DEGRASS, LISA MARIE, Ph.D. An Examination of the Appropriateness of the Content of the DSM-IV AD/HD Symptom Criteria for Elementary School Girls. (2009) Directed by Dr. Arthur D. Anastopoulos. 131 pp.

Like many childhood disorders, prevalence rates of AD/HD differ significantly across gender, with male-to-female ratios ranging from 2:1 to 9:1 depending on the sample (APA, 1994). Limited research has been conducted thus far in an effort to better understand these differential prevalence rates. However, it has been proposed that the current symptom descriptions for AD/HD in the DSM-IV may not be fully capturing how females manifest the disorder (Ohan & Johnston, 2005). To address this theory and the existing gap in the literature, this study examined the ability of the current DSM-IV symptom items and some newly proposed gender-sensitive items (Ohan & Johnston, 2005) to predict impairment in elementary school girls. Sixty-three parents and 45 primary classroom teachers of girls ages six to eleven completed packets providing information about the girls. Primary analyses of parent data revealed that a combination of some gender-sensitive items in addition to some DSM-IV items were predictive of overall impairment in girls. However, secondary analyses of teacher data revealed that only some DSM-IV items were predictive of overall impairment. Nonetheless, these findings lend some support for the notion that although the underlying mechanisms of AD/HD may be the same for boys and girls, how this disorder is manifested may be different, and the current diagnostic criteria are not fully capturing how females express AD/HD. Implications for future research and clinical practice were discussed.

AN EXAMINATION OF THE APPROPRIATENESS OF THE CONTENT

OF THE DSM-IV AD/HD SYMPTOM CRITERIA

FOR ELEMENTARY SCHOOL GIRLS

by

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A Dissertation Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
2009

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CHAPTER I

INTRODUCTION

Psychological disorders of childhood are much more commonly diagnosed in

boys than in girls. In fact, of the twenty-one disorders typically first diagnosed in

childhood for which sex ratios are provided in the fourth edition of the *Diagnostic and*

*Statistical Manual of Mental Disorders* (*DSM-IV*; American Psychiatric Association

[APA], 1994), seventeen have higher prevalence rates for males than for females

(Hartung & Widiger, 1998). In addition, of all the risk factors for developing a disruptive

behavior disorder in childhood, gender is the most robust dimension identified (Robins,

1991). Attention-Deficit/Hyperactivity Disorder (AD/HD) is no exception. In general,

AD/HD has been found to affect between 3-5% of the general population, with male-to-

female ratios in clinic-referred samples ranging from 6:1 to 9:1 (APA, 1994). In

population-based samples, the difference in prevalence rates drops significantly, but still

remains substantial, with boys with AD/HD outnumbering girls with AD/HD by

approximately 2:1 (DuPaul & Eckert, 1998).

Limited research has been conducted in an effort to better understand the

differential prevalence rates of AD/HD in boys and in girls. Thus, it remains unclear

whether these differential prevalence rates are due to actual differences in

psychopathology between males and females or if they are merely the result of biases in

ascertainment, definition, or assessment of the disorder that result in an over-

identification of boys with AD/HD, an under-identification of girls with the disorder, or

both. While these are all possibilities, there is some evidence to suggest that underidentification of girls with AD/HD is occurring (Ohan & Johnston, 2005). If so, the costs of failing to identify and treat girls with AD/HD are substantial. The underidentification of girls with AD/HD is likely to contribute to their inability to access potentially beneficial treatments. Thus, girls with AD/HD may become more severely affected over time. Hinshaw and colleagues (2006; 2007) found that the risk for AD/HD-related psychiatric problems and functional impairments extends at least until early to mid-adolescence for females. Studies have also shown that girls with AD/HD are at an increased risk for teen pregnancy (Arnold, 1996). Moreover, AD/HD has been found to be a more serious risk factor for substance use disorders in girls than it is in boys (Biederman et al., 2002). Most recently, Lahey and colleagues (2007) found that childhood AD/HD predicts more steeply rising symptoms of anxiety and depression during early adolescence in girls than in boys. Thus, early identification of the disorder is imperative and likely to lead to early intervention, which can then alter the trajectory of the disorder.

This study aimed to further examine the existing debate in the literature regarding gender differences in symptom expression of AD/HD. Although genetic factors and sociocultural influences have been implicated, this study focused on potential biases in the way in which the disorder is assessed, with an emphasis on how AD/HD is diagnosed in girls. Specifically, this study examined the utility and appropriateness of the current DSM-IV symptom descriptions for girls. As background for this discussion, this paper begins with an overview of the current DSM-IV diagnostic criteria for AD/HD and an

examination of gender differences in symptom expression, both categorically and dimensionally. Next, it details impairment in different domains of functioning that are associated with AD/HD, emphasizing observed gender differences within each domain. Finally, the proposed explanations for observed gender differences are discussed, with an emphasis on the biases that exist in assessment and diagnosis of the disorder.

### *Diagnostic Criteria*

In order to receive a diagnosis of AD/HD, the DSM-IV requires the presence of six out of nine symptoms of inattention and/or six out of nine symptoms of hyperactivity-impulsivity. Moreover, these symptoms need to persist for at least six months and result in functional impairment in two or more settings. The DSM-IV requires an onset of symptoms before age seven; symptoms that are better accounted for by another mental disorder do not count towards the diagnosis of AD/HD (APA, 1994).

The current diagnostic criteria allows for subtyping of AD/HD. In fact, according to the DSM-IV, all AD/HD diagnoses must be accompanied by a subtype distinction. Specifically, there are three major subtype classifications of AD/HD in the DSM-IV, which are distinguished from one another by the presence of one or both of the primary symptoms of inattention and hyperactivity-impulsivity. If at least six out of nine symptoms of inattention are present, but fewer than six hyperactive-impulsive symptoms are present, a child would qualify for a diagnosis of AD/HD, Predominantly Inattentive (IA) Type. Conversely, if at least six out of nine symptoms of hyperactivity-impulsivity are present, but fewer than six inattention symptoms are present, a child would qualify for a diagnosis of AD/HD, Predominantly Hyperactive-Impulsive (HI) Type. Lastly, if six or

more symptoms from both lists are present, a child would qualify for a diagnosis of

AD/HD, Combined (C) Type (APA, 1994).

In the DSM-IV clinical field trials, the C type outnumbered the IA type by 2:1 and

the HI type by 3:1 (Lahey et al., 1994). However, community-based samples have

yielded different results. In particular, community-based studies have found that the IA

type is the most commonly occurring subtype (Gaub & Carlson, 1997; Wolraich,

Hannah, Pinnock, Baumgaertel, & Brown, 1996). This pattern suggests that a more

severe presentation of AD/HD, such as the C type, is more likely to prompt referrals

(Anastopoulos & Shelton, 2001).

### *Categorical and Dimensional Differences*

Previous studies examining gender differences in the subtypes of AD/HD have

indicated that relative to boys, girls with AD/HD are more likely to be diagnosed with the

IA type rather than the C type or the HI type (Carlson, Shin, & Booth, 1999; Lahey et al.,

1994). However, more recent research indicates that although girls are twice as likely as

boys to manifest the IA type of the disorder, the C type of AD/HD is the predominant

subtype in both boys and girls (Biederman et al., 2002).

Studies that have examined the symptoms of AD/HD dimensionally have found

that boys and girls differ in severity of the expressed symptoms of inattention and

hyperactivity-impulsivity. Numerous studies have found that boys actually display higher

levels of inattention than girls (DuPaul, Power, Anastopoulos, & Reid, 1998). Gaub and

Carlson (1997) found that recruitment source was an important factor in determining

which gender displayed greater levels of inattention. They found that non-referred boys

displayed more inattention than non-referred girls. However, they found a trend in the opposite direction for clinic-referred boys and girls, suggesting that clinic-referred girls may actually show higher levels of inattention than clinic-referred boys.

Research on gender differences in levels of hyperactivity-impulsivity has yielded more consistent findings. Studies have consistently demonstrated that boys are more hyperactive than their female counterparts (DuPaul et al., 1998). In addition, boys generally display more impulsive behavior than girls with the disorder (DuPaul et al., 1998; Newcorn et al., 2001).

