantage of them; further, they may expect to be treated in this manner. Trends towards significance were observed for females to obtain higher scores than males on the Avoidant, Depressive, Dependent, and Negativistic personality pattern scales. Additionally, trends towards significance were observed for males to score higher than females on the Histrionic and Narcissistic personality pattern scales.

Severe personality pathology scales. There was a trend towards significance for females to score higher than males on the Borderline personality pathology scale. Three females (25%) obtained elevated scores on this scale, in comparison to no male participants (0%). Consequently, female participants in this study appear more likely than male participants to display dysregulated affect, experience recurrent thoughts of self-

harm, be overly concerned about obtaining care and attention from others, or experience conflicting feelings of strong affection and strong anger towards others.

CHAPTER IV

DISCUSSION

While ASD is often diagnosed during early childhood, a notable subset of individuals with these disorders may be misdiagnosed or overlooked until adolescence or even adulthood. Researchers have suggested that females with ASD are more likely than males to be missed or diagnosed late, given what appears to be a somewhat different symptom presentation. However, the trajectory for autistic symptom development and factors that may interfere with early identification of ASD among females, including differences between females and males in terms of social cognition, social skills, and social expectations, have not been studied well. The reported lower incidence for ASD for females compared to males is thought to be one reason that females have not been the focus of many autism investigations. The course of development, including onset of psychiatric symptoms, is poorly understood. Females in the general population have been shown to have a higher rate of depression and anxiety compared to males, and there are no data that show this is different for females with ASD. Further, there are a number of questions about the personality characteristics of females that may interfere with early identification and implementation of interventions.

This study is one of the first to examine sex differences in a sample of adolescents and adults with ASD and normal intelligence in the following areas: early ASD symptom development and manifestation, including age of recognition of ASD symptoms, early

behaviors and developmental milestones, initiating the diagnostic process by expressing concerns to a professional, and age of first formal diagnosis; current ASD symptomatology and functioning, including current social/communication skills, restricted interests and repetitive behavior, level of independence and functioning, and career aspirations; school experiences, both academic and social/behavioral; presence of other problems, including psychological and psychiatric comorbidity; and personality characteristics.

Recent studies have begun to suggest that females with ASD may be more likely to go unrecognized, in comparison to males or females with a concomitant intellectual disability, perhaps due to subtler manifestation of symptoms and better social communication skills. This issue is becoming more widely recognized and was highlighted in the recently released DSM-5 (American Psychiatric Association, 2013). Previous research has looked at differences in development of ASD symptomatology in early childhood, while other research has looked at differences in symptomatology in adulthood. To our knowledge, the current study is the first study that is comprehensive and examines sex differences across multiple areas in adolescents and young adults with ASD.

Early ASD Symptom Development and Manifestation

The results of the current study indicate that parent age of recognition of autistic symptomatology was slightly later for females than males. This finding differs from that of another recent study (Horovitz, Matson, Turygin, & Beighley, 2012), which revealed that age of first parent concern was significantly younger for female children than male children, in a sample of children with various disorders (e.g., ASD, global developmental

delays, Down's Syndrome, cerebral palsy, microcephaly, seizure disorders). In the current study, participant self-reported age of recognition was approximately 2 years earlier for females than it was for males. Although self-reports of retrospective information from the current study should be interpreted with caution, due to the difficulty that some participants had in recalling this information accurately, such findings may suggest that females do indeed have better self-awareness and self-referential cognitive ability as suggested in previous research (Lai et al., 2011), as evidenced by this earlier age of recognition in comparison to males.

Very few parents in the current study reported that their child had displayed a regression of skills in early childhood (i.e., 7 out of 42 participants, or 16.67% of our sample). This proportion is slightly smaller than was reported by a recent meta-analysis (Barger et al., 2013) who reported that different methods of data collection yielded between 21-40% of parents reporting that their child experienced a regression in symptoms. However, one potential explanation for this may be that the participants in the current study were of normal intelligence and more likely to be diagnosed with Asperger's Disorder or PDD-NOS rather than Autistic Disorder, as individuals with a diagnosis of Autistic Disorder appear more likely to have experienced such a regression in skills (Barger et al., 2013). No significant differences were observed in regression patterns between male and female participants in the current study, which is consistent with the findings of the meta-analysis conducted by Barger and colleagues (2013).

In the current study, parents generally reported similar early symptom patterns between their female and male children. However, parents of males were somewhat more likely than parents of females to report noticing early sensory problems. This finding is

similar to what has been reported in previous research, that males with ASD appear to display greater restricted and repetitive behaviors in childhood (e.g., Hartley & Sikora, 2009; van Wijngaarden-Cremers et al., 2013). Other researchers have speculated that restricted and repetitive behaviors may simply be more noticeable in males than in females, as males may have more unusual interests (e.g., transportation, science, technology) while females tend to display interests in areas that are more developmentally appropriate such as dolls or toy animals (Atwood 2007; Atwood, Grandin, Bolick, & Faherty, 2006; Kopp & Gillberg, 1992; Nichols, Moravcik, & Tetenbaum, 2009). Although parents in the current study tended to report that females met some developmental milestones (e.g., language development) at earlier ages than males, it is important to note that this is also true among typically-developing children; therefore, this finding may not be particularly relevant to differences in early ASD symptomatology between females and males.

Another important finding of the current study is a significant sex difference between when parents recalled taking their child to a professional to address concerns related to their developmental abnormalities. Parents recalled that the first professional contact for their male children occurred when their son was approximately 3 years, 9 months old (on average), while first professional contact for female children did not occur until their daughters were almost 7 years old on average. Although the researchers did not specifically ask parents why they waited so long to bring their daughters to a professional, parents of some females indicated that they noticed differences in their daughters development, but thought that she was just shy, had a unique personality, or waited for her to “grow out of” her differences. One mother recalled noticing concerns

with her daughter from a very young age, but stated that she “didn’t know it (autism) had a name” until her daughter reached adolescence.

In the current study, parents of females were more likely to report that professionals either did not agree with their concerns regarding their child’s development, or otherwise did not recommend further evaluation. Some possible explanations as to why this may have been a more common occurrence for female participants has been previously suggested in recent research. First, some researchers have suggested that because most of the research on ASD has been conducted with primarily male participants, what we know about ASD may be limited almost exclusively to males (Kirkovski et al., 2013; Tsakanikos et al., 2011; van Wijngaarden-Cremers, van Eeten, Groen, Van Durzen, Oosterling, & Van der Gaag, 2013). Therefore, the possibility of a sex bias in the diagnosis of ASD cannot be ignored (e.g., Cheslack-Postava & Jordan-Young, 2012; Dworzynski et al., 2012; Giarelli et al., 2010; van Wijngaarden-Cremers et al., 2013). Consequently, professionals may not know how to recognize signs of ASD in females and may therefore be less likely to consider the possibility of ASD in female patients (Baron-Cohen, Lombardo, Auyeung, Ashwin, Bhismadev, & Knickmeyer, 2011; Giarelli et al., 2010; Siklos & Kerns, 2007).

Despite a significant delay in female participants’ being brought to a professional to address developmental concerns, in comparison to when males were brought to a professional, further analyses suggest that in the current study, female and male participants received their initial ASD diagnoses at virtually identical times (i.e., 10 years, 9 months). This is substantially later than ASD is often diagnosed, and it is an interesting finding that this delay was observed in participants of both sexes. Parents of

both sexes generally reported that: 1) they were aware of their child's developmental differences but were unsure of where to go for help, or 2) that their child did not display significant difficulties until they reached adolescence or adulthood and the demands of their environment (e.g., social, academic, occupational) became more challenging and complex. Previous research has also reported that, despite increased awareness of ASD in recent years, in some cases participants may still experience a delay in diagnosis until late childhood, adolescence, or even adulthood (e.g., Begeer et al., 2013; Kopp & Gillberg, 1992; Lugnegard, Hallerback, & Gillberg, 2011; Siklos & Kerns, 2007).

Regarding which specific DSM-IV-TR criteria that participants met previously or currently, as indicated by parent report, no significant sex differences were observed. In fact, parents of both sexes reported that their children met virtually the same criteria for Autistic Disorder. Parents further reported that their male and female children met most of their early developmental milestones at approximately the same ages, with minor exceptions. Parents of males recalled that their children met some motor milestones (i.e., running and biking) at somewhat earlier ages in comparison to parents of females. Although very few studies to our knowledge have examined sex differences in motor skills among young children with ASD, the results of one study suggest that female toddlers may indeed display delays in motor skills in comparison to male toddlers (Carter et al., 2007).

Current ASD Symptomatology and Functioning

The current study also looked at current ASD symptomatology among adolescent and adult participants. When asked about current communication and social interaction skills, parents of school-age participants (ages 13-18) reported that both sexes displayed

moderate to severe levels of impairment. Parents of adults, however, consistently reported that female participants displayed slightly more severe deficits related to social communication and interaction, as well as restricted interests and repetitive behaviors, than male participants. While these differences did not reach statistical significance, it is worth noting that parents appeared to observe somewhat greater impairment in female participants in comparison to males. This may reflect an “expectation bias,” in which parents expect their daughters to have a high level of social/communication skills, particularly in comparison to their male peers. Due to this increased expectation for females may result in more discrepant ratings, parents may subsequently rate their daughters as having lower social and communication skills in comparison to males (e.g., Carter et al., 2007; Holtmann et al., 2007). Another potential explanation is that females may have greater difficulty than males with impulse control, which can lead to females displaying increased social problems, particularly when in a high state of arousal such as anxiety (Lemon et al., 2011).

On participant self-reports of their own social communication and interaction skills, an item analysis yielded mixed results among school-age participant data. There was some evidence that females perceived themselves as having greater difficulty than males in recognizing when others are taking advantage of them, difficulty recognizing emotions in others, reluctance to join group activities unless prompted to do so, perceiving that others perceive them as odd or strange, experiencing frequent teasing, and having less awareness of when they are talking too loudly or otherwise making too much noise. When adult participant self-report data were examined, females again consistently scored slightly higher than males on all SRS-2 subscales. Although these differences

were small and did not approach statistical significance, this finding provides further evidence that in adulthood, female participants with ASD may display somewhat higher levels of social impairment in comparison to their male peers, or perhaps have higher awareness (Lai et al., 2011) of their social difficulties. Another potential explanation may be that females are aware that they are expected to display a high level of social interaction skills, and may therefore see their deficits as greater than they actually are, similar to the expectation bias discussed earlier (e.g., Carter et al., 2007; Holtmann et al., 2007).

Previous research (Orsmond, Shattuck, Cooper, Sterzing, & Anderson, 2013) has suggested that young adults with ASD have high rates of social isolation in comparison to their peers with an intellectual disability, a learning disability, or an emotional disturbance. More specifically, young adults with ASD are more likely to never see friends, receive phone calls from friends, or be invited to activities. Similar occurrences were observed in the current study. Although many participants reported having had friends at school or work that they could sit with during class or at lunch, or make small talk with, many of these participants further reported rarely or never interacting with these friends outside of school or work.

Parent reports of current restrictive and repetitive behaviors indicate similar behavior patterns between female and male participants with one notable exception: parents reported significantly more self-injurious behaviors among female participants than among male participants. This finding is consistent with previous research (e.g., Cohen et al., 2010; Esbensen et al., 2009), which suggests that females with ASD are at an increased likelihood of self-injurious behavior. While both of these studies included a

substantial number of participants with a comorbid intellectual disability, results of the current study suggest that this finding may generalize to females with average- or above-average intellectual ability.

Parents of male participants were somewhat more likely to report that their sons experienced elevated levels of ritualistic behaviors, such as following rigid routines. Participant self-reports of restricted and repetitive behavior suggest that participants of both sexes provided similar responses on most items, as indicated by an item analysis. Based on the results of the item analysis, there does not appear to be a significant difference between female and male participants in self-reports of restricted and repetitive behavior.

Current level of functioning was assessed during structured interviews. No significant sex differences were observed, based on parent and participant self-reports, in the areas of the level and type of parent support needed, daily responsibilities, and employment history. Participants and their parents were also asked about participants' current career aspirations, that is, the extent to which they had thought about and made decisions regarding the type of role or career they wished to take on as an adult. Again, no significant sex differences were observed in parent reports or participant self-reports. However, on parent reports, a greater variety of potential career interests was endorsed for females (e.g., teaching, nursing, library sciences, the arts), while males appeared to be primarily interested in pursuing a career involving computers. Most parents reported that their child's future career goals were fairly realistic.

The findings of the current study differ from another recently conducted study (Tsakanikos et al., 2011), which suggested that adult females with ASD were more likely

to live in their family homes, while adult males with ASD were more likely to either live independently or in a health care service residence. However, the participants in the Tsakanikos (2011) study also had a comorbid diagnosis of intellectual disability. In conjunction with the study conducted by Tsakanikos and colleagues (2011), the results of the current study indicate that as cognitive functioning increases, no differences are seen between females and males in the level of independence and living arrangements.

School Experiences

Parent reports suggest that the majority of participants, regardless of sex, received special education services during their time in grade school. However, females were more likely than males to receive 504 accommodations. Equal numbers of both sexes (i.e., 3 females and 3 males) participated in school gifted and talented programs.

Parent reports also indicated that there were no significant sex differences in experiencing serious academic problems during grade school. However, parents of male participants were somewhat more likely than parents of females to report that although their child was smart, he displayed other difficulties within an academic setting, such as problems with organization, follow-through, work completion, difficulty with abstract concepts, or maintaining positive relationships with teachers.

In self-reports of serious academic problems experienced during grade school, no significant differences were observed. Both females and males generally reported positive experiences in the early grades, and then reported more challenges as they went through the upper grades (e.g., maintaining positive relationships with teachers, organization, understanding more difficult or abstract concepts). Females appeared to report more difficulty in their understanding of abstract concepts, and were also more

likely to report differing abilities to be successful in different academic areas (e.g., math was often reported to be more difficult than reading, due to the level of abstract concepts within that subject).

As previously mentioned, many participants displayed some level of social difficulty during their school age years. Parents often reported that their child had friends at school, but that they rarely or never socialized with these friends outside of school. Parents of both sexes reported that their child experienced teasing in the early grades, but more parents of females than males began to recall that their child experienced teasing in middle school. Although there appeared to be a decline in teasing experienced in high school, it is important to note that many participants were young and had not yet had the opportunity to report on their high school experiences (i.e., some of them were in 8th grade at the time of their study participation), while other participants may have left their traditional public school to attend an alternative school setting by their high school years.

One important finding of the current study is that, based on participant self-reports of their social/behavioral experiences during grade school, female participants were significantly more likely than males to report difficulties in these areas. Females often reported that they had few or no friends during their schooling, and that they were upset about not fitting in to their peer group at school. This may again be explained by previous research suggesting that females may have better self-awareness than males (Lai et al., 2011). It is possible that females were more likely to be aware of their social difficulties and upset by them, whereas males were perhaps less aware of their social difficulties or simply less likely to be bothered by them.

Participants reported positive experiences in alternative school settings, such as a local charter school focused on serving students with ASD or other private schools. Research has suggested that children who attend a specialized school setting may have better outcomes (Simonoff et al., 2013). Researchers have also suggested that students who attend specialized schools may have improved peer relationships, due to greater social support and less bullying (e.g., Humphrey & Symes, 2010; Rowley et al., 2012).

Comorbid Psychiatric Symptoms

In the current study, parent reports indicated that females displayed significantly greater difficulty with anger and frustration than males. Specifically, parents of females reported that their children had difficulty handling stress, responding negatively to unplanned or unexpected events, or directing significant levels of anger towards their siblings. In parent reports of some other psychiatric symptom areas, slight differences were noted between males and females. For instance, parents were more likely to report that female participants experienced anxiety that centered around social situations, while male participants tended to experience anxiety centering around new or unfamiliar situations. Parents of female participants were also more likely than parents of male participants to report that their child had experienced a history of suicidal thoughts. No significant sex differences were noted in parent reports of age of onset of any psychiatric symptoms.

Participant self-reports of their own psychiatric symptom histories indicated that female participants were significantly more likely than male participants to report experiencing symptoms of anxiety, depression, and histories of self-harm. Females were also more likely than males to report that their anxiety and depression symptoms were

related to negative experiences with social situations (e.g., general social anxiety, teasing or other negative feedback from others, not having friends, feeling different or lonely). Although there were no statistically significant sex differences in self-reports of age of onset of psychiatric symptoms, slight differences were noted. For instance, male participants reported an onset of depression approximately 3 years earlier than females, while female participants reported an onset of thoughts related to self-harm approximately 4 years earlier than males. Additionally, female participants reported an onset of attention problems approximately 2 years later than males, and an onset of anger and aggression approximately 1 year later than males. However, it is important to note that some participants appeared to have difficulty recalling when they began to experience such psychiatric symptoms with accuracy; therefore, these data should be interpreted with some degree of caution.

Personality Characteristics

Participant responses on the MACI indicate many similarities in personality characteristics between females and males. For instance, participants of both sexes displayed average levels of Doleful, Egotistical, Unruly, Forceful, Oppositional, Self-Demeaning, and Borderline personality patterns, which suggests that elevated levels of these personality characteristics may be relatively uncommon in adolescents with ASD. However, both females and males obtained elevated scores on the Submissive, Peer Insecurity, Anxious Feelings, and Depressive Affect scales, suggesting high levels of difficulty asserting oneself and dependency on others, desire for social approval, anxiety, and depression among adolescent participants regardless of their sex.

Some sex differences were observed in various personality characteristics as measured by the MACI. Female participants obtained significantly higher scores than males on the Desirability subscale, which suggests that females may be more likely than males to try to present themselves in a socially attractive manner. Female participants also displayed significantly higher scores than males on the Dramatizing/Histrionic, Conforming/Compulsive, and Suicidal Tendency subscales. Individuals who obtain elevated scores on these subscales may be more likely to be highly verbal, emotionally expressive, socially appropriate or "charming," serious, rigid, routine-oriented, routine-oriented and avoidant of unpredictable situations, and to display greater tendencies towards self-harm. On the other hand, males displayed significantly higher scores than females on the Introversive and Inhibited subscales, which reflect a lack of desire for social contact, or a desire for social contact in conjunction with a fear of forming relationships with others.

Adult participants displayed more noticeable differences in personality characteristics, as measured by participant ratings on the MCMI-III. Female participants appeared to display substantially more complex personality profiles, as they obtained significantly higher scores than male participants on the Inconsistency, Debasement, Masochistic/Self-Defeating, Avoidant, Depressive, Dependent, Negativistic, Borderline, Anxiety, Somatoform, Bipolar/Manic, Dysthymia, Post-Traumatic Stress Disorder, and Major Depression scales. Male participants, on the other hand, obtained significantly higher scores than females on the Desirability, Compulsive, Histrionic, and Narcissistic subscales. The results of the current study suggest that adult female participants with

ASD present more clinically complex personality profiles, and perhaps greater psychopathology, than adult male participants with ASD.

Previous research has suggested that individuals meeting criteria for a personality disorder may indicate that they have more severe ASD symptomatology, and may be related to lower chances of having or maintaining outside employment (Lugnegard et al., 2012). These findings were generally not supported by the results of the current study. Generally speaking, females did not have more severe ASD symptomatology than males, and there were no sex differences in parent or self-reports of employment history, current daily responsibilities, or career aspirations.

Although very few studies have been conducted to this point concerning personality characteristics of young adults with ASD, the findings of the current study generally support those that have been described in previous research. For instance, previous research has suggested that adults with ASD are more likely to display personality characteristics that include social isolation, depressed mood, interpersonal difficulties, and rigidity/inflexibility (Ozonoff et al., 2005) as well as low levels of novelty seeking (Soderstrom et al., 2002). The current study found that adolescents of both sexes displayed elevated levels of social difficulty and depressive symptomatology, while adolescent females also displayed characteristics of rigidity and aversion to unplanned or unexpected events. Previous research has also suggested that adolescents and adults with ASD may have higher symptoms of paranoia than typically developing peers (Blackshaw et al., 2001); however, the current study did not replicate this finding.

The results of a recent meta-analysis also suggested that among young adults with Asperger's Disorder, males were more likely than females to meet criteria for a

personality disorder (Lugnegard et al., 2012). Similar results were found in a population of adults with ASD and comorbid intellectual disability, in which males were found to have an increased likelihood of personality disorders in comparison to females, who were more likely not to have any diagnosable psychiatric disorders (Tsakanikos et al., 2011). The current study obtained results that were somewhat conflicting. Specifically, female participants (and particularly adult female participants) appeared to display substantially more elevated scores on various scales of the MACI and MCMI-III, suggesting that they may display a more complex personality profile indicative of greater psychopathology in comparison to male participants.

Limitations

One limitation of the current study is that some of the primary measures, the Structured Interview Forms (i.e., participant self-report and parent report), as well as the Symptom Report Form, were created for the current study. Creating these measures was advantageous in some aspects, such as capturing novel information that may be unique to this study. Additionally, these forms were created by consolidating items from existing measures with acceptable reliability and validity. However, it is a weakness that no information as to the reliability and validity of these particular instruments was obtained.

Another potential limitation of the current study is that two different individuals, the PI and a graduate research assistant, were responsible for data collection. Although many previous studies have utilized multiple researchers in the data collection process, some significant differences were observed on select interview items between the two researchers in this study. Therefore, the possibility that the researchers worded these

questions in slightly different ways, or provided information to participants that may have influenced their responses, cannot be ruled out at the present time.

A third potential limitation of the current study involves the wide age range, as well as the wide variety in life experiences, of the participants involved. For instance, a small number of participants were older than the majority of the rest of the sample (i.e., only 4 participants were over the age of 25, while the remaining 38 participants were under 25 years old). Of these participants, 2 were married with children of their own. Specific analyses were not conducted to determine whether the information provided by these participants differed significantly from the remainder of the sample, due to the small number of participants involved. Although these participants generally seemed to report fairly similar life experiences in many ways during structured interviews (e.g., school experiences, psychiatric symptoms), it is certainly possible that they may display differences in some way from other participants who were not married and did not have children of their own. Finally, another limitation of the current study involved a relatively small sample size (i.e., data were collected for 21 female participants and 21 male participants). A larger sample size would have allowed for greater generalization of results.

Another limitation to the current study was the fact that, in certain areas (e.g., early symptomatology, developmental milestones, psychiatric symptom history), it relied substantially on retrospective reporting from participants and their parents. Both participants and parents often appeared to have difficulty recalling detailed information from several years ago (e.g., often 10 to 20 years earlier, depending on the participant's age) and sometimes stated that they were unsure of their ability to accurately recall

certain information. Similar difficulties with detailed retrospective reporting have been noted in past studies (e.g., Finney, 1981; Henry, Moffitt, Caspi, Langley, & Silva, 1994; Ozonoff et al., 2010; Yarrow, Campbell, & Burton, 1970).