### Impairment in Functioning

*Academic and Cognitive Functioning*

The nature of the primary symptoms of AD/HD makes success in school and other academic endeavors a challenge for children with the disorder. Specifically, children with AD/HD often fail to finish assigned tasks due to their inability to stay focused for prolonged periods of time (Hooks, Milish, & Lorch, 1994). Moreover, they find it difficult to memorize complex information, particularly when the use of organization and rehearsal strategies is needed (Douglas & Benezra, 1990). Some children with AD/HD have comorbid learning disorders, with comorbid reading disorders occurring most often (August & Garfinkel, 1990). Moreover, higher rates of math learning disabilities are also reported for students with AD/HD (31%) than are reported for the general population (6%-7%) (Mayes et al., 2000). Additionally, children with AD/HD score slightly lower on standardized intelligence tests than controls (McGee,

Williams, Moffitt, & Anderson, 1989), and approximately 30% of students with ADHD fail to achieve at a level predicted by their age or IQ score (Zentall, 2007).

An examination of gender differences in the cognitive and language functioning of children with AD/HD has produced conflicting results. Some studies suggest that girls diagnosed with AD/HD demonstrate more severe cognitive and language deficits than their male counterparts (Berry, Shaywitz, & Shaywitz, 1985; Brown, Madan-Swain, & Baldwin, 1991; James & Taylor, 1990). Specifically, some research has shown that girls with AD/HD have lower reading achievement scores than boys with AD/HD (Sharp, Walter, Marsh, Ritchie, Hamburger, & Castellanos, 1999). Other findings suggest that there is no significant difference between boys and girls with AD/HD in the domains of global academic functioning and achievement in mathematics, reading, and spelling (Gaub & Carlson, 1997; Gershon, 2002). However, a recent study by Eisenberg and Schneider (2007) found that parents and teachers perceive the academic skills of girls diagnosed with AD/HD to be substantially more negative than girls without AD/HD. This difference is much less pronounced for boys with AD/HD.

In addition, a number of research findings indicated that females with AD/HD perform worse than males on measures of intellectual functioning (Gaub & Carlson, 1997; Gershon, 2002). In particular, studies have reported that girls with AD/HD have lower Full Scale and Verbal IQ scores than boys with the disorder (Berry et al., 1985; James & Taylor, 1990). Some researchers have suggested that gender differences in intellectual functioning may reflect a referral bias, since females often receive referrals for school-related difficulties or potential learning disorders (Nadeau, Littman, & Quinn,

1999). Furthermore, Barkley (1989) has suggested that since studies assessing IQ performance all relied on clinic-referred samples, the lower intellectual functioning found for girls with AD/HD relative to boys with AD/HD may be limited to clinic-referred children and may not hold true in community samples.

*Parent-Child and Family Functioning*

In addition to academic impairments, AD/HD can lead to disruptions in parent-child and family functioning. There is currently no research to suggest that boys and girls with AD/HD experience disruptions within the family domain differently. However, impairment in this domain is significant and noteworthy. Children with AD/HD are less compliant with parental requests and thus require more parental attention including prompts, reminders, and redirection (Barkley & Cunningham, 1980). Parenting children with AD/HD is associated with the use of more negative, aversive, coercive, and conflictual styles of parenting, which collectively place the parent and child at risk for disruptions in their relationship (Andra & Thomas, 1998; Barkley, 1985; Barkley, Anastopoulos, Guevremont, & Fletcher, 1992; Tallmadge & Barkley, 1983). Similarly, parents of children with AD/HD adopt more controlling approaches, characterized by an increase in the number of commands and reprimands used (Barkley, 1985), which are related to elevated levels of parenting stress (Anastopoulos, Guevremont, Shelton, & DuPaul, 1992; Mash & Johnston, 1983; Mash & Johnston, 1990). Parents of children with AD/HD are more likely to endorse a lack of positive feelings towards their child, as well as fewer reinforcing interactions (Andra & Thomas, 1998), which is associated with emotional withdrawal from the child (Mash & Johnson, 1990).

In addition to the strain placed on the parent-child relationship, AD/HD impacts the entire family system. AD/HD is related to higher rates of sibling conflict, fewer reported positive relationships between siblings as rated by parents and children and elevated rates of the unaffected sibling's misbehavior (Mash & Johnston, 1983). Additionally, parenting a child with AD/HD is associated with poor relationship outcomes, such as decreased marital satisfaction and parenting alliance (Befera & Barkley, 1985) higher rates of separation and divorce (Brown & Pacini, 1989), and increased personal stress (Befera & Barkley, 1985; Cunningham, Benness, & Siegel, 1988).

*Social Functioning*

Children with AD/HD often have impaired social relations, and interpersonal deficits are a major correlate of AD/HD irrespective of gender. (Greene et al., 2001). Recent studies have shown that children with AD/HD are more likely to experience peer rejection and negative imbalance between given and received liking ratings (i.e., children with ADHD liked others more than they were liked) than their classmates (Mrug, Hoza, Gerdes, Hinshaw, & Arnold, 2009).

Some studies have shown that girls with AD/HD have more social problems than boys with AD/HD (Carlson, Tamm, & Gaub, 1997). Specifically, girls with AD/HD experience more peer rejection than boys with AD/HD (Berry et al., 1985; Brown et al., 1991). Gaub and Carlson (1997) found that inattentive girls experienced more peer rejection than inattentive boys. Wheeler and Carlson (1994), on the other hand, found that inattentive girls were actually more neglected than rejected. More recently, in a study

comparing girls with AD/HD to girls without AD/HD, Blachman and Hinshaw (2002) found that girls with AD/HD had fewer mutual friends and were more likely to have no friends than girls without AD/HD. Overall, they had higher levels of negative relationship features, including conflict and relational aggression, than did girls without AD/HD. In addition, Greene and colleagues (2001) found that girls with AD/HD had more social problems on Child Behavior Checklist (CBCL) than girls without AD/HD. However, they also found that boys with AD/HD exhibited greater social impairment within the school domain than girls with the disorder.

*Behavioral Functioning*

Children with AD/HD often exhibit secondary symptoms of aggression, as well as comorbid diagnoses of externalizing disorders. In clinic-referred samples, up to 40% of children with AD/HD will meet criteria for a secondary diagnosis of Oppositional Defiant Disorder (ODD), with another 25% meeting criteria for Conduct Disorder (CD) (Barkley, 1990; Pelham, Gagny, Greenslade, & Milich, 1992). Overall, girls with AD/HD are less likely than boys with AD/HD to have comorbid disruptive behavior problems (Biederman & Faraone, 2004). In particular, girls with AD/HD have fewer CD diagnoses than boys with AD/HD (Gaub & Carlson, 1997). As a whole, girls with AD/HD exhibit less externalizing pathology, including oppositional, antisocial, and aggressive behaviors, than boys with AD/HD (Berry et al., 1985; Eme, 1992; Gaub & Carlson, 1997).

*Emotional Functioning*

Children with AD/HD often exhibit secondary symptoms of depression and anxiety, as well as comorbid diagnoses of internalizing disorders. However, these

comorbid internalizing disorders occur much less frequently than comorbid externalizing disorders. Specifically, in both clinic-referred samples and community samples, up to 30% of children with AD/HD had comorbid mood disorders, with Major Depressive Disorder and Dysthymic Disorder occurring most often (August, Realmuto, MacDonald, Nugent, & Crosby, 1996; Biederman, Newcorn, & Sprich, 1991). Comorbid anxiety disorders are also common, affecting up to 34% of children with AD/HD. Both subtype and the presence of comorbid externalizing disorders seem to play a moderating role in the presence of secondary internalizing features (August et al., 1996).

Existing research on gender differences in comorbid internalizing disorders is mixed. Since boys are more likely to exhibit comorbid externalizing problems, and the addition of comorbid externalizing disorders increases risk for comorbid internalizing disorders, one would predict that boys more often exhibit comorbid internalizing problems as well. As expected, recent studies indicate that although girls with AD/HD are at a significantly higher risk for comorbid depression than girls without AD/HD, they have a significantly lower rate of comorbid depression than boys with AD/HD (Biederman et al., 2002). However, other studies suggest that females with AD/HD have more internalizing comorbid conditions than their male counterparts (Conners, 1994; Gershon, 2002). Furthermore, Faraone, Biederman, & Mick (2000) found a significantly greater risk for depression and an increased prevalence of several anxiety disorders among the relatives of girls with AD/HD.