Implications for Practice

One of the primary goals of the current study was to obtain further and more comprehensive information concerning the possibility of different manifestations of ASD between adolescent and adult female and male participants with normal intelligence. In examining the similarities and differences between these groups, one important consideration is determining how this information may be used to improve early identification, and timely diagnosis, of individuals with ASD. Although previous studies have suggested that females may be more likely to be diagnosed at later ages than their male peers (e.g., Begeer et al., 2013; Giarelli, Wiggins, Rice, Levy, Kirby, Pinto-Martin, & Mandell, 2010; Goin-Kochel, Mackintosh, & Myers, 2006; Kopp & Gillberg, 1992; Siklos & Kerns, 2007), the results of the current study revealed that female and male participants were diagnosed at virtually the same age (10 years, 9 months). Consequently, the information yielded from the current studies, as well as other recent and future research, may help to improve early identification and diagnosis for both males and females. For instance, it is important to consider that individuals with ASD and normal intelligence may display different or subtler symptoms than professionals are accustomed to in individuals who display more “classic” symptoms of ASD. For instance, professionals may expect that a person with ASD will not be able to form friendships; however, as evidenced in the current study, some individuals may form friendships that are either not developmentally appropriate in some manner (e.g., only socializing with

others who are much older or younger than they are; only socializing with others who have also been diagnosed with an ASD) or exclusive to certain settings (e.g., they may only see their friends at school, but not socialize or interact with them outside of school).

Another implication of the current study is associated with the finding that professionals may be less likely to consider an ASD diagnosis in female patients. This idea has been alluded to in previous research (e.g., Cheslack-Postava & Jordan-Young, 2012; Dworzynski et al., 2012; Giarelli et al., 2010; van Wijngaarden-Cremers et al., 2013). In several cases in the current study, parents reported that when they brought their concerns regarding their daughter's development to a professional (e.g., a pediatrician or psychologist), that professional either did not agree with their concerns or otherwise did not suggest further evaluation. Consequently, several of these participants were likely diagnosed at later ages than they may otherwise have been if such professionals had been more alert to the possibility of ASD in females and had suggested further evaluation. The authors of the current study hope to increase professional awareness of the possibility of ASD in female patients.

Another important implication of the current study pertains to treatment planning for females, as females with ASD and normal intelligence are a unique population that has only recently begun to receive more widespread attention among researchers and professionals. Based on the results of the current study, these females may be more likely than males with ASD to report distress related to negative social experiences, such as not being satisfied with the level of friendships and positive peer interactions that they had experienced. Therefore, social skills and friendship building skills may be important areas to target with females diagnosed with ASD. Other important areas to target may

include internalizing symptoms, such as anxiety, depression, and thoughts of self-harm, as these issues were also very commonly reported in female participants in the current study.

Implications for Future Research

Further research needs to be conducted in this area, particularly with larger participant pools, to obtain further comprehensive information regarding the differences in symptoms between males and females with ASD. To address potential differences in ASD phenotype between females and males, Constantino and Charman (2012) have suggested that perhaps the most useful strategy for researchers and practitioners is to more closely examine existing screening and diagnostic instruments for ASD. In doing this, professionals should aim to specifically investigate how to separate criteria for females and males in order to more accurately diagnose manifestations of the disorder that may present differently across sexes.

Additional research on sex differences will be especially helpful to determine the impact of the new DSM-5 (American Psychiatric Association, 2013) criteria for ASD, particularly whether it will impact the number of females diagnosed. Some researchers (e.g., Mandy et al., 2012) have suggested that the new diagnostic criteria may in fact make it more difficult for females to receive a diagnosis, due to the level of restricted and repetitive behaviors that an individual must display in order to meet DSM-5 criteria for an ASD. Several research studies, including the current study, have suggested that females with ASD and normal intelligence generally display fewer restricted and repetitive behaviors than their male peers (e.g., Hartley & Sikora, 2009; van Wijngaarden-Cremers et al., 2013). More extensive research studies conducted over time,

involving large participant samples, will be critical to the field to learn more about how ASD may manifest differently between females and males.

Additionally, further research involving participant samples with different life experiences and different levels of symptom severity would also be helpful to expand knowledge of sex differences in ASD symptomatology. For instance, future studies may focus strictly on adult participants to obtain further information on trajectory of symptoms over more of the life span as well as more detailed information regarding outcomes. It may also be helpful to conduct research with participants with varying levels of symptom severity, such as participants who are currently receiving inpatient psychiatric services. Further study involving participants who require more intensive services may help to increase professional knowledge of sex differences in individuals who are experiencing more severe psychiatric symptoms. Finally, conducting further research on multiply affected families (i.e., families with multiple children with ASD) may also be beneficial.

APPENDIX A

RECRUITING FLIERS

Contribute to the Knowledge About Autism Spectrum Disorders

Participate in a University of Utah Research Study

Participants Needed:

- Teenagers/Young Adults (ages 13-40) diagnosed with high-functioning autism, Asperger's, or PDD-NOS and a parent

Study Information:

- The purpose of this study is to gain an understanding of the differences in characteristics between males and females with high functioning autism spectrum disorders in order to increase knowledge of different manifestations of autism spectrum disorders

Participation in the study requires:

- Approximately 2 hours and includes interviews, self report questionnaires, and parent-report questionnaires
- Sessions may be scheduled at flexible locations throughout Northern Utah, based on participant convenience

Contact Megan at 801-578-8435 or megan.wanzek@utah.edu for more information.
Compensation will be provided.
Please share this with others who may be Interested.

We Need Adolescents/Adults and Their Parents
For a Study at The University of Utah

We are studying differences between males and females with an Autism Spectrum Disorder (ASD) regarding symptom patterns, social relationships, and psychological functioning.

Participants needed are:

- Ages 13-40
- Living with (or having regular contact with) at least one of their biological parents who is also willing to participate
- Diagnosed with an autism spectrum disorder (Autism, Asperger's, PDD)
- Read at a 6th grade level or above and no serious cognitive delays

Participation in the study requires:

- A brief IQ test, a possible brief reading test, an interview, and self-report assessments for the adolescent/adult participant
- An interview and rating scales completed by the parent
- Estimated time of completion is approximately 2 hours for each pair of participants

Participants benefit by:

- Contributing to the knowledge of autism spectrum disorders and how males and females may display symptoms differently
- Receiving written summaries of the research goals and findings

PLEASE SHARE WITH OTHERS! If you or someone you know may be interested in participating, please contact Megan Wanzek at

(801) 578-8435

for more information. Please leave a message.

APPENDIX B

ADULT CONSENT, PARENT PERMISSION, AND ADOLESCENT ASSENT FORMS

Consent Document

BACKGROUND

You are being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you want to volunteer to take part in this study.

The purpose of this study is to investigate the differences in the characteristics of high functioning autism spectrum disorders (HFASDs) in male and female adolescents/young adults. The study will compare self- and parent-reported symptoms between the two sexes.

This research is being done because males and females with high functioning autism spectrum disorders may have different characteristics, and there is a need for greater understanding of these differences. Females with high functioning autism spectrum disorders (HFASDs) are often misdiagnosed or overlooked because their symptoms may be less severe during early childhood. However, difficulties may increase in severity as social demands increase with age.

The information gained from this study will be used to help clinicians better understand different presentations of autism spectrum disorders (ASDs), with the ultimate goals of gaining knowledge of the course of HFASDs in females, as well as improving effective identification and treatment planning.

This study is being conducted by Megan Wanzek, a graduate student in the School Psychology Program in the Department of Educational Psychology at the University of Utah, and her supervisors who are faculty members of the University of Utah. The study is being conducted as part of dissertation research for Megan Wanzek.

STUDY PROCEDURE

<u>If you are the parent of a participant:</u>
It will take you approximately 2 hours to complete this study over the course of 1-2 sessions. During the 1st hour, you will be asked to complete questionnaires about your child. Questions will be asked about the behaviors, skills, personality traits, and autism symptoms that are exhibited by your child. You will also be asked to take part an interview that will take about 1 hour. This interview will include the following topics about your child: family history, diagnostic history information, school experiences (both academic and social), and parent perceptions of your child's current functioning.

<u>If you are a young adult participant 18 or older:</u>
It will take you approximately 2 hours to complete this study over the course of 1-2 sessions. You will be asked to complete questionnaires concerning your behaviors, thoughts, feelings, and personality traits. You will also be asked to participate in an interview during which you will be asked to talk about friends, feelings, and interact with the researcher.

University of Utah
Institutional Review Board
Approved 8/7/2012
Expires 8/6/2014
IRB_00049103

RISKS

The risks of this study are minimal. You may feel upset thinking about or talking about personal information related to your or your child's thoughts, feelings and actions. Some of the questions are personal and may cause you to feel embarrassed. It is also possible that you may feel frustration if it is difficult to answer a question. These risks are similar to those you experience when discussing personal information with others. You may choose not to answer certain questions, or you may stop your participation in this study at any time. If you feel upset from this experience, you can tell the researcher, and he/she will tell you about resources available to help.

BENEFITS

If you choose to participate in this study, you may request a summary of the results of the surveys you or your child have completed.

Other than that mentioned above, there are no direct benefits for taking part in this study. However, we hope the information we gain from this study may help develop a greater understanding the differences in HFASDs between males and females in the future. The goal is to aid clinicians in diagnosing HFASDs earlier and more accurately. It is also hoped that this information will help to make treatment selection and planning more appropriate.

CONFIDENTIALITY

We will keep all research records that identify you private to the extent allowed by law. Records will be stored in locked filing cabinets. Only those who work with this study will be allowed access to your information. Your name will be kept with your responses from your interview and questionnaires. In publications, your name will be removed.

However, if you disclose actual or suspected abuse, neglect, or exploitation of a child, or disabled or elderly adult, the researcher or any member of the study staff must, and will, report this to Child Protective Services (CPS), Adult Protective Services (APS) or the nearest law enforcement agency.

There are some additional cases in which a researcher is obligated to report issues, such as serious threats to public health or safety. For example, if you disclose intention to harm yourself or others to any member of the research team, this information must be reported to the necessary agency.

PERSON TO CONTACT

If you have questions, complaints or concerns about this study, you can contact Megan Wanzek at (801) 578-8435 or her faculty supervisor at the University of Utah, Elaine Clark, Ph.D. (801) 581-7148. If you feel you or your child have been harmed as a result of participation, please contact the University of Utah Institutional Review Board at 801-581-3655, which may be reached at during normal business hours.

University of Utah
Institutional Review Board
Approved 8/7/2012
Expires 8/6/2014
IRB_00049103

Institutional Review Board: Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

Research Participant Advocate: You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by email at participant.advocate@hsc.utah.edu.

VOLUNTARY PARTICIPATION

It is your choice to decide whether to take part in this study. Refusal to participate or the decision to withdraw from this research will involve no penalty or loss of benefits to which you are otherwise entitled. This will not affect your relationship with the investigator.

COSTS AND COMPENSATION TO PARTICIPANTS

There are no costs for participation in this research. Compensation will be provided for participants' time in the form of $10 gift cards.

CONSENT

By signing this consent form, I confirm I have read the information in this consent form and have had the opportunity to ask questions. I will be given a signed copy of this consent form. I voluntarily agree to take part in this study.

_____
Printed Name of Participant

_____ _____
Signature of Participant Date

_____
Printed Name of Person Obtaining Consent

_____ _____
Signature of Person Obtaining Consent Date

University of Utah
Institutional Review Board
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Parental Permission Document

BACKGROUND

Your child is being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you will allow your child to take part in this study.
The purpose of this study is to investigate the differences in the characteristics of high functioning autism spectrum disorders (HFASDs) in male and female adolescents/young adults. The study will compare self and parent reported symptoms between the two sexes.

This research is being done because males and females with high functioning autism spectrum disorders may have different characteristics, and there is a need for greater understanding of these differences. Females with high functioning autism spectrum disorders (HFASDs) are often misdiagnosed or overlooked because their symptoms may be less severe during early childhood. However, difficulties may increase in severity as social demands increase with age.

The information gained from this study will be used to help clinicians better understand different presentations of autism spectrum disorders (ASDs), with the ultimate goals of gaining knowledge of the course of HFASDs in females, as well as improving effective identification and treatment planning.

This study is being conducted by Megan Wanzek, a graduate student in the School Psychology Program in the Department of Educational Psychology at the University of Utah, and her supervisors who are faculty members of the University of Utah. The study is being conducted as part of dissertation research for Megan Wanzek.

STUDY PROCEDURE
It will take your child approximately 2 hours to complete this study over the course of 1-2 sessions. Your child will be asked to complete questionnaires concerning his or her thoughts, feelings, and personality traits. Your child will also be asked to participate in an interview during which he or she will be asked to talk about friends, feelings, and interact with the researcher.

RISKS
The risks of this study are minimal. Your child may feel upset thinking about or talking about personal information related to his or her thoughts, feelings and actions. Some of the questions are personal and may cause your child to feel embarrassed. It is also possible that your child may feel frustration if it is difficult to answer a question. These risks are similar to those your child experiences when discussing personal information with others. You or your child may choose not to answer certain questions or to stop your participation in this study at any time. If your child feels upset from this experience, you can tell the researcher, and he/she will tell you about resources available to help.

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BENEFITS

If your child participates in this study, you may request a summary of the results of the surveys you or your child have completed.

Other than that mentioned above, there are no direct benefits for taking part in this study. However, we hope the information we gain from this study may help develop a greater understanding the differences in HFASDs between males and females in the future. The goal is to aid clinicians in diagnosing HFASDs earlier and more accurately. It is also hoped that this information will help to make treatment more appropriate.

CONFIDENTIALITY

We will keep all research records that identify your child private to the extent allowed by law. Records will be stored in locked filing cabinets. Only those who work with this study will be allowed access to your child's information. Your child's name will be kept with his or her responses from the interview and questionnaires. In publications, your name will be removed.

However, if your child discloses actual or suspected abuse, neglect, or exploitation of a child, or disabled or elderly adult, the researcher or any member of the study staff must, and will, report this to Child Protective Services (CPS), Adult Protective Services (APS) or the nearest law enforcement agency.

There are some additional cases in which a researcher is obligated to report issues, such as serious threats to public health or safety. For example, if your child discloses intention to harm him or herself or others to any member of the research team, this information must be reported to the necessary agency.

PERSON TO CONTACT

If you have questions, complaints or concerns about this study, you can contact Megan Wanzek at (801) 578-8435 or her faculty supervisor at the University of Utah, Elaine Clark, Ph.D. (801) 581-7148. If you feel you or your child have been harmed as a result of participation, please contact the Institutional Review Board at 801-581-3655, which may be reached at during normal business hours.

Institutional Review Board: Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

Research Participant Advocate: You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by email at participant.advocate@hsc.utah.edu.

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VOLUNTARY PARTICIPATION

It is up to you to decide whether to allow your child to take part in this study. Refusal to allow your child to participate or the decision to withdraw your child from this research will involve no penalty or loss of benefits to which your child is otherwise entitled. This will not affect your or your child's relationship with the investigator.

COSTS AND COMPENSATION TO PARTICIPANTS

There are no costs for participation in this research. Compensation will be provided for participants' time in the form of $10 gift cards.

CONSENT

By signing this consent form, I confirm I have read the information in this parental permission form and have had the opportunity to ask questions. I will be given a signed copy of this parental permission form. I voluntarily agree to allow my child to take part in this study.

_____
Child's Name

_____
Parent/Guardian's Name

_____ _____
Parent/Guardian's Signature Date

_____
Relationship to Child

_____
Name of Person Obtaining Consent

_____ _____
Signature of Person Obtaining Consent Date

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Assent to Participate in a Research Study

Who are we and what are we doing?

We are from the University of Utah. We would like to ask if you would be in a research study. A research study is a way to find out new information about something. This is the way we try to find out how teenagers with high functioning autism spectrum disorders have experienced their symptoms; how teenagers with these diagnoses are doing at home, school, and work; whether they have any other symptoms or diagnoses; and what their personality traits are.

Why are we asking you to be in this research study?

We are asking you to be in this research study because we want to learn more about how high functioning autism, Asperger's disorder, and PDD are different in male and female teenagers/young adults. We want you to be in this study because your opinions can help us to answer this question.

What happens in the research study?

If you decide to be in this research study and parent or guardian agrees, this is what will happen:

- We will ask you to have an interview with the examiner and fill out some rating forms.
    - You will be asked questions about topics like friends and feelings.
- We will also ask your parents to answer some questions about you and fill out some forms about you.
- We will look at the responses from you and your parents.
- You will be in the study for 2 hours. One hour will be the interview, and 1 hour will be the rating forms.

Will any part of the research study hurt you?

There is a chance that during this research study, some of the questions we ask may make you feel uncomfortable. For example, some of the questions will be about symptoms you have experienced, your feelings about things, or your friendships. If you feel uncomfortable, we will try to help you feel better. You can choose not to answer certain questions, or you can stop at any time if you want to.

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Will the research study help you or anyone else?

We do not know for sure if being in this research study will help you. Your parent or guardian may get a summary of your results if they would like. It is possible that we could learn something to help other people to get the right diagnosis sooner and get the right kind of treatment.

Who will see the information about you?

Only the researchers or others who are doing their jobs will be able to see the information about you from this research study. We will not tell anyone else that you are in the study. We may talk about the results from the tests with you and your parents.

If you tell us that you want to hurt yourself, we will tell other adults about it so that we can help you feel better.

What if you have any questions about the research study?

It is okay to ask questions. If you don't understand something, you can ask us. We want you to ask questions now and anytime you think of them. If you have a question later that you didn't think of now, you can call Megan Wanzek at (801) 578-8435 or ask us the next time we see you.

Do you have to be in the research study?

You do not have to be in this study if you don't want to. Being in this study is up to you. No one will be upset if you don't want to do it. Even if you say yes now, you can change your mind later and tell us you want to stop. You can take your time to decide. You can talk to parent or guardian before you decide.
We will also ask your parent or guardian to give their permission for you to be in this study. But even if your parent or guardian says "yes" you can still decide not to be in the research study.

Agreeing to be in the study

I was able to ask questions about this study. Signing my name at the bottom means that I agree to be in this study. My parent or guardian and I will be given a copy of this form after I have signed it.

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Printed Name

Sign your name on this line | Date

Printed Name of Person Obtaining Assent

Signature of Person Obtaining Assent | Date

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The following should be completed by the study member conducting the assent process if the participant agrees to be in the study. Initial the appropriate selection:

_____ The participant is capable of reading the assent form and has signed above as documentation of assent to take part in this study.

_____ The participant is not capable of reading the assent form, but the information was verbally explained to him/her. The participant signed above as documentation of assent to take part in this study.

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APPENDIX C

STRUCTURED INTERVIEW: SELF-REPORT FORM

Adolescents and Adults with High Functioning Autism Spectrum Disorders: Structured Interview – Self-Report Form

Parent Name(s): _____ Interviewer: _____

Participant Name: _____ DOB: _____ Age: _____

Date of Interview: _____

General

1. Tell me a little bit about yourself. What do you like to do? What are you interested in? (activities, etc)?

   What are some of your strengths?

2. Do you have any concerns right now, about anything in your life? If so, what are your biggest concerns?

3. What kinds of challenges have you faced that others may not have experienced?

Diagnostic History Information:
Autism Spectrum Disorders

1. Was there ever a time in your life that you noticed that your behavior or how you felt about things was different from others? **Age: _____**
   What did you notice that was different?:

2. Did others (relatives, family friends, etc) ever say anything to you about your behavior or feelings being different from others, or different than they expected? **YES NO (describe:)**

3. a. Did you ever have to see a professional (e.g., pediatrician, psychologist, speech-language therapist) about these concerns? If so, how old were you? **Age: _____**

   b. Did that professional seem to agree with these concerns? **YES NO**
   Do you remember what the professional said about these concerns?

c. Do you remember about how many professionals you saw before you were diagnosed with an autism spectrum disorder? _____

4. How old were you when you were first diagnosed with an autism spectrum disorder? **Age:** _____

5. Have there been times where you have noticed that your ASD symptoms seem to "come and go"? In other words, have there been times where these symptoms seem mild, and other times where these symptoms become more of a problem (i.e., when you are feeling stressed)? **YES NO**

   -If you have noticed this pattern, what types of events seem to be associated with these symptoms getting worse?

6. Do you feel that your personality, mood, or demeanor has changed over time? **YES NO**
   If so, how? (Ex: more irritable, more depressed, greater difficulty getting along with others, etc)

Other Diagnoses

7. In addition to an ASD, do you have any other previous or current **diagnoses**? **YES NO**
   If so, what were they?

Diagnosis	Approximate Date of Diagnosis	Provider

8. Do you have any history of any other kinds of **symptoms**:

   a. Anxiety YES NO Age of onset: _____

Describe:_____

   b. Depression YES NO Age of onset: _____

Describe:_____

   History of self-harm (thoughts or attempts)? YES NO Age: _____

Describe: _____
   *(**if endorsed, conduct threat assessment and document safety plan and recommendations)*

   c. Obsessive-compulsive behavior YES NO Age of onset: _____

Describe:_____

d. Attention problems YES NO Age of onset: _____

Describe:_____

e. Anger YES NO Age of onset: _____

Describe: _____

f. Aggression (specify: others, self, property) YES NO Age of onset: _____

Describe:_____

g. Bipolar YES NO Age of onset: _____

Describe:_____

h. Psychotic YES NO Age of onset: _____

Describe:_____

9. What substances have you used (in the past or currently)? _____

_____.

10. Do you have any other medical conditions? **YES NO**
If yes, what conditions? (e.g., seizures, diabetes, chronic pain, allergies, etc) _____

_____.

Current/past medications: _____

School Experiences:

1. Academic performance: Did you enjoy school? Did you understand the curriculum and make progress academically:

   - In elementary school?

   - In middle school?

   - In high school?

   - Would you say that you experienced significant academic problems during your schooling?
     YES NO (check: _____elementary ___middle _____high)

2. Social/peer relations: Tell me about your social experiences in school. Did you have friends, get along with other children, or experience teasing or bullying:

   - In elementary school?

   - In middle school?

   - In high school:

   - Would you say that you experienced significant social or behavioral problems during your schooling? **YES NO (check: _____elementary ___middle _____high)**

   Did you ever have a formal Behavior Intervention Plan in place at school? **YES NO**
   Describe the behavior? _____
   Approximately which grades? _____

   Were you ever suspended from school? **YES NO**
   What grades? _____ Approx how many times? _____ Length?_____

3. At any time during your education, did any of your teachers express concerns of any kind?

Grade	Type of teacher (general classroom, reading, math, gym, etc) General education or special education?	What was the concern?

4. At any time during your education, did you receive any special services (e.g., resource or study skills classes, counseling, speech, 504 accommodations, special education)? **YES NO**
   Which services?: _____

5. If you received special education services, under which classification? _____

Perceptions of Current Functioning:

1. Tell me about your current social relationships. Do you have friends, belong to any social groups, or participate regularly in any social activities? **YES NO Describe:**

2. Have you ever had a romantic or dating relationship? **YES NO**
3. Is a romantic or dating relationship something that you would be interested in right now? **YES NO**

4. How much support would you say that your parents currently provide for you?

1	2	3	4	5
none	little	some regular	quite a bit	a lot

Describe: _____

5. In which areas of your life do your parents provide support? (circle all that apply)

examples:
- Personal care (dressing, toileting, meals)
- Providing transport
- General housework
- Shopping/errands
- Shopping/errands
- Supervision
- Socializing/emotional support
- Other(s):_____

6. What services (e.g., counseling, vocational rehab/job coaching, home help) do you participate in?

7. What responsibilities do you have on a regular basis (e.g., chores, activities of daily living)?

8. Have you ever had a job (babysitting, odd jobs, jobs outside of the home)? Do you currently have a job? **YES NO Describe:**

Location	Job title/Description	Approximate Dates	Describe Performance

9. What is your highest level of education?

Years of Education (#)_____ Highest degree held_____

10. How would you describe your level of self-reliance?

(least possible) 1 2 3 4 5 6 7 8 9 10 (most possible)

-Are there areas where you notice that you are quite self-reliant?