*Summary of Impairments in Functioning*

The primary symptoms of AD/HD lead to numerous impairments in various domains of functioning, including academic, parent-child/family, social, behavioral, and emotional domains. Although all children with AD/HD generally experience some impairment across these domains, there is evidence to suggest that females experience some gender-specific impairment that their male counterparts do not. Most notably, some studies suggest that girls with AD/HD demonstrate more severe cognitive and language deficits than their male counterparts (Brown et al., 1991) and score lower on some measures of achievement (Sharp et al., 1999). Studies have also shown that girls with AD/HD experience more peer rejection than boys with AD/HD (Berry et al., 1985). Moreover, studies have demonstrated that girls with AD/HD tend to have fewer mutual friends, higher levels of negative relationship features, and have more social problems as indicated by scores on the CBCL than girls without AD/HD (Blachman & Hinshaw, 2002; Greene et al., 2001).

However, research on gender differences in impairment in functioning has mostly relied on clinical samples, or at least used the current DSM-IV criteria for AD/HD to define AD/HD within their sample. It is difficult to draw any conclusions from these samples alone because girls with AD/HD have been identified using the current DSM-IV criteria, which may not accurately capture how females manifest the disorder. In fact, two recent studies examining gender differences in impairment and other outcomes associated with AD/HD have found little evidence to suggest that boys and girls experience different sequelae as a result of AD/HD (Arcia & Conner, 1998; Bauermeister et al., 2007). Given

this conflicting information, an in-depth examination of the explanations for the differential prevalence rates of AD/HD is essential to aid in understanding these differences.

### *Explanations for Differential Prevalence Rates*

It is evident in the literature that gender differences in symptom expression and functional impairment exist; however, there is much debate as to whether the observed gender differences in symptom expression and functional impairment are primarily due to biological factors, differences in familial environment and other sociocultural influences, or are the result of how the disorder is assessed and diagnosed.

*Biological Factors*

Current theories regarding the etiology of AD/HD suggest that biological mechanisms underlie the disorder. In general, AD/HD is considered to be a neurobiological disorder, which has a strong genetic component (Biederman et al., 1995; Durston, 2003; Sprich, Biederman, Crawford, Mundy, & Faraone, 2000). In particular, several studies have examined the biological factors that may lead to gender differences in the expression of inattention and hyperactivity-impulsivity. In the study of sex differences in the developmental disorders of childhood, there is the widely held belief that the sex less frequently affected by a disorder is the relatively more severely afflicted. Researchers have proposed a number of theories to explain these paradoxical findings and the male predominance of AD/HD. One theory is the polygenic multiple threshold model, which proposes that individuals need an accumulation of harmful genetic and environmental factors to reach the threshold for developing AD/HD. According to this

theory, females, the less afflicted sex, must have a higher threshold than males. Thus, females who develop AD/HD should have a higher genetic loading for the disorder, more affected relatives, and more severe manifestations of the disorder (Carter, 1969, 1973; Cloninger, Christiansen, Reich, & Gottesman, 1978; DeFries, 1989). Another theory is the constitutional variability model, which assumes a greater genetic variability in males than in females. According to this theory, relatives of males with AD/HD would be more likely to manifest the disorder than relatives of females with the disorder, since male affliction is believed to be related to genes and more likely to occur than the rarer organic causes thought to lead to female affliction (Tayler & Ounsted, 1972). Lastly, the immunoreactivity model developed by Gualtieri & Hicks (1985) proposes that there is something about the male fetus that evokes an inhospitable uterine environment in the mother. Specifically, male fetuses are more antigenic than female fetuses, and the mother's immune system may react to the antigenicity of the developing male fetus and may actually attack fetal antigens, leading to development of certain neurological deficits, including AD/HD. According to this theory, maternal attack will occur more often with male embryos because male fetuses are more antigenic than females.

Overall studies have found little support for the immunoreactivity model as an explanation for the differential prevalence rates of AD/HD across gender. The polygenic multiple threshold model and the constitutional variability model have both received mixed reviews. However, newer research has found some support for the notion that females require a greater loading of familial influences in order to develop the disorder, suggesting the polygenic multiple threshold model as a potential explanation for the

differential prevalence rates of AD/HD in boys and girls (Rhee, Waldman, & Hay, 2001;

Smalley et al., 2000). Thus, it is evident from the research that biological factors are

involved in the development of AD/HD; however, the specific mechanism of

involvement still remains unclear.

*Social Influences*

Contrary to biological theories that propose that differences between males and

females are innate, social learning theory argues that these differences are learned.

According to prominent theorists, such as Mischel (1966), Bandura (1986), and Bussey

and Bandura (1999), the differing behaviors of males and females can best be understood

in terms of social learning principles, including classical conditioning, operant

conditioning, and modeling (Lippa, 2005). Following the principles set forth by social

learning theorists, early socialization of children's behaviors would seem to greatly

impact their functioning later in life. In particular, early socialization studies provide us

with important information regarding the development of children's propensity for rule

violations and adherence to norms. Studies have found that anger expressions in infants

(Malatesta & Haviland, 1982) and early childhood transgressions (Smetana, 1989)

received different maternal responses based on the gender of the child.

The aggression literature provides an excellent model for how girls and boys have

been socialized to express behaviors differently. Specifically, recent studies have

demonstrated that CD is actually expressed differently across gender, with girls

exhibiting higher levels of covert aggression and boys exhibiting higher levels of overt

aggression (Hinshaw & Anderson, 1996). Crick and Grotpeter (1995) found that when

both relational and overt forms of aggression are measured, peers perceive girls and boys

as equally aggressive. Thus, using measures of aggression that focus solely on overt

aggression will underestimate the number of girls identified as aggressive (Ohan &

Johnston, 2005). Hinshaw (2002) examined aggression within a population of girls with

AD/HD and found that 6-12 year-old girls with AD/HD, C type were rated significantly

higher in relational aggression compared to girls without AD/HD. Similarly, Abikoff and

colleagues (2002) found that girls with AD/HD had relatively high rates of verbal

aggression compared to comparison girls without AD/HD. Given this information, it

seems likely that early social influences may have shaped how girls differ in their

expression of the symptoms of AD/HD, similar to what has been found in the aggression

literature.

*Summary of Biological Factors and Social Influences*

An examination of the biological factors and social influences that may impact the

development of AD/HD is crucial to any discussion of gender differences and AD/HD.

Biological theories suggest that there are innate biological differences in males and

females that affect their susceptibility to developing the disorder. Social influences, on

the other hand, suggest that males and females may be equally susceptible to developing

AD/HD but have simply been socialized to express the symptoms of the disorder

differently. However, neither research on biological factors nor social influences has

provided any conclusive evidence regarding the etiology of the observed gender

differences. Thus, the door remains open for other explanations.

***Biases in Evaluation and Diagnosis of AD/HD***

Methodological limitations in assessment and diagnosis of the disorder may also provide viable explanations for the differential prevalence rates of AD/HD; however, they have received little attention and limited research thus far. It is quite possible that a combination of explanations would provide the most thorough understanding of the differential prevalence rates of the disorder. Nonetheless, it is important to address each explanation individually, and the current study focused on the explanation that has received the least attention – biases in how the disorder is assessed and diagnosed.

*Biases in Referral Source*

The considerably lower gender ratio observed in community samples (2:1) than in clinic-referred samples (6:1 to 9:1) provides strong evidence that biases in identification, assessment, and diagnosis may play a role in the differential prevalence rates of the disorder. In the field of child psychology, clinic-referred samples are not representative of the entire disordered population. Recent findings suggest that the gender differences reported in groups of subjects seen in a clinical setting may be caused by referral biases (Biederman, Kwon, & Aleardi, 2005). The lower prevalence ratio of AD/HD in the general population indicates that proportionally more boys with AD/HD present to clinics than girls with AD/HD. Some researchers suggest that lower referral rates of girls with AD/HD may reflect a neglect of the problems experienced by girls with the disorder (Berry et al., 1985; Brown et al., 1991). Moreover, lower referral rates of girls may reflect the nature of their associated difficulties. For example, learning problems and internalizing problems, thought to be more commonly displayed by females, may be less

problematic for parents and teachers and may go more easily undetected than the conduct problems typically displayed by boys (Berry et al., 1985).

It is also possible that girls are less likely to be referred because teachers have different thresholds for referring boys than girls. Thus, perhaps not only do boys and girls differ in their symptom expression, but teachers may view the same symptom expression differently depending on which gender is displaying these symptoms. Indeed, Sciutto, Nolfi, and Bluhm (2004) found a gender bias in teacher perceptions of students' behavior that may contribute to a referral bias. When presented with the same symptom profile, teachers were more likely to refer a boy than a girl, particularly when the child displayed symptoms of hyperactivity without inattention or aggression.