-Are there areas where you seem to have greater difficulty (i.e., need a lot of help)?

11. Self-Determination: Have you decided what career you want to have or what you want in life?
YES NO Tell me more about this career or what you want in life:

-What actions have you taken towards this goal?

-What other things will you need to do to reach this goal?

-How old were you when you made this decision about what you wanted? **Age:** _____

-How hard do you think it will be to reach this goal?

Circle: very hard hard unsure easy very easy

Family History

1. Have any members of your immediate or extended family been diagnosed with any psychological or learning disorders? (Who? Include relationship to subject, sex, and age)
   -Which specific diagnosis? If diagnosis is unknown, what symptoms/traits?

Relation to You	Age and Sex	Diagnosis (or Symptoms/Traits)	Other Details if known (which provider diagnosed them, date of diagnosis, etc)

2. Have any members of your immediate or extended family been **diagnosed with** an autism spectrum disorder? (Who? Include relationship to subject, sex, and age)

Relation to You	Age and Sex	Autism, Asperger's, PDDNOS, or unknown?

3. Do you see any **traits of** an autism spectrum disorder in any family members? (Ex: hard time socializing, very specific or focused interest(s), odd behavior, difficulty communicating)

Relation to You	Age and Sex	Which traits have you observed?

APPENDIX D

STRUCTURED INTERVIEW: PARENT REPORT FORM

Adolescents and Adults with High Functioning Autism Spectrum Disorders: Structured Interview – Parent Form

Parent Name(s): _____ Interviewer: _____

Participant Name: _____ DOB: _____ Age: _____

Date of Interview: _____

General

1. Tell me a little bit about _____. What does he/she like to do? What is he/she interested in? (activities, etc)?

   What are _____'s strengths?

2. What are your biggest concerns for him/her at this time?

3. Have you noticed any unique challenges that he/she faces?

Diagnostic History Information:
Autism Spectrum Disorders

1. How old was _____ when you first began to notice that something was unusual (i.e., his/her behavior or development was different than others' or different than you expected)? **Age: _____**
   What did you notice that was different?:

2. Did others (relatives, family friends, etc) ever comment on his/her development or suggest that something about his/her development or behavior seemed unusual? **YES NO (describe:)**

3. a. How old was _____ when you first brought these concerns to a professional (e.g., pediatrician, psychologist, speech-language therapist, teacher)? **Age: _____**

   b. Did that professional seem to agree with your concerns? **YES NO**
   What did this professional say regarding your concerns?

   c. Approximately how many professionals did you see before _____ was diagnosed with an autism spectrum disorder? **Number: _____**

4. At what age was _____ first formally diagnosed with an autism spectrum disorder? **Age:** _____

5. Have there been times where you have noticed that _____'s ASD symptoms seem to "come and go"? In other words, have there been times where his/her symptoms have been barely noticeable, and other times where his/her symptoms become more severe (i.e., during times of stress)?
YES NO

   -If you have noticed this pattern, what types of events seem to be associated with increased symptom severity?

6. Has _____'s personality, mood, or demeanor changed over time? **YES NO**
If so, how? (Ex: more irritable, more depressed, greater difficulty getting along with others, etc)

Other Diagnoses

7. In addition to an ASD, has _____ had any other previous or current **diagnoses**? **YES NO**
If so, what were they?

Diagnosis	Approximate Date of Diagnosis	Provider

8. Does _____ have a history of any other psychiatric **symptoms**:

a. Anxiety YES NO Age of onset: _____

Describe:_____

b. Depression YES NO Age of onset: _____

Describe:_____

History of self-harm (thoughts or attempts)? YES NO Age: _____

Describe: _____
*(**if endorsed, conduct threat assessment and document safety plan and recommendations)*

c. Obsessive-compulsive behavior YES NO Age of onset: _____

Describe:_____

d. Attention problems YES NO Age of onset: _____

Describe:_____

e. Anger YES NO Age of onset: _____

Describe: _____

f. Aggression (specify: others, self, property) YES NO Age of onset: _____

Describe:_____

g. Bipolar YES NO Age of onset: _____

Describe:_____

h. Psychotic YES NO Age of onset: _____

Describe:_____

9. What substances has _____ used (in the past or currently)? _____

_____.

10. Does he/she have any other medical conditions? **YES NO**
If yes, what conditions? (e.g., seizures, diabetes, chronic pain, allergies, etc) _____

_____.

Current/past medications: _____

School Experiences:

1. Academic performance: Did _____ enjoy school? Did he/she seem to understand the curriculum and make progress academically:

   - In elementary school?

   - In middle school?

   - In high school?

   - Would you say that _____ experienced significant academic problems during his/her schooling? **YES NO (check: _____elementary ___middle _____high)**

2. Social/peer relations: Describe _____'s social experiences in school. Did he/she have friends, get along with other children, or experience teasing or bullying:

- In elementary school?

- In middle school?

- In high school:

- Would you say that _____ experienced significant social or behavioral problems during his/her schooling? **YES NO (check: _____elementary ___middle ____high)**

Did ____ ever have a formal Behavior Intervention Plan in place at school? **YES NO**
Describe the behavior? _____
Approximately which grades? _____

Was he/she ever suspended from school? **YES NO**
What grades? _____ Approx how many times? _____ Length?_____

3. At any time during _____'s education, did any of his/her teachers express concerns of any kind?

Grade	Type of teacher (general classroom, reading, math, gym, etc) General education or special education?	What was the concern?

4. At any time during _____'s education, did he/she receive any special services (e.g., resource or study skills classes, counseling, speech, 504 accommodations, special education)? **YES NO**

Which services?: _____

5. If he/she received special education services, under which classification? _____

Parent Perceptions of Current Functioning:

1. Describe _____'s current social functioning. Does he/she have friends, belong to any social groups, or participate regularly in any social activities?

2. Has _____ ever had a romantic or dating relationship? **YES NO**

3. Is a romantic or dating relationship something that _____ seems interested in right now?
   YES NO

4. How much support would you say that you currently provide for your child?

1	2	3	4	5
none	little	some regular	quite a bit	a lot

Describe: _____.

5. In which aspects of his/her life do you provide support? (circle all that apply)
   examples: Personal care (dressing, toileting, meals) Shopping/errands
   Providing transport Supervision
   General housework Socializing/emotional support
   Other(s):_____

6. What types of services (e.g., counseling/therapy, vocational rehab/job coaching, home help etc) does _____ utilize?

7. What responsibilities does _____ have on a regular basis (e.g., chores, activities of daily living)?

8. Has _____ ever had a job (babysitting, odd jobs, jobs outside of the home)? Does he/she currently have a job? **YES NO Describe:**

Location	Job title/Description	Approximate Dates	Describe Performance

9. What is _____'s highest level of education?

   Years of Education (#)_____ Highest degree held_____

10. How would you describe _____'s level of self-reliance?
    (least possible) 1 2 3 4 5 6 7 8 9 10 (most possible)

    -Are there areas where you notice that _____ is quite self-reliant?

    -Are there areas where you have noticed that he/she seems to have greater difficulty (i.e., seems overly dependent)?

11. Self-Determination: Has _____ decided what career he/she wants to have or what role he/she wants to take on as an adult? **YES NO Tell me more about this career or role:**

-How do you know that _____ has made this decision?

-When did _____ make this decision (i.e., approximately how old was he/she?) **Age:_____**

-In your opinion, how realistic is _____'s plan?

Circle: very unrealistic unrealistic unsure realistic very realistic

Family History

1. Have any members of your immediate or extended family been diagnosed with any psychological or learning disorders? (Who? Include relationship to subject, sex, and age)
   -Which specific diagnosis? If diagnosis is unknown, what symptoms/traits?

Relation to Your Child	Age and Sex	Diagnosis (or Symptoms/Traits)	Other Details if known (which provider diagnosed them, date of diagnosis, etc)

2. Have any members of your immediate or extended family been **diagnosed with** an autism spectrum disorder? (Who? Include relationship to subject, sex, and age)

Relation to Your Child	Age and Sex	Autism, Aspergers, PDDNOS, or unknown?

3. Do you see any **traits of** an autism spectrum disorder in any family members? (Who? Include relationship to subject, sex, and age). Ex: hard time socializing, very specific or focused interest(s), odd behavior, difficulty communicating

Relation to Your Child	Age and Sex	Which traits have you observed?

APPENDIX E

SYMPTOM REPORT FORM (PARENT)

Adolescents and Adults with High Functioning Autism Spectrum Disorders: Symptom Report Form (Parent)

Parent Name(s): _____

Child Name: _____ DOB: _____ Age: _____

I am going to ask you some questions about *(name)*'s development. For each item, please indicate if this is something that he/she currently experiences, or has experienced in the past. For any items that you have seen him/her display, I will ask you some follow up questions, such as how old he/she was when you first noticed the behavior, and to provide a general description of the behavior.

_____

(1) Social Interaction:

i. Significant problems in the use of multiple nonverbal behaviors (e.g., eye-gaze, body posture, nonverbal communication).....**YES NO**
____Past Behavior ____Current Behavior Age(s):_____

Describe: _____

ii. Failure to develop appropriate peer relationships relative to peers.....**YES NO**
____Past Behavior ____Current Behavior Age(s):_____

Describe: _____

iii. A lack of shared enjoyment or interest with others.....**YES NO**
____Past Behavior ____Current Behavior Age(s):_____

Describe: _____

iv. A lack of social reciprocity.....**YES NO**
____Past Behavior ____Current Behavior Age(s):_____

Describe: _____

(2) Communication:

i. A delay in, or absence of verbal language (not accompanied by attempts to compensate through other types of communication such as gesturing).....**YES NO**
____Past Behavior ____Current Behavior Age(s):_____

Describe: _____

ii. Deficits in starting or sustaining conversations with others.....**YES NO**
____Past Behavior ____Current Behavior Age(s):_____

Describe: _____

iii. Stereotyped and repetitive use of language.....**YES NO**

____**Past Behavior** ____**Current Behavior** **Age(s):**_____

Describe: _____

iv. Lack of variety in make-believe play or play appropriate to developmental level.....**YES** **NO**
____**Past Behavior** ____**Current Behavior** **Age(s):**_____

Describe: _____

(3) Repetitive and Stereotyped Behavior:

i. Preoccupation with one or more stereotyped and circumscribed patterns of interest that is abnormal in intensity and/or focus.....**YES** **NO**
____**Past Behavior** ____**Current Behavior** **Age(s):**_____

Describe: _____

ii. Rigid adherence to routines or rituals.....**YES** **NO**
____**Past Behavior** ____**Current Behavior** **Age(s):**_____

Describe: _____

iii. Repetitive motor mannerisms (e.g., hand flapping, twisting).....**YES** **NO**
____**Past Behavior** ____**Current Behavior** **Age(s):**_____

Describe: _____

iv. Continual preoccupations with the parts of objects.....**YES** **NO**
____**Past Behavior** ____**Current Behavior** **Age(s):**_____

Describe: _____

Current Diagnosis:

1. What is your child's current diagnosis?

   ___Autism/Autistic Disorder

   ___ Asperger's Disorder

   ___ Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS)

   ___ Unsure/Don't Know

Early Developmental Milestones:

For each of the developmental milestones listed below, please provide your best estimate regarding the age range that your child **began to display** that behavior:

	0-12 months	13-24 months	2 years	3 years	4 years	5 years +
Speech/Communication						
1. Using single words						
2. Using two words						
3. Using phrase speech						
Motor						
1. Sitting						
2. Crawling						
3. Walking						
4. Running						
5. Climbing						
6. Riding a bike						
7. Sports/dance						
8. Other activities						
Self-Care						
1. Toilet training – during the day						
2. Toilet training – at night						

At any time during their development, has your child displayed a regression or loss of skills? **YES** **NO**