Since most of the research on AD/HD examines clinic-referred samples of children, not much is known about non-referred children with AD/HD. In a recent meta-analysis, Gaub and Carlson (1997) concluded that girls with AD/HD might actually express lower rates of inattention, internalizing behavior, and peer disliking than boys with AD/HD in non-referred samples. In clinic-referred samples, however, boys and girls show similar levels of these behaviors, with a trend toward girls being more impaired in these domains. Referred girls with AD/HD comprise the most severely internalizing group of the general population of girls with AD/HD (Gaub & Carlson, 1997). Moreover, some research suggests that children diagnosed with AD/HD by psychiatrists tend to comprise a more severe population, exhibiting more behavioral and psychiatric difficulties (Epstein, Shaywitz, Shaywitz, & Woolston, 1991). If, as suggested above, clinic-referred girls with AD/HD are not representative of girls with AD/HD in general,

then studying gender differences within clinic-referred samples is likely to lead to erroneous conclusions about the nature of AD/HD in girls (Gaub & Carlson, 1997).

*Biases in Parents' Perceptions*

Parental perceptions about the etiology and severity of AD/HD in their children may also lead to certain biases in referral. Parents of girls with AD/HD are more likely to attribute the onset of AD/HD symptoms to life events and less likely to relate it to genetics (Bussing, Gary, Mills, & Garvan, 2003). This finding suggests that parents of girls with AD/HD may view this disorder and its related symptoms as due to a temporary maladjustment and would thus be less likely to seek out professional help for the problem. Similarly, a focus group study asked parents to provide explanations for not seeking professional help for their daughters who express AD/HD symptoms. In the study, parents expressed the idea that their daughters were simply acting like "tomboys" and would eventually outgrow this behavior and become more "lady-like" in the future (Bussing & Gary, 2001).

Consistent with these findings, a recent study by Bussing, Koro-Ljungberg, Gary, Mason, & Garvan (2005) examined differences in parental perceptions of the associated behaviors of AD/HD and the best course for treatment in ethnically diverse populations. In particular, they found that the parents of African American girls with AD/HD described the girls as "misbehaving children," whose behaviors were typically handled through behavior modification strategies and spanking. Overall, African American families kept the interventions confined to home strategies, instead of seeking help from the school or other outside sources. Parents of Caucasian girls with AD/HD, on the other

hand, often described the girls as "reactive children," and they often used rewards as tools to control problem behavior and promote positive behavior. Caucasian families tended to recruit the help of teachers, tutors, and counselors to supplement their own strategies at home (Bussing et al., 2005).

*Biases in Ratings*

Some researchers suggest that teacher ratings are influenced by "negative halo-effects," such that other problem behaviors influence teacher ratings of AD/HD core symptoms (Vincent, Williams, Harris, & Duval, 1981). In other words, teachers who observe aggressive and defiant behavior in students are then more likely to attribute other negative behaviors to those students, such as hyperactivity and inattention, regardless of the actual presence of these behaviors. Consistent with this hypothesis, Abikoff, Courtney, Pelham, & Koplewicz (1993) found a unidirectional bias in teacher ratings, such that teacher ratings of AD/HD symptoms were inflated when a child engaged in oppositional behaviors in the classroom. However, teachers rated oppositional conduct problems more accurately, regardless of the presence of hyperactivity (Abikoff et al., 1993).

The previous findings are important to note when looking at differential prevalence rates across gender. Relative to boys, girls with AD/HD are less likely to exhibit behavior management problems in the classroom (Gaub & Carlson, 1997; McGee & Feehan, 1991). Previous studies have shown that AD/HD among girls may often be associated with more subtle forms of disruptive behavior, such as relational aggression (Hinshaw & Anderson, 1996). Therefore, based on the unidirectional bias evident in

teacher ratings, one would expect that boys are more likely than girls to be rated as exhibiting AD/HD symptoms in addition to their other disruptive classroom behaviors.

Jackson and King (2004) extended these early findings by having teachers rate video clips of children exhibiting normal behavior and either behavior that is indicative of AD/HD or ODD. They also varied the sex of the child on the video clips. They found that the male portrayal of ODD generated significantly higher teacher ratings of AD/HD than his female counterpart. Moreover, teachers were more likely to rate females exhibiting hyperactivity and inattentiveness as also displaying oppositional characteristics than they were for males portraying these same AD/HD symptoms (Jackson & King, 2004). This finding suggests that teachers perceive AD/HD symptoms in girls as more indicative of oppositional problems than they view the same behavior in boys.

Gaub and Carlson (1997) suggest that some of the biases in referral derive from the fact that parents and teachers use different anchors for their ratings. They hypothesize that parents, who may have less exposure to groups of children, base their ratings on comparisons with other children who are the same sex as their child. Teachers, on the other hand, may tend to compare the behavior of each child with a population of boys and girls. Thus, if teachers compare all children to a norm influenced by boys, who display more overt problem behavior, they are likely to identify only the most severely affected girls (Gaub & Carlson, 1997).

*Inappropriate Symptom Count Cutoffs*

As noted previously, the DSM-IV requires the presence of at least six out of nine symptoms of inattention and/or six out of nine symptoms of hyperactivity-impulsivity in

order to receive a diagnosis of AD/HD (APA, 1994). These symptom count cutoffs were determined in field trials that investigated the number of symptoms that best predicted functional impairment as measured by the Children's Global Assessment Scale and clinical diagnosis (Lahey et al., 1994). However, 79% of children included in the field trial analyses were boys. Previous research has shown that boys tend to display higher rates of inattention and hyperactivity-impulsivity than girls. Thus, the current symptom count cutoffs in the DSM-IV may not be appropriate for use with girls.

Indeed, recent findings suggest that the current cutoffs are more stringent for girls than for boys. Specifically, an inattention symptom count of six corresponds to the 93rd percentile for girls and the 86th percentile for boys. Similarly, a hyperactivity-impulsivity symptom count of six corresponds to the 92nd percentile for girls and the 84th percentile for boys (DuPaul et al., 1998). Because current diagnostic criteria use the same symptom count cutoffs for girls and boys, girls have to be more deviant relative to other girls than boys have to be relative to other boys to receive a diagnosis of AD/HD. Consistent with this notion, Weiss, Worling, and Wasdell (2003) found that 25 percents of all girls diagnosed with AD/HD-IA type are more than two standard deviations outside the norms of their same-sex peers on hyperactive-impulsive symptoms, suggesting that DSM-IV categorical cutoffs create a bias against an AD/HD-C type diagnosis in girls.

In a recently completed, but not yet published study, Farley (2004) found that girls had be more deviant relative to other girls than boys had to be relative to other boys in order to meet the DSM-IV symptom count cutoff of six or more symptoms of inattention and/or hyperactivity-impulsivity. In addition, Farley (2004) found clinically

significant percentages of girls who did not meet the current DSM-IV symptom count criteria, but who were functionally impaired across family, academic, and social domains.

Similarly, Waschbusch and King (2006) found a small subset of girls who had higher than average AD/HD and ODD symptoms as compared with other girls, yet they did not meet DSM-IV symptom count criteria for the disorders. In contrast, almost no boys were identified using the same method. Thus Waschbusch and King (2006) concluded that lower thresholds may be needed to identify DSM-IV symptoms in girls. Similarly, Eiraldi, Cohen, Marshall, & Power (2006) recently examined whether girls with sub-threshold symptom counts differ on functional impairment and comorbidity from girls with full symptom counts and from those with low levels of inattention, hyperactivity, and impulsivity. They found that many girls who met criteria for sub-threshold AD/HD characterized by parent and teacher endorsement of 4 to 5 DSM-IV items or who receive a cutoff of 1.5 standard deviations above the mean on a parent or teacher rating scale should actually be diagnosed with AD/HD because they are similarly impaired to girls who meet current symptom count cutoffs.

*Inappropriate Symptom Content*

Whereas some research has focused on the number of symptoms required for a diagnosis of AD/HD when examining the appropriateness of the DSM-IV criteria for females, other researchers believe that the issue may be in the way the symptoms are phrased. The DSM-IV symptom criteria for AD/HD were developed and validated using samples composed primarily of school-aged boys (Lahey et al., 1994). Thus, many researchers and clinicians question whether the symptoms for AD/HD in the DSM-IV are

truly representative of how girls manifest the core symptoms of this disorder (Hartung & Widiger, 1998; Quinn & Nadeau, 2002). The basis of this argument is that the expression of AD/HD may differ between boys and girls despite the presence of the same underlying pathology (Ohan & Johnston, 2005).