If so, in which area (circle all that apply):

Language Social Behavior Motor Skills Other

Describe: _____

_____

Communication:

For each of the communication skills/behaviors listed below, please provide your best estimate of the age range(s) that your child displayed that behavior:

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
Conversations with Others												
1. Having conversations with others												
2. Engaging in **reciprocal** ("back and forth") conversations												
3. Engaging in social "chat" or small talk												
4. Initiating conversations with others												
Unusual Speech												
5. Using words or phrases that he/she seems to have "made up" on their own												
6. Using words or phrases repetitively												
Expressing ideas and Feelings												
7. Expressing ideas clearly/appropriately												
8. Expressing feelings or emotions clearly and appropriately												
9. Using unusual voice volume (too loud or soft) for the environment												
10. Unusual voice rhythm (e.g., regular, irregular)												

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
11. Unusual voice intonation (e.g., monotone or flat voice, high-pitched)												
12. Unusual voice rate (e.g., too fast or slow)												
Nonverbal Communication												
13. Uses nonverbal communication appropriately (e.g., gestures, pointing, eye contact, head nodding or shaking)												
14. Uses nonverbal communication in conjunction with speech (e.g., using gestures while speaking to clarify or describe what she is saying)												

Social Development and Functioning:

For each of the social skills/behaviors listed below, please provide your best estimate of the age range(s) that your child displayed that behavior:

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
Early Socialization												
1. Gaze at/make eye contact with caregivers												
2. Social smile directed towards caregivers												
3. Stays near caregivers, or checks in appropriately, in new or unfamiliar situations												

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
4. Directing others' attention to objects or events (e.g., pointing)												
Early Play Skills and Social Interaction												
5. Plays appropriately with toys												
6. Plays/interacts appropriately with adults												
7. Plays/interacts appropriately with peers												
8. Displays unusual play behavior (unusual toys or actions)												
Social Relationships												
9. Has appropriate friendships												
10. Has a best friend												
11. Has difficulty making friends												
12. Has difficulty keeping friends												
13. Expresses interest in having friends												
14. Has friendships that are reciprocal												
15. Displays unusual attachments to another person (unusual in intensity, focus, duration, etc)												
16. Initiates social interactions with others												

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
17. Engages in sustained social interactions with others												
18. Appears to keep up in conversations with typically developing peers												
19. Has an appropriate understanding of friendships												
20. Has an appropriate understanding of romantic relationships												
21. Has an appropriate understanding of his/her own role in social relationships												
22. Appears to have an interest in having a romantic/intimate relationship												

Restrictive and Repetitive Behaviors

For each of the behaviors listed below, please provide your best estimate of the age range(s) that your child displayed that behavior:

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
Stereotyped or Rigid Behavior												
1. Engages in unusual motor movements (e.g., hand or body movements)												

	0-12 mo	13-24 mo	2 yrs	3 yrs	4 yrs	5 yrs	6-8 yrs	9-11 yrs	12-14 yrs	15-17 yrs	18+ yrs	Does not do this
2. Displays strict/rigid adherence to routine												
3. Displays unusual interests (e.g., unusual in intensity or focus)												
Response to Transition												
4. Responds inappropriately to changes in environment or usual routine												
5. Displays difficulty with minor transitions (e.g., moving from one activity or location to another)												
6. Displays difficulty with major transitions (e.g., life transitions such as moving from elementary to middle school, new teacher or classroom in the fall, etc)												

APPENDIX F

SOCIAL RESPONSIVENESS SCALE 2 (SRS-2) SCHOOL AGE SELF-REPORT ITEM ANALYSIS

Item Analysis of SRS-2 School Age Self Report

Item	Females	Males
1. I am much more fidgety in social situations than when I am by myself.	Not True: 44.4% Sometimes True: 33.3% Often True: 11.1% Almost Always True: 11.1%	Not True: 0% Sometimes True: 46.2% Often True: 7.7% Almost Always True: 46.2%
2. My facial expressions send the wrong message to others about how I really feel.	Not True: 44.4% Sometimes True: 33.3% Often True: 22.2% Almost Always True: 0%	Not True: 30.8% Sometimes True: 53.8% Often True: 7.7% Almost Always True: 7.7%
3. I feel self-confident when interacting with others.	Not True: 11.1% Sometimes True: 33.3% Often True: 33.3% Almost Always True: 22.2%	Not True: 15.4% Sometimes True: 23.1% Often True: 46.2% Almost Always True: 15.4%
4. When under stress, I show rigid or inflexible behaviors that seem odd to people.	Not True: 22.2% Sometimes True: 33.3% Often True: 33.3% Almost Always True: 11.1%	Not True: 15.4% Sometimes True: 30.8% Often True: 46.2% Almost Always True: 7.7%
5. I do not recognize when others are trying to take advantage of me.	Not True: 11.1% Sometimes True: 55.6% Often True: 11.1% Almost Always True: 22.2%	Not True: 53.8% Sometimes True: 23.1% Often True: 15.4% Almost Always True: 7.7%
6. I would rather be alone than with others.	Not True: 22.2% Sometimes True: 66.7% Often True: 11.1% Almost Always True: 0%	Not True: 7.7% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 23.1%
7. I am usually aware of how others are feeling.	Not True: 22.2% Sometimes True: 11.1% Often True: 66.7% Almost Always True: 0%	Not True: 0% Sometimes True: 38.5% Often True: 46.2% Almost Always True: 15.4%
8. I behave in ways that seem strange or bizarre to others.	Not True: 11.1% Sometimes True: 44.4% Often True: 33.3% Almost Always True: 11.1%	Not True: 0% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 30.8%
9. I cling to adults and am too dependent on them.	Not True: 44.4% Sometimes True: 44.4% Often True: 0% Almost Always True: 11.1%	Not True: 38.5% Sometimes True: 23.1% Often True: 23.1% Almost Always True: 15.4%
10. I take things too literally and sometimes misunderstand parts of conversations.	Not True: 11.1% Sometimes True: 55.6% Often True: 33.3% Almost Always True: 0%	Not True: 15.4% Sometimes True: 30.8% Often True: 38.5% Almost Always True: 15.4%

11. I have good self-confidence.	Not True: 11.1% Sometimes True: 11.1% Often True: 33.3% Almost Always True: 44.4%	Not True: 7.7% Sometimes True: 30.8% Often True: 30.8% Almost Always True: 30.8%
12. I am able to communicate my feelings to others.	Not True: 0% Sometimes True: 22.2% Often True: 66.7% Almost Always True: 11.1%	Not True: 7.7% Sometimes True: 30.8% Often True: 53.8% Almost Always True: 7.7%
13. I am awkward in turn-taking conversations with others my age (i.e., I have a hard time keeping up with the give-and-take of a conversation).	Not True: 22.2% Sometimes True: 66.7% Often True: 11.1% Almost Always True: 0%	Not True: 23.1% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 7.7%
14. I am not well coordinated.	Not True: 77.8% Sometimes True: 11.1% Often True: 0% Almost Always True: 11.1%	Not True: 53.8% Sometimes True: 38.5% Often True: 0% Almost Always True: 7.7%
15. I am able to understand the meaning of other people's tone of voice and facial expressions.	Not True: 0% Sometimes True: 33.3% Often True: 55.6% Almost Always True: 11.1%	Not True: 0% Sometimes True: 15.4% Often True: 61.5% Almost Always True: 23.1%
16. I avoid eye contact or am told that I have unusual eye contact.	Not True: 22.2% Sometimes True: 66.7% Often True: 0% Almost Always True: 11.1%	Not True: 23.1% Sometimes True: 30.8% Often True: 38.5% Almost Always True: 7.7%
17. I recognize when something is unfair.	Not True: 11.1% Sometimes True: 11.1% Often True: 55.6% Almost Always True: 22.2%	Not True: 0% Sometimes True: 7.7% Often True: 46.2% Almost Always True: 46.2%
18. I have difficulty making friends, even when trying my best.	Not True: 44.4% Sometimes True: 33.3% Often True: 22.2% Almost Always True: 0%	Not True: 23.1% Sometimes True: 38.5% Often True: 23.1% Almost Always True: 15.4%
19. I get frustrated trying to get ideas across in conversations.	Not True: 33.3% Sometimes True: 44.4% Often True: 22.2% Almost Always True: 0%	Not True: 15.4% Sometimes True: 53.8% Often True: 15.4% Almost Always True: 15.4%
20. I have sensory interests that others find unusual (e.g., smelling or looking at things in a special way).	Not True: 11.1% Sometimes True: 77.8% Often True: 0% Almost Always True: 11.1%	Not True: 23.1% Sometimes True: 46.2% Often True: 23.1% Almost Always True: 7.7%

21. I am able to imitate others' actions and expressions.	Not True: 0% Sometimes True: 22.2% Often True: 55.6% Almost Always True: 22.2%	Not True: 0% Sometimes True: 53.8% Often True: 30.8% Almost Always True: 15.4%
22. I interact appropriately with others my age.	Not True: 0% Sometimes True: 11.1% Often True: 55.6% Almost Always True: 33.3%	Not True: 0% Sometimes True: 7.7% Often True: 61.5% Almost Always True: 30.8%
23. I do not join group activities unless someone tells me that I should.	Not True: 22.2% Sometimes True: 22.2% Often True: 33.3% Almost Always True: 22.2%	Not True: 15.4% Sometimes True: 53.8% Often True: 0% Almost Always True: 30.8%
24. I have more difficulty than others my age with changes in my routine.	Not True: 11.1% Sometimes True: 33.3% Often True: 44.4% Almost Always True: 11.1%	Not True: 15.4% Sometimes True: 23.1% Often True: 30.8% Almost Always True: 30.8%
25. I don't mind being out of step or "not on the same wavelength" as others.	Not True: 11.1% Sometimes True: 33.3% Often True: 44.4% Almost Always True: 11.1%	Not True: 30.8% Sometimes True: 7.7% Often True: 38.5% Almost Always True: 23.1%
26. I try to comfort others when they are sad.	Not True: 0% Sometimes True: 11.1% Often True: 33.3% Almost Always True: 55.6%	Not True: 0% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 30.8%
27. I avoid starting social interactions with other kids or with adults.	Not True: 44.4% Sometimes True: 55.6% Often True: 0% Almost Always True: 0%	Not True: 23.1% Sometimes True: 38.5% Often True: 7.7% Almost Always True: 30.8%
28. I think or talk about the same thing over and over.	Not True: 33.3% Sometimes True: 33.3% Often True: 22.2% Almost Always True: 11.1%	Not True: 0% Sometimes True: 53.8% Often True: 30.8% Almost Always True: 15.4%
29. Others my age think that I am odd or weird.	Not True: 22.2% Sometimes True: 22.2% Often True: 44.4% Almost Always True: 11.1%	Not True: 7.7% Sometimes True: 61.5% Often True: 23.1% Almost Always True: 7.7%
30. I become upset in situations with lots of things going on.	Not True: 11.1% Sometimes True: 44.4% Often True: 44.4% Almost Always True: 0%	Not True: 7.7% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 23.1%
31. I can't get my mind off something once I start thinking about it.	Not True: 0% Sometimes True: 100% Often True: 0% Almost Always True: 0%	Not True: 7.7% Sometimes True: 7.7% Often True: 46.2% Almost Always True: 38.5%