The aggression literature provides an excellent example of how the same core construct can be displayed differently across gender. As mentioned earlier, recent studies have shown that aggression is expressed differently across gender, with girls exhibiting higher levels of covert aggression and boys exhibiting higher levels of overt aggression (Hinshaw & Anderson, 1996). In fact, research has demonstrated that peers perceive girls and boys as equally aggressive when both relational and overt forms of aggression are considered (Crick & Grotpeter, 1995). Thus, using measures of aggression that define the construct primarily as it is expressed by males will underestimate the number of girls identified as aggressive (Ohan & Johnston, 2005). Following this line of thinking, it is possible that AD/HD is expressed differently across gender, and that some of the current items may not be as sensitive to how females express the disorder as they should be, thereby underestimating the number of girls identified as having AD/HD.

Ohan and Johnston (2005) point out that the DSM-IV symptoms for AD/HD tend to be achievement-oriented and task-oriented, which are values commonly perceived as traditionally masculine and emphasized more often in boys' play groups (Maccoby, 2002; Martin, 1995). These criteria include items such as, "often does not follow through on instruction" and "fails to finish homework" (APA, 1994). Very few items in the DSM-IV criteria for AD/HD are interpersonally-oriented, a value which is traditionally considered

to be female and more often emphasized in girls' playgroups (Maccoby, 2002; Martin, 1995).

In order to address these concerns, Ohan and Johnston (2005) asked mothers to indicated how gender-descriptive and problematic they viewed the DSM-IV symptoms of AD/HD. In addition, they created more gender-sensitive descriptions of the disorder that still represented the same underlying difficulties associated with AD/HD and asked mothers to indicate how gender-specific and problematic these gender-sensitive descriptions were. Some examples of gender-sensitive items include "giggles and/or talks excessively," "writes or passes notes instead of completing classwork," "blurts out things to others without thinking," "changes friends impulsively," "impulsively changes conversation topics," "whispers or talks to peers during classtime instead of paying attention to work," "doodles instead of completing classwork," and "forgetful in social activities, such as forgets/is late to meet friends." (Ohan & Johnston, 2005).

Overall, they found that mothers of children with and without AD/HD perceive the DSM-IV symptom criteria as descriptive of boys, with the exception of one symptom. The interpersonally-oriented DSM-IV AD/HD item, "talks excessively," was rated as being girl-descriptive. Moreover, the items they created to represent female manifestations of AD/HD were rated by mothers as more descriptive of girls as well (Ohan & Johnston, 2005).

Nonetheless, mothers' perceptions of these behaviors as being descriptive of one gender or another does not imply that actual gender differences exist. Their perceptions may merely be a product of their own gender stereotypes. Regardless, studying mothers'

perceptions of problem behavior is important, as mothers' ratings of their children's behavior are commonly used as a primary source of information in the diagnosis of AD/HD. Thus, mothers may rate the DSM-IV symptoms as not accurately describing their daughters' behaviors, even though their daughter may be experiencing the underlying deficits associated with AD/HD (Ohan & Johnston, 2005).

Additionally, Ohan and Johnston (2005) looked at the relationship between the gender-sensitive items they created and DSM-IV symptoms in girls. They found that relative to girls without AD/HD, mothers of girls with AD/HD rated their daughters as showing significantly greater levels of the gender-sensitive AD/HD items, providing preliminary support for the differential validity of these items. Furthermore, using the Child Behavior Checklist (CBCL) and Children's Impairment Rating Scale (CIRS) as indices of impairment, they found that the gender-sensitive items were related to psychopathology and impairment in girls with and without AD/HD. Moreover, after accounting for DSM-IV AD/HD symptoms, they found that higher levels of gender-sensitive items related to higher levels of total problems on the CBCL and impairment on the CIRS (Ohan & Johnston, 2005).

Assuming that these findings are valid, it points to another problem in the literature. Specifically, most of the current research examining gender differences in AD/HD utilizes samples of boys and girls already identified as having AD/HD based on established criteria. Thus, they first utilize DSM-IV items to assess for AD/HD in boys and girls, and then examine differences in how each gender expresses the symptoms. There is circularity in this reasoning. If it is true that gender-sensitive items provide

unique information regarding how girls exhibit the symptoms of AD/HD, then it is essential to first correctly identify girls who have AD/HD and are functionally impaired before comparing them to boys with the disorder. It is using circular reasoning to identify boys and girls with AD/HD using the same criteria, and then to look for differences in symptom expression.

### *Statement of Purpose and Hypotheses*

Limited research has been conducted in an effort to better understand the differential prevalence rates of AD/HD across gender. Although biological factors and social influences likely play a role in the development and expression of the disorder, biases that currently exist in the way the disorder is defined and assessed must first be addressed in order to help explain the differential prevalence rates of AD/HD across gender.

The current study aimed to build on previous research examining biases in the DSM-IV criteria used to assess and diagnose AD/HD. Specifically, the study aimed to build on the previous work conducted by Ohan and Johnston (2005), which assessed the appropriateness of the current diagnostic symptom criteria for females by examining if the gender-sensitive symptoms predicted functional impairment in girls better than the existing DSM-IV symptoms. However, the current study also aimed to avoid some of the methodological limitations of previous research. For example, Ohan and Johnston (2005) based their conclusions on parent report only. The current study utilized both parent and teacher report to determine the appropriateness of the gender-sensitive criteria for AD/HD. In addition, Ohan and Johnston (2005) averaged ratings across gender-sensitive

items in order to develop one overall rating score that was then used in analyses to determine the utility of gender-sensitive items as a whole in predicting impairment. The goal of this study was to expand on this idea in order to examine items individually to determine the unique predictive ability of each item. In addition, the aim of this study was to define impairment more broadly than previous research. Ohan and Johnston (2005), for example, used parent report only to generate only one rating of overall impairment. Similarly, Waschbusch and King (2006) summed scores across domains of impairment to yield one overall impairment score. This study examined impairment both globally and specifically across a number of domains, including academic, parent-child/family, and social functioning to determine if participants were impaired in two or more settings, as outlined in the current diagnostic criteria. Lastly, previous research did not take into account the fact that functional impairment in females with AD/HD may have been influenced by the presence of comorbid disorders (Eiraldi et al., 2006). In this study, the presence of comorbid disorders was assessed to ensure that observed impairment was the result of the presence of AD/HD symptoms and not solely due to the presence of comorbid conditions.

Keeping in mind these methodological issues, this study addressed the following questions in a community sample of school-aged girls: To what extent do the current DSM-IV items for AD/HD account for variance in impairment? Does the addition of gender-sensitive items for AD/HD add to the predictive ability of current DSM-IV items? Furthermore, would a combination of DSM-IV and gender-sensitive items explain more variance in impairment than the DSM-IV items alone?

Based upon consideration of theories mentioned earlier, the following hypotheses were made:

- *Some current DSM-IV items will account for significant variance in impairment in elementary school girls. In particular, DSM-IV items that would likely predict impairment include more relational items, such as "Talks Excessively" and "Interrupts Others."*

- *The addition of gender-sensitive items will account for additional variance in impairment above and beyond what DSM-IV items predict alone.*

- *A combination of some DSM-IV items and some gender-sensitive items will best predict impairment in elementary school girls.*

CHAPTER II

METHOD

*Participants*

Females between the ages of 6 and 11 were of interest in this study, though they did not directly participate. Parents and primary classroom teachers completed packets providing information about the girls. 137 participants were originally recruited from the community through distribution of flyers and through the AD/HD Clinic at UNCG and other health care specialists. Although the researcher attempted to contact and recruit all of the mothers of eligible girls, only 63 mothers completed questionnaire packets regarding their daughters' behaviors. The remainder of mothers did not participate for various reasons (could not be contacted, declined to participate, did not follow through with completing questionnaires). Of those 63, 45 of the girls' primary classroom teachers also completed and returned questionnaires regarding behavioral observations of the girls within the classroom setting. It was important to have both parent and teacher report since a clinical diagnosis of AD/HD requires the presence of symptoms across multiple settings, and clinicians typically rely on both parent and teacher report of a child's behavior to make a diagnosis.

Daughters' ages ranged from 6 years, 2 months to 11 years, 10 months, with a mean age of 8 years, 11 months. Efforts were made to recruit participants from diverse socio-economic backgrounds commensurate with that found in the surrounding community. However, the final sample of participants was not as representative of the

community as initially desired. Approximately 76% of all participants were Caucasian, 16% were African American, and 8% were from another ethnic background. About 11% of the parents reported annual family incomes below $15,000, while 21% reported incomes over $75,000. The remaining 68% reported incomes in categories between $15,000 and $75,000. Five percent of participants' mothers did not finish high school. Eleven percent reported high school equivalency or diploma as their highest education level. Thirty-eight percent attended some college. Thirty-five percent earned either an Associate's or Bachelor's degree, and the remaining 11% attended graduate school. Prior diagnosis of AD/HD was not required; however, whether or not each child was taking medication for behavioral difficulties was assessed. Approximately 32% were taking medication for behavior management; 68% were not. Of those taking medication, 65% were taking Adderall, 20% were taking Concerta, and 15% were taking Strattera. When it was determined that a child was taking medication for behavioral management, mothers were asked to rate their daughters' behavior off of medication.

***Measures***

Predictor Variables

*Attention-Deficit Hyperactivity Disorder Rating Scale – IV – Home and School Versions* (AD/HD RS; DuPaul, Anastopoulos, Power, & Reid, 1998). This 18-item scale includes nine inattention items and nine hyperactive-impulsive items that were adapted directly from the DSM-IV symptom lists and combined into one list with the individual items presented alternately from the inattention list and the hyperactive-impulsive list. The frequency of each symptom is rated on a four-point Likert scale ranging from

"Rarely or Never" (0) to "Very Often" (3), with higher scores reflecting higher levels of

AD/HD-related behavior. The ADHD RS has been found to be a useful instrument for

identification purposes in accordance with DSM-IV diagnostic criteria (DuPaul et al.,

1998; DuPaul, et al., 1997) and has excellent internal consistency (alpha coefficient =

.88-.92), test-retest reliability ranging from .78-.86, and adequate validity (DePaul et al.,

1998). The parent version of this measure was completed by each participant's mother,

and the teacher version was completed by 46 of the 63 girls' primary classroom teachers.

All 18 items from this scale were used to assess DSM-IV symptomatology in girls.

*Gender-sensitive AD/HD items* (Ohan & Johnston, 2005). Ohan and Johnston

developed 8 gender-sensitive items that they found to be more indicative of impairment

in females than DSM-IV items (See Table 1 for list of gender-sensitive items). They

found that the newly proposed gender-sensitive items were significantly correlated with

the DSM-IV items for AD/HD, but mothers rated these new items as more descriptive of

how girls express the symptoms of AD/HD. These items were organized into a format

modeled after the ADHD RS, in which parents and teachers rated the frequency of each

symptom on a four-point Likert scale ranging from "Rarely or Never" (0) to "Very

Often" (3), with higher scores reflecting higher levels of AD/HD-related behavior. See

Appendices D and E.

*Behavior Assessment System for Children – Second Edition, Parent and Teacher*

*Versions* (BASC-2; Reynolds & Kamphaus, 1992). The BASC-2 is a psychometrically

sound, broad band rating scale that assesses children ages 4-18 for emotional disorders,

personality constructs, and behavioral problems. Parent and teacher forms were

administered to assess each participant's general level of functioning across a number of

domains. Questionnaires were scored using gender-based norms. T-scores from the

Aggression and Internalizing subscales were used to assess for the presence of comorbid

disorders.

Outcome Variables

Consistent with prior studies, a measure of each participant's global impairment

was assessed. In addition, each participant's level of impairment within specific domains

was also examined.

*Children's Impairment Rating Scale – Parent and Teacher Version* (CIRS;

Fabiano et al., 2006). The CIRS measures impairment in developmentally important

areas. It contains six items that reflect areas central to children's functioning. Each item is

rated from "0" ("no problem, definitely does not need treatment") to 6 ("extreme

problem, definitely needs treatment or special services"). The CIRS has good interrater

reliability with coefficients ranging from .64 to .79 and concurrent and discriminant

validity with coefficients ranging from .58 to .85. Each child's mother completed a CIRS,

indicating how impaired the child is across a number of domains, as well as giving an

overall level of impairment. Similar to previous studies, the overall impairment score was

used as a global index of impairment in girls

*Academic Progress Questionnaire*. As a measure of each participant's academic

functioning, each participant's mother completed a brief questionnaire inquiring about

that child's academic history. Questions assessed whether a child has been held back a

year in school, received services/accommodations at school, failed a course at school, or

has ever been suspended or expelled from school. If any of the above-mentioned four items were positively endorsed by a participant's mother, the child was considered impaired in the academic domain. See Appendix C.

*Behavior Assessment System for Children – Second Edition, Parent and Teacher Versions* (BASC-2; Reynolds & Kamphaus, 1992). T-score from the Learning Problems subscale of the BASC-2 Teacher Version was used to assess each participant's academic functioning. T-score from the Social Skills (SS) subscales from the BASC-2 Parent and Teacher Versions were used to assess each participant's social functioning.

*Family Assessment Device* (FAD; Epstein, Baldwin, & Bishop, 1983). The FAD is a 60-item assessment measure based on the McMaster Model of Family Functioning. The FAD yields a General Functioning (GF) score in addition to six subscale scores: Problem Solving, Communication, Roles, Behavioral Control, Affective Responsiveness, and Affective Involvement. The FAD has good internal consistency (Epstein et al., 1983) and test-retest reliability (Miller, Epstein, Bishop, & Keitner, 1985). Mothers of participants completed the FAD, and the GF score was used as an index of impairment within the family domain, with higher scores indicative of greater impairment.

*Parenting Stress Index – Short Form* (PSI-SF; Abidin, 1995). The PSI-SF, a 36-item self-report measure, assesses stress specific to the parenting role. Items are rated on a 5-point scale. The PSI-SF contains three stress domains: parental distress, parent-child dysfunctional interaction, and difficult child. A subscale score is generated for each domain, as well as a Total Stress Score, with higher scores indicative of higher levels of parenting stress. This measure has excellent reliability and validity with coefficients

exceeding .80 (Abidin, 1995). The PSI-SF was completed by participants' mothers, and the total stress score was used as an index of stress in the parent-child relationship.

*Procedure*

This study was comprised primarily of a nonreferred sample of participants, who were recruited into the project through siblings and friends of children referred to the AD/HD Clinic at UNCG and from the community through flyers. Efforts were made to get a broad distribution of DSM-IV AD/HD symptom counts. See Figures 1 through 4 for graphs of symptom count distributions. In an effort to obtain participants on the more severely impaired end of the spectrum, some were recruited from the AD/HD Clinic at UNCG. The high percentage of participants taking medication (approximately 32%) is likely due to recruitment source.

Participants recruited from the community were required to sign consent forms (see Appendix F) prior to participation in the study. Participants' mothers were then either mailed or given packets of material to complete that included the ADHD RS – Parent Version, rating scale with gender-sensitive items, BASC-2, PSI-SF, FAD, academic progress questionnaire, and CIRS-Parent Form. In addition, mothers were asked to complete a brief demographic questionnaire (see Appendix B). Participants' primary classroom teachers were also either mailed or given packets to complete that included ADHD RS – Teacher Version, rating scale with female-sensitive items, BASC-2, and CIRS-Teacher Form. Participants recruited through the AD/HD Clinic may have already completed the ADHD Rating Scale, BASC-2, and PSI-SF as part of their clinic evaluation. In this case, mothers were asked to sign authorizations to release protected

health information (PHI), which authorized the release of this information from the

child's clinic record to the research study (see Appendix G). Following the release of this

information, mothers also signed study consent forms, and the remainder of assessments

in the parent and teacher packets were completed as outlined above.