32. I have good personal hygiene.	Not True: 0% Sometimes True: 0% Often True: 33.3% Almost Always True: 66.7%	Not True: 15.4% Sometimes True: 30.8% Often True: 53.8% Almost Always True: 0%
33. My behavior is socially awkward, even when I am trying to be polite.	Not True: 11.1% Sometimes True: 77.8% Often True: 11.1% Almost Always True: 0%	Not True: 7.7% Sometimes True: 53.8% Often True: 23.1% Almost Always True: 15.4%
34. I avoid people who want to be emotionally close to me.	Not True: 44.4% Sometimes True: 44.4% Often True: 11.1% Almost Always True: 0%	Not True: 46.2% Sometimes True: 46.2% Often True: 0% Almost Always True: 7.7%
35. I have trouble keeping up with the flow of a normal conversation.	Not True: 33.3% Sometimes True: 55.6% Often True: 11.1% Almost Always True: 0%	Not True: 30.8% Sometimes True: 53.8% Often True: 7.7% Almost Always True: 7.7%
36. I have difficulty relating to adults.	Not True: 44.4% Sometimes True: 44.4% Often True: 11.1% Almost Always True: 0%	Not True: 53.8% Sometimes True: 38.5% Often True: 7.7% Almost Always True: 0%
37. I have difficulty relating to others my age.	Not True: 33.3% Sometimes True: 44.4% Often True: 11.1% Almost Always True: 11.1%	Not True: 23.1% Sometimes True: 53.8% Often True: 15.4% Almost Always True: 7.7%
38. I respond appropriately to mood changes in others (e.g., when a friend's mood changes from happy to sad).	Not True: 0% Sometimes True: 22.2% Often True: 11.1% Almost Always True: 66.7%	Not True: 0% Sometimes True: 46.2% Often True: 53.8% Almost Always True: 0%
39. Other people think that I am interested in too few topics, or that I am too interested in these topics.	Not True: 33.3% Sometimes True: 33.3% Often True: 11.1% Almost Always True: 22.2%	Not True: 30.8% Sometimes True: 23.1% Often True: 15.4% Almost Always True: 30.8%
40. I am imaginative and good at pretending (without losing touch of reality).	Not True: 11.1% Sometimes True: 0% Often True: 22.2% Almost Always True: 66.7%	Not True: 0% Sometimes True: 15.4% Often True: 38.5% Almost Always True: 46.2%
41. I sometimes wander aimlessly from one activity to another.	Not True: 0% Sometimes True: 44.4% Often True: 33.3% Almost Always True: 22.2%	Not True: 15.4% Sometimes True: 46.2% Often True: 7.7% Almost Always True: 30.8%

42. I am overly sensitive to certain sounds, textures, and smells.	Not True: 22.2% Sometimes True: 11.1% Often True: 33.3% Almost Always True: 33.3%	Not True: 30.8% Sometimes True: 15.4% Often True: 23.1% Almost Always True: 30.8%
43. I am able to leave my parents/caregivers without a problem.	Not True: 0% Sometimes True: 77.8% Often True: 22.2% Almost Always True: 0%	Not True: 23.1% Sometimes True: 15.4% Often True: 46.2% Almost Always True: 15.4%
44. I have a hard time understanding how events relate to one another (cause and effect).	Not True: 44.4% Sometimes True: 44.4% Often True: 11.1% Almost Always True: 0%	Not True: 46.2% Sometimes True: 46.2% Often True: 7.7% Almost Always True: 0%
45. When others are looking at or listening to something, I get interested in what they are paying attention to.	Not True: 0% Sometimes True: 33.3% Often True: 55.6% Almost Always True: 11.1%	Not True: 0% Sometimes True: 15.4% Often True: 69.2% Almost Always True: 15.4%
46. I have been told that my facial expressions are too serious.	Not True: 33.3% Sometimes True: 55.6% Often True: 0% Almost Always True: 11.1%	Not True: 46.2% Sometimes True: 30.8% Often True: 15.4% Almost Always True: 7.7%
47. I am too silly or laugh at inappropriate times.	Not True: 22.2% Sometimes True: 44.4% Often True: 33.3% Almost Always True: 0%	Not True: 30.8% Sometimes True: 38.5% Often True: 15.4% Almost Always True: 15.4%
48. I have a good sense of humor and can understand jokes.	Not True: 0% Sometimes True: 22.2% Often True: 66.7% Almost Always True: 11.1%	Not True: 7.7% Sometimes True: 7.7% Often True: 38.5% Almost Always True: 46.2%
49. I do extremely well at a few tasks, but not as well with most other tasks.	Not True: 11.1% Sometimes True: 33.3% Often True: 44.4% Almost Always True: 11.1%	Not True: 7.7% Sometimes True: 46.2% Often True: 23.1% Almost Always True: 23.1%
50. I have repetitive behaviors that others consider odd (e.g., moving my hands, rocking my body back and forth).	Not True: 55.6% Sometimes True: 0% Often True: 44.4% Almost Always True: 0%	Not True: 7.7% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 23.1%
51. I have difficulty answering questions directly and end up	Not True: 22.2% Sometimes True: 55.6% Often True: 22.2%	Not True: 30.8% Sometimes True: 30.8% Often True: 23.1%

talking around the subject.	Almost Always True: 0%	Almost Always True: 15.4%
52. I know when I am talking too loud or making too much noise.	Not True: 0% Sometimes True: 77.8% Often True: 0% Almost Always True: 22.2%	Not True: 7.7% Sometimes True: 38.5% Often True: 38.5% Almost Always True: 15.4%
53. I have been told that I talk to people in an unusual tone of voice (like a robot or like I am giving a lecture).	Not True: 66.7% Sometimes True: 11.1% Often True: 22.2% Almost Always True: 0%	Not True: 46.2% Sometimes True: 38.5% Often True: 7.7% Almost Always True: 7.7%
54. I think about people in the same way that I think about objects.	Not True: 55.6% Sometimes True: 22.2% Often True: 22.2% Almost Always True: 0%	Not True: 69.2% Sometimes True: 30.8% Often True: 0% Almost Always True: 0%
55. I know when I am too close to someone or invading someone's space.	Not True: 0% Sometimes True: 22.2% Often True: 11.1% Almost Always True: 66.7%	Not True: 15.4% Sometimes True: 30.8% Often True: 38.5% Almost Always True: 15.4%
56. I sometimes make the mistake of walking in between two people who are talking.	Not True: 22.2% Sometimes True: 77.8% Often True: 0% Almost Always True: 0%	Not True: 15.4% Sometimes True: 38.5% Often True: 23.1% Almost Always True: 23.1%
57. I get teased a lot.	Not True: 22.2% Sometimes True: 44.4% Often True: 22.2% Almost Always True: 11.1%	Not True: 69.2% Sometimes True: 15.4% Often True: 0% Almost Always True: 15.4%
58. I concentrate too much on parts of things rather than seeing the whole picture (e.g., if asked to describe a story, I might only talk about one small detail, such as the clothes a character was wearing).	Not True: 33.3% Sometimes True: 11.1% Often True: 55.6% Almost Always True: 0%	Not True: 46.2% Sometimes True: 30.8% Often True: 15.4% Almost Always True: 7.7%
59. I am more suspicious than most other people.	Not True: 55.6% Sometimes True: 22.2% Often True: 22.2% Almost Always True: 0%	Not True: 23.1% Sometimes True: 38.5% Often True: 30.8% Almost Always True: 7.7%
60. Other people think that I am emotionally distant and do not show	Not True: 66.7% Sometimes True: 22.2% Often True: 11.1%	Not True: 61.5% Sometimes True: 23.1% Often True: 15.4%

my feelings.	Almost Always True: 0%	Almost Always True: 0%
61. I am inflexible and have a hard time changing my mind.	Not True: 22.2% Sometimes True: 44.4% Often True: 33.3% Almost Always True: 0%	Not True: 15.4% Sometimes True: 61.5% Often True: 15.4% Almost Always True: 7.7%
62. When I tell someone why I am doing something, they tell me that my reason is strange or unusual.	Not True: 22.2% Sometimes True: 66.7% Often True: 11.1% Almost Always True: 0%	Not True: 15.4% Sometimes True: 46.2% Often True: 23.1% Almost Always True: 15.4%
63. I touch others in an unusual way (e.g., I may touch someone just to make contact, and then walk away).	Not True: 88.9% Sometimes True: 0% Often True: 11.1% Almost Always True: 0%	Not True: 92.3% Sometimes True: 0% Often True: 0% Almost Always True: 7.7%
64. I am too tense in social settings.	Not True: 44.4% Sometimes True: 44.4% Often True: 0% Almost Always True: 11.1%	Not True: 23.1% Sometimes True: 38.5% Often True: 23.1% Almost Always True: 15.4%
65. I stare or gaze off into space.	Not True: 11.1% Sometimes True: 33.3% Often True: 33.3% Almost Always True: 22.2%	Not True: 0% Sometimes True: 23.1% Often True: 46.2% Almost Always True: 30.8%

APPENDIX G

REPETITIVE BEHAVIOR SCALE – REVISED (RBS-R) SELF-REPORT ITEM ANALYSIS

Item Analysis of RBS-R Self-Report

Subscale/Item	Females	Males
I. Stereotyped Behavior Subscale: Apparently purposeless movements or actions that are repeated in a similar manner		
1. Whole Body (body rocking, body swaying)	Does Not Occur: 42.9% Mild Problem: 38.1% Moderate Problem: 19.0% Severe Problem: 0%	Does Not Occur: 61.9% Mild Problem: 23.8% Moderate Problem: 14.3% Severe Problem: 0%
2. Head (Rolls head, nods head, turns head)	Does Not Occur: 52.4% Mild Problem: 38.1% Moderate Problem: 9.5% Severe Problem: 0%	Does Not Occur: 71.4% Mild Problem: 28.6% Moderate Problem: 0% Severe Problem: 0%
3. Hand/Finger (Flaps hands, wiggles or flicks fingers)	Does Not Occur: 38.1% Mild Problem: 38.1% Moderate Problem: 23.8% Severe Problem: 0%	Does Not Occur: 47.6% Mild Problem: 38.1% Moderate Problem: 9.5% Severe Problem: 4.8%
4. Locomotion (Turns in circles, whirls, jumps, bounces)	Does Not Occur: 52.4% Mild Problem: 33.3% Moderate Problem: 14.3% Severe Problem: 0%	Does Not Occur: 66.7% Mild Problem: 28.6% Moderate Problem: 4.8% Severe Problem: 0%
5. Object Usage (Spins or twirl objects, twiddles or slaps or throws objects, lets objects fall out of hands)	Does Not Occur: 47.6% Mild Problem: 33.3% Moderate Problem: 14.3% Severe Problem: 4.8%	Does Not Occur: 28.6% Mild Problem: 38.1% Moderate Problem: 14.3% Severe Problem: 19.0%
6. Sensory (Covers eyes, looks closely or gazes at hands or objects, covers ears, smells or sniffs items, rubs surfaces)	Does Not Occur: 14.3% Mild Problem: 52.4% Moderate Problem: 28.6% Severe Problem: 4.8%	Does Not Occur: 42.9% Mild Problem: 42.9% Moderate Problem: 4.8% Severe Problem: 9.5%
II. Self-Injurious Behavior Subscale: Movement or Actions that have the potential to cause redness, bruising, or other injury to the body, and that are repeated in a similar manner		
7. Hits Self with Body Part (Hits or slaps head, face, or other body area)	Does Not Occur: 57.1% Mild Problem: 38.1% Moderate Problem: 4.8% Severe Problem: 0%	Does Not Occur: 85.7% Mild Problem: 14.3% Moderate Problem: 0% Severe Problem: 0%