CHAPTER III

RESULTS

For the purpose of this study, impairment was defined two ways. First, impairment was defined globally using parent-completed and teacher-completed CIRS overall impairment scores. Second, impairment was defined more specifically by examining a participant's impairment in various domains of functioning and deriving an overall impairment score based on certain established criteria. Following the guidelines set by the DSM-IV, which specify that in order to receive a diagnosis of AD/HD impairment in functioning must be evident in two or more settings, a participant was considered impaired if she experienced impairment in two or more of the identified domains: academic, parent-child/family, and social functioning (See Figure 5). Impairment within the specific domains was defined as greater than one standard deviation in the direction of impairment from the population mean score. Specifically, within the academic domain, a T-score > 60 on the Learning Problems subscale of the teacher-completed BASC-2 or the endorsement of any of the academic progress questions (i.e., my child has been retained, received special services/accommodations) indicated impairment within the academic domain. In terms of parent-child and family functioning, a Total Stress Score > 90 on the PSI-SF or a General Functioning score on the FAD $\geq$ 2.00 indicated impairment in this domain. Lastly, a T-score < 40 on the parent-completed BASC-2 Social Skills subscale or a T-score < 40 on the teacher-completed BASC-2 Social Skills subscale indicated impairment within the social domain.

Frequencies of individuals impaired according to previously established criteria are presented in Table 2.

### *Preliminary Analyses*

An examination of descriptive statistics and histograms of the main variables revealed that two variables (one parent-completed gender-sensitive item and one teacher-competed DSM-IV item) were positively skewed and had high kurtosis values. It was determined that skewness and kurtosis values of 1.5 or greater represented problematic departure from normality that violated the assumption of the parametric tests used for analyses (see Lomax, 2001). Both variables with high skewness and kurtosis variables were transformed with a square root transformation. In both cases, skewness and kurtosis were reduced to below 1.5. The transformed scores for these variables were used in all subsequent analyses.

### *Correlational Analyses*

To determine the relationship between predictor variables and outcome variables, correlation analyses were conducted. Correlations between parent-completed predictor variables and outcome variables are presented in Tables 3 through 5. Correlations between parent-completed predictor variables and parent CIRS overall impairment scores ranged from .339 (gender-sensitive item – "Passes Notes") to .705 (DSM-IV item "Interrupts Others"). Correlations between parent-completed predictor variables and specific impairment defined as being impaired in two or more domains of functioning ranged from .172 (DSM-IV item – "Difficulty Organizing") to .465 (DSM-IV item – "Difficulty Waiting Turn"). Correlations between teacher-completed predictor variables

and outcome variables are presented in Tables 6 through 8. Correlations between teacher-completed predictor variables and teacher CIRS overall impairment scores ranged from .184 (gender-sensitive item – "Passes Notes") to .777 (DSM-IV item – "Easily Distracted"). Correlations between teacher-completed predictor variables and specific impairment defined as being impaired in two or more domains of functioning ranged from .021 (DSM-IV item – "Makes Careless Mistakes") to .419 (DSM-IV item – "Easily Distracted"). Correlations among predictor variables were also examined in order to assess for significant multicollinearity, defined as correlations among predictor variables of .75 or higher. Though most predictor variables were positively correlated, these correlations were only moderate (.50 or lower) in nature. In addition, correlations between demographic variables (i.e., age of participants, race, education level of mothers, and income level of family) and outcome variables were conducted, and all correlations were non-significant.

### *Predicting Overall Impairment Based on Parent Data*

*Predictors of Overall Impairment on CIRS*

The first set of analyses predicted global impairment in girls, as defined by the overall impairment score on the parent-completed CIRS, through a series of regressions. First, a stepwise multiple linear regression was conducted to determine the most powerful parent-completed DSM-IV AD/HD items to retain in the main analysis to prevent entering too many variables, which could lead to low power and chance findings. It was found that the DSM-IV AD/HD items, "Interrupts Others," "Difficulty Organizing Tasks," "Fidgets," and "Forgetful in Daily Activities," were significant predictors of

global impairment based on parent-completed CIRS overall impairment scores, $F(4,58)=$ 35.325, p<.001, Adjusted $R^2=.69$. Table 9 presents the coefficients of this regression. Second, a stepwise multiple linear regression was conducted with parent-completed gender-sensitive AD/HD items in addition to predictive DSM-IV items from the first analyses in order to determine if the gender-sensitive items accounted for additional variance in impairment. It was found that the identified DSM-IV items retained their predictive ability in this second analysis. In addition, the gender-sensitive item, "Forgetful in Social Activities," was a significant predictor of global impairment based on parent-completed CIRS overall impairment scores above and beyond the variance that was accounted for by the DSM-IV items $F(5,57)= 37.69$, p<.001, Adjusted $R^2=.75$. Table 10 presents the coefficients of this regression.

In a final analysis, a stepwise hierarchical multiple linear regression was conducted in order to ascertain whether or not the addition of comorbid predictors accounted for additional variance above and beyond what was accounted for by the DSM-IV and gender-sensitive items. The regression was conducted using the gender-sensitive item found to be a significant predictor ("Forgetful in Social Activities") in block 1, DSM-IV AD/HD items found to be significant predictors ("Interrupts Others," "Difficulty Organizing Tasks," "Fidgets," and "Forgetful in Daily Activities") in block 2, and comorbid predictors (Aggression subscale and Internalizing composite t-scores from parent-completed BASC-2) in block 3 predicting overall impairment scores on parent-completed CIRS. It was found that one gender sensitive item ("Forgetful in Social Activities") and all four DSM-IV items ("Interrupts Others," "Difficulty Organizing

Tasks," "Fidgets," and "Forgetful in Daily Activities") were significant predictors of global impairment scores on parent-completed data. Comorbid predictors were not significant predictors of variance in final analyses. Table 11 represents the coefficients of this regression.

*Predictors of Overall Impairment in ≥ 2 Domains of Functioning*

The second set of analyses predicted impairment in girls more specifically (defined categorically by functional impairment in two or more domains) through a series of logistic regressions. Unlike previous linear regressions, which identified predictor variables that contributed significantly to variance in impairment, logistic regressions can only identify items that contribute to the overall model of impairment, such that the endorsement of a particular item increases the likelihood of impairment by a given amount. In the first analysis, a forward logistic regression was conducted to predict overall impairment in two or more domains of functioning using parent-completed DSM-IV AD/HD items as predictors. It was found that the DSM-IV item, "Difficulty Waiting Turn," contributed significantly to the model. Thus, for one unit change in the variable "Difficulty Waiting Turn," the relative risk of girls being impaired over girls not impaired would increase by a factor of 2.56. Results are presented in Table 12. Second, a forward logistic regression was conducted with parent-completed gender-sensitive AD/HD items in addition to predictive DSM-IV items from the first analysis in order to determine if the gender-sensitive items also contributed significantly to impairment. It was found that the DSM-IV item retained its predictive ability and contributed significantly to the model, such that for one unit change in the variable, "Difficulty Waiting Turn," the relative risk

of girls being impaired over girls not impaired would increase by a factor of 1.95. In addition, the gender-sensitive item, "Changes Friends Impulsively," also contributed significantly to the model, such that for one unit change in the variable "Changes Friends Impulsively," the relative risk of girls being impaired over girls not impaired would increase by a factor of 2.16. Results are presented in Table 13.

In a third analysis, a final forward logistic regression was conducted in order to ascertain whether or not comorbid predictors also contributed significantly to the model predicting impairment in two or more domains of functioning. The significant gender-sensitive item ("Changes Friends Impulsively"), DSM-IV item ("Difficulty Waiting Turn"), and Aggression subscale and Internalizing composite scores from parent-completed BASC-2 were entered into this forward logistic regression. It was found that the DSM-IV item, "Difficulty Waiting Turn," was a significant predictor in the final model, indicating that for one unit change in the variable, the relative risk of girls being impaired over girls not impaired would increase by a factor of 1.95. In addition, the gender-sensitive item, "Changes Friends Impulsively," also contributed significantly to the model, such that for one unit change in the variable, "Changes Friends Impulsively," the relative risk of girls being impaired over girls not impaired would increase by a factor of 2.16. Comorbid predictors did not contribute significantly to the model. Results are presented in Table 14.

### *Predicting Overall Impairment Based on Teacher Data*

*Predictors of Overall Impairment on CIRS*

The first set of analyses predicted global impairment in girls, as defined by the overall impairment score on the teacher-completed CIRS, through a series of regressions. First, a stepwise multiple linear regression was conducted to determine the most powerful teacher-completed DSM-IV AD/HD items to retain in the main analysis to prevent entering too many variables, which could lead to low power and chance findings. It was found that the DSM-IV AD/HD items, "Easily Distracted" and "Does Not Listen" were significant predictors of global impairment based on teacher-completed CIRS overall impairment scores, $F(2,42)= 40.203$, $p<.001$, Adjusted $R^2=.64$. Table 15 presents the coefficients of this regression. Second, a stepwise multiple linear regression was conducted with parent-completed gender-sensitive AD/HD items in addition to predictive DSM-IV items from the first analysis in order to determine if the addition of gender-sensitive items accounted for additional variance in impairment. It was found that the identified DSM-IV items retained their predictive ability in this second analysis with no gender-sensitive items accounting for additional variance in impairment. Table 16 presents the coefficients of this regression.