8. Hits Self Against Surface or Object (Hits or bangs head or other body part on table, floor or other surface)	Does Not Occur: 81.0% Mild Problem: 14.3% Moderate Problem: 4.8% Severe Problem: 0%	Does Not Occur: 85.7% Mild Problem: 14.3% Moderate Problem: 0% Severe Problem: 0%
9. Hits Self with Object (Hits or bangs head or other body area with objects)	Does Not Occur: 90.5% Mild Problem: 9.5% Moderate Problem: 0% Severe Problem: 0%	Does Not Occur: 90.5% Mild Problem: 9.5% Moderate Problem: 0% Severe Problem: 0%
10. Bites Self (Bites hand, wrist, arm, lips or tongue)	Does Not Occur: 57.1% Mild Problem: 38.1% Moderate Problem: 4.8% Severe Problem: 0%	Does Not Occur: 85.7% Mild Problem: 14.3% Moderate Problem: 0% Severe Problem: 0%
11. Pulls (Pulls hair or skin)	Does Not Occur: 71.4% Mild Problem: 14.3% Moderate Problem: 9.5% Severe Problem: 4.8%	Does Not Occur: 100% Mild Problem: 0% Moderate Problem: 0% Severe Problem: 0%
12. Rubs or Scratches Self (Rubs or scratches marks on arms, leg, face or torso)	Does Not Occur: 66.7% Mild Problem: 19.0% Moderate Problem: 9.5% Severe Problem: 4.8%	Does Not Occur: 66.7% Mild Problem: 23.8% Moderate Problem: 9.5% Severe Problem: 0%
13. Inserts Finger or Object (Eye-poking, ear-poking)	Does Not Occur: 95.2% Mild Problem: 4.8% Moderate Problem: 0% Severe Problem: 0%	Does Not Occur: 95.2% Mild Problem: 4.8% Moderate Problem: 0% Severe Problem: 0%
14. Skin Picking (Picks at Skin on Face, Hands, Arms, Legs, or Torso)	Does Not Occur: 42.9% Mild Problem: 19.0% Moderate Problem: 33.3% Severe Problem: 4.8%	Does Not Occur: 90.5% Mild Problem: 4.8% Moderate Problem: 4.8% Severe Problem: 0%
III. Compulsive Behavior Subscale: Behavior that is repeated and is performed according to a rule, or involves things being done "just so"		
15. Arranging/Ordering (Arranges certain objects in a particular pattern or place; Need for things to be even or symmetrical)	Does Not Occur: 28.6% Mild Problem: 42.9% Moderate Problem: 23.8% Severe Problem: 4.8%	Does Not Occur: 19.0% Mild Problem: 61.9% Moderate Problem: 19.0% Severe Problem: 0%
16. Completeness (Must have doors open or closed; Takes all items out of a container or area)	Does Not Occur: 42.9% Mild Problem: 38.1% Moderate Problem: 9.5% Severe Problem: 9.5%	Does Not Occur: 33.3% Mild Problem: 57.1% Moderate Problem: 9.5% Severe Problem: 0%
17. Washing/Cleaning (Excessively cleans certain	Does Not Occur: 42.9% Mild Problem: 47.6%	Does Not Occur: 42.9% Mild Problem: 47.6%

body parts; Picks at lint or loose threads)	Moderate Problem: 9.5% Severe Problem: 0%	Moderate Problem: 4.8% Severe Problem: 4.8%
18. Checking (Repeatedly checks doors, windows, drawers, appliances, clocks, locks, etc.)	Does Not Occur: 57.1% Mild Problem: 23.8% Moderate Problem: 19.0% Severe Problem: 0%	Does Not Occur: 42.9% Mild Problem: 28.6% Moderate Problem: 19.0% Severe Problem: 9.5%
19. Counting (Counts items or objects; Counts to a certain number or in a certain way)	Does Not Occur: 66.7% Mild Problem: 19.0% Moderate Problem: 9.5% Severe Problem: 4.8%	Does Not Occur: 57.1% Mild Problem: 28.6% Moderate Problem: 14.3% Severe Problem: 0%
20. Hoarding/Saving (Collects, hoards, or hides specific items)	Does Not Occur: 52.4% Mild Problem: 28.6% Moderate Problem: 14.3% Severe Problem: 4.8%	Does Not Occur: 61.9% Mild Problem: 23.8% Moderate Problem: 9.5% Severe Problem: 4.8%
21. Repeating (Need to repeat routine events; In/out door, up/down from chair, clothing on/off)	Does Not Occur: 76.2% Mild Problem: 19.0% Moderate Problem: 4.8% Severe Problem: 0%	Does Not Occur: 66.7% Mild Problem: 23.8% Moderate Problem: 4.8% Severe Problem: 4.8%
22. Touch/Tap (Need to touch, tap, or rub items, surfaces, or people)	Does Not Occur: 61.9% Mild Problem: 33.3% Moderate Problem: 4.8% Severe Problem: 0%	Does Not Occur: 61.9% Mild Problem: 38.1% Moderate Problem: 0% Severe Problem: 0%
IV. Ritualistic Behavior Subscale: Performing activities of daily living in a similar manner		
23. Eating/Mealtime (Strongly prefers/insists on eating/drinking only certain things; Eats or drinks items in a set order; Insists that meal related items are arranged a certain way)	Does Not Occur: 47.6% Mild Problem: 33.3% Moderate Problem: 9.5% Severe Problem: 9.5%	Does Not Occur: 47.6% Mild Problem: 19.0% Moderate Problem: 14.3% Severe Problem: 19.0%
24. Sleeping/Bedtime (Insists on certain pre-bedtime routines; Arranges items in room “just so” prior to bedtime; Insists that certain items be present with him/her during sleep; Insists that another person be present prior to or during sleep)	Does Not Occur: 61.9% Mild Problem: 4.8% Moderate Problem: 33.3% Severe Problem: 0%	Does Not Occur: 66.7% Mild Problem: 14.3% Moderate Problem: 19.0% Severe Problem: 0%
25. Self-Care – Bathroom and Dressing (Insists on specific	Does Not Occur: 47.6%	Does Not Occur: 61.9%

order of activities or tasks related to using the bathroom, to washing, showering, bathing or dressing; Arranges items in a certain way in the bathroom or insists that bathroom items not be moved; Insists on wearing certain clothing items)	Mild Problem: 28.6% Moderate Problem: 14.3% Severe Problem: 9.5%	Mild Problem: 28.6% Moderate Problem: 4.8% Severe Problem: 4.8%
26. Travel/Transportation (Insists on taking certain routes/paths, Must sit in specific location in vehicles; Insists that certain items be present during travel, e.g., a toy or material; Insists on seeing or touching certain things or places during travel such as a sign or store)	Does Not Occur: 57.1% Mild Problem: 19.0% Moderate Problem: 19.0% Severe Problem: 4.8%	Does Not Occur: 52.4% Mild Problem: 33.3% Moderate Problem: 14.3% Severe Problem: 0%
27. Play/Leisure (Insists on certain play activities; Follows a rigid routine during play/leisure; Insists that certain items be present/available during play/leisure; Insists that other persons do certain things during play)	Does Not Occur: 57.1% Mild Problem: 23.8% Moderate Problem: 9.5% Severe Problem: 9.5%	Does Not Occur: 71.4% Mild Problem: 23.8% Moderate Problem: 0% Severe Problem: 4.8%
28. Communication/Social Interactions (Repeats same topic(s) during social interactions; Repetitive questioning; Insists on certain topics of conversation; Insists that others say certain things or respond in certain ways during interactions)	Does Not Occur: 47.6% Mild Problem: 33.3% Moderate Problem: 14.3% Severe Problem: 4.8%	Does Not Occur: 61.9% Mild Problem: 28.6% Moderate Problem: 9.5% Severe Problem: 0%
V. Sameness Behavior Subscale: Resistance to change, insisting that things stay the same)		
29. Insists that things remain in the same place(s) (e.g., toys, supplies, furniture, pictures, etc.)	Does Not Occur: 57.1% Mild Problem: 19.0% Moderate Problem: 19.0% Severe Problem: 4.8%	Does Not Occur: 47.6% Mild Problem: 38.1% Moderate Problem: 4.8% Severe Problem: 9.5%

30. Objects to visiting new places	Does Not Occur: 66.7% Mild Problem: 19.0% Moderate Problem: 9.5% Severe Problem: 4.8%	Does Not Occur: 85.7% Mild Problem: 4.8% Moderate Problem: 4.8% Severe Problem: 4.8%
31. Becomes upset if interrupted in what he/she is doing	Does Not Occur: 28.6% Mild Problem: 47.6% Moderate Problem: 14.3% Severe Problem: 9.5%	Does Not Occur: 23.8% Mild Problem: 42.9% Moderate Problem: 33.3% Severe Problem: 0%
32. Insists on walking in a particular pattern (e.g., straight line)	Does Not Occur: 85.7% Mild Problem: 4.8% Moderate Problem: 9.5% Severe Problem: 0%	Does Not Occur: 81.0% Mild Problem: 19.0% Moderate Problem: 0% Severe Problem: 0%
33. Insists on sitting at the same place	Does Not Occur: 71.4% Mild Problem: 9.5% Moderate Problem: 14.3% Severe Problem: 4.8%	Does Not Occur: 66.7% Mild Problem: 19.0% Moderate Problem: 9.5% Severe Problem: 4.8%
34. Dislikes changes in appearance or behavior of the people around him/her	Does Not Occur: 57.1% Mild Problem: 23.8% Moderate Problem: 9.5% Severe Problem: 9.5%	Does Not Occur: 66.7% Mild Problem: 14.3% Moderate Problem: 14.3% Severe Problem: 4.8%
35. Insists on using a particular door	Does Not Occur: 81.0% Mild Problem: 9.5% Moderate Problem: 9.5% Severe Problem: 0%	Does Not Occur: 95.2% Mild Problem: 0% Moderate Problem: 4.8% Severe Problem: 0%
36. Likes the same CD, tape, record or piece of music played continually; Likes the same movie/video or part of movie/video	Does Not Occur: 42.9% Mild Problem: 23.8% Moderate Problem: 9.5% Severe Problem: 23.8%	Does Not Occur: 61.9% Mild Problem: 28.6% Moderate Problem: 4.8% Severe Problem: 4.8%
37. Resists changing activities; Difficulty with transitions	Does Not Occur: 33.3% Mild Problem: 38.1% Moderate Problem: 28.6% Severe Problem: 0%	Does Not Occur: 33.3% Mild Problem: 47.6% Moderate Problem: 14.3% Severe Problem: 4.8%
38. Insists on same routine, household, school or work schedule everyday	Does Not Occur: 52.4% Mild Problem: 38.1% Moderate Problem: 4.8% Severe Problem: 4.8%	Does Not Occur: 42.9% Mild Problem: 47.6% Moderate Problem: 9.5% Severe Problem: 0%
39. Insists that specific things take place at specific times	Does Not Occur: 71.4% Mild Problem: 19.0% Moderate Problem: 9.5% Severe Problem: 0%	Does Not Occur: 52.4% Mild Problem: 28.6% Moderate Problem: 19.0% Severe Problem: 0%

VI. Restricted Behavior Subscale: Limited range of focus, interest, or activity		
40. Fascination, preoccupation with one subject or activity (e.g., trains, computers, weather, dinosaurs)	Does Not Occur: 33.3% Mild Problem: 28.6% Moderate Problem: 19.0% Severe Problem: 19.0%	Does Not Occur: 23.8% Mild Problem: 42.9% Moderate Problem: 19.0% Severe Problem: 14.3%
41. Strongly attached to one specific object	Does Not Occur: 42.9% Mild Problem: 38.1% Moderate Problem: 4.8% Severe Problem: 14.3%	Does Not Occur: 57.1% Mild Problem: 23.8% Moderate Problem: 9.5% Severe Problem: 9.5%
42. Preoccupation with part(s) of objects rather than the whole object (e.g., buttons on clothes, wheels on toy cars)	Does Not Occur: 76.2% Mild Problem: 14.3% Moderate Problem: 9.5% Severe Problem: 0%	Does Not Occur: 76.2% Mild Problem: 9.5% Moderate Problem: 9.5% Severe Problem: 4.8%
43. Fascination, preoccupation with movement/things that move (e.g., fans, clocks)	Does Not Occur: 71.4% Mild Problem: 19.0% Moderate Problem: 4.8% Severe Problem: 4.8%	Does Not Occur: 71.4% Mild Problem: 19.0% Moderate Problem: 4.8% Severe Problem: 4.8%

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