In a final analysis, a stepwise hierarchical multiple linear regression was conducted in order to ascertain whether or not the addition of comorbid predictors accounted for additional variance above and beyond the predictive DSM-IV items. The regression was conducted using DSM-IV items found to be significant predictors ("Easily distracted" and "Does Not Listen") in block 1 and comorbid predictors (Aggression

subscale and Internalizing composite from teacher-completed BASC-2) and medication status in block 3 predicting overall impairment scores on parent-completed CIRS. It was found that two DSM-IV items, ("Easily Distracted" and "Does Not Listen"), and the Internalizing composite of the teacher-completed BASC-2 were significant predictors of global impairment scores on teacher-completed CIRS. Together, these items accounted for 67% of the total variance. Table 17 represents the coefficients of this regression.

*Predictors of Overall Impairment in ≥ 2 Domains of Functioning*

The second set of analyses predicted impairment in girls more specifically (defined categorically by functional impairment in two or more domains) through a series of logistic regressions. First, a forward logistic regression was conducted to predict overall impairment in two or more domains of functioning using teacher-completed DSM-IV AD/HD items as predictors. It was found that the DSM-IV items, "Makes Careless Mistakes" and "Easily Distracted," contribute significantly to the model. Thus, for one unit change in the variable "Makes Careless Mistakes," the relative risk of girls being impaired over girls not impaired would increase by a factor of .25. In addition, for one unit change in the variable "Easily Distracted," the relative risk of girls being impaired over girls not impaired would increase by a factor of 5.64. Results are presented in Table 18. Second, a forward logistic regression was conducted with teacher-completed gender-sensitive AD/HD items in addition to predictive DSM-IV items from fist analyses in order to determine if any of the gender-sensitive items also contributed significantly to impairment. It was found that the DSM-IV items ("Makes Careless Mistakes" and

"Easily Distracted") still contributed to the overall model of impairment; however, gender-sensitive items did not. Results are presented in Table 19.

In a third analysis, a final forward logistic regression was conducted in order to ascertain whether or not comorbid predictors contributed significantly to impairment in this model. Significant DSM-IV items ("Makes Mistakes" and "Easily Distracted"), and comorbid predictors and medication status were entered into this final forward logistic regression. It was found that both DSM-IV items and Medication Status were significant predictors in the final model. Specifically, for one unit change in the DSM-IV item "Makes Mistakes", the relative risk of girls being impaired over girls not impaired would increase by a factor of .22. For one unit change in the DSM-IV item, "Easily Distracted", the relative risk of girls being impaired over girls not impaired would increase by a factor of 6.63. Finally, for one unit change in Medication Status, the relative risk of girls being impaired over girls not impaired would increase by a factor of .11. Results are presented in Table 20. Also, see Table 21 for overview of which items were predictive in various analyses.

### *Analyses for Predicting Impairment within Various Domains of Functioning*

In addition to examining overall impairment, analyses were conducted to determine which items were most predictive of impairment within the specific domains of functioning.

*Predicting Impairment within the Academic Domain Based on Parent Data*

First, a forward logistic regression was conducted to predict academic impairment using parent-completed DSM-IV AD/HD items as predictors. It was found that the DSM-

IV items, "Makes Careless Mistakes" and "Blurts Out Things Without Thinking"

contribute significantly to the model. Thus, for one unit change in the variable "Makes

Careless Mistakes," the relative risk of girls being impaired over girls not impaired would

increase by a factor of 3.14. In addition, for one unit change in the variable "Blurts Out

Things," the relative risk of girls being impaired over girls not impaired would increase

by a factor of 2.32. Results are presented in Table 22. Second, a forward logistic

regression was conducted with parent-completed gender-sensitive AD/HD items in

addition to predictive DSM-IV items from first analyses in order to determine if any of

the gender-sensitive items also contributed significantly to impairment. It was found that

the DSM-IV items ("Makes Careless Mistakes" and "Easily Distracted") still contributed

to the overall model of impairment. In addition, two gender-sensitive items ("Giggles"

and "Impulsively Changes Conversations") also contributed to the model. Results are

presented in Table 23.

In a third analysis, a final forward logistic regression was conducted in order to

ascertain whether or not comorbid predictors contributed significantly to impairment in

this model. Significant DSM-IV items ("Makes Mistakes" and "Blurts Out Things"),

significant gender-sensitive items ("Giggles" and "Impulsively Changes Conversations")

and comorbid predictors were entered into this final forward logistic regression. It was

found that both DSM-IV items and both gender-sensitive items were significant

predictors in the final model. Specifically, for one unit change in the DSM-IV item

"Makes Mistakes", the relative risk of girls being impaired over girls not impaired would

increase by a factor of 4.38. For one unit change in the DSM-IV item, "Blurts Out

Things", the relative risk of girls being impaired over girls not impaired would increase by a factor of 4.85. For one unit change in the gender-sensitive item, "Giggles", the relative risk of girls being impaired over girls not impaired would increase by a factor of .18. Finally, for one unit change in the gender-sensitive item, "Impulsively Changes Conversations," the relative risk of girls being impaired over girls not impaired would increase by a factor of 2.56. Results are presented in Table 24.

*Predicting Impairment within the Academic Domain Based on Teacher Data*

First, a forward logistic regression was conducted to predict academic impairment using teacher-completed DSM-IV AD/HD items as predictors. It was found that the DSM-IV item, "Difficulty Playing Quietly" contributed significantly to the model. Thus, for one unit change in this variable, the relative risk of girls being impaired over girls not impaired would increase by a factor of 1.05. Results are presented in Table 25. Second, a forward logistic regression was conducted with parent-completed gender-sensitive AD/HD items in addition to predictive DSM-IV items from first analyses in order to determine if any of the gender-sensitive items also contributed significantly to impairment. It was found that the DSM-IV item ("Difficulty Playing Quietly") still contributed to the overall model of impairment; however, no gender-sensitive items significantly contributed to the model. Results are presented in Table 26.

In a third analysis, a final forward logistic regression was conducted in order to ascertain whether or not comorbid predictors contributed significantly to impairment in this model. The significant DSM-IV item ("Difficulty Playing Quietly"), comorbid predictors, and medication status were entered into this final forward logistic regression.

It was found that both the DSM-IV item and medication status were significant predictors in the final model. Specifically, for one unit change in the DSM-IV item "Difficulty Playing Quietly", the relative risk of girls being impaired over girls not impaired would increase by a factor of 3.04. For one unit change in medication status, the relative risk of girls being impaired over girls not impaired would increase by a factor of .100. Results are presented in Table 27.

*Predicting Impairment within the Family Domain Based on Parent Data*

Only parent data was used to predict impairment within the family domain because teachers do not likely have knowledge of parent-child/family functioning at home. Moreover, both measures of impairment within this domain were completed by mothers. First, a forward logistic regression was conducted to predict family impairment using parent-completed DSM-IV AD/HD items as predictors. It was found that the DSM-IV item, "Difficulty Playing Quietly" contributed significantly to the model. Thus, for one unit change in the variable "Difficulty Playing Quietly," the relative risk of girls being impaired over girls not impaired would increase by a factor of 3.55. Results are presented in Table 28. Second, a forward logistic regression was conducted with parent-completed gender-sensitive AD/HD items in addition to the predictive DSM-IV item from first analysis in order to determine if any of the gender-sensitive items also contributed significantly to impairment. It was found that the DSM-IV items ("Difficulty Playing Quietly") still contributed to the overall model of impairment; however, no gender-sensitive items significantly contributed to the model. Results are presented in Table 29.

In a third analysis, a final forward logistic regression was conducted in order to ascertain whether or not comorbid predictors contributed significantly to impairment in this model. The significant DSM-IV item ("Difficulty Playing Quietly") and comorbid predictors were entered into this final forward logistic regression. It was found that both the DSM-IV item and one comorbid predictor significantly contributed to impairment in the final model. Specifically, for one unit change in the DSM-IV item "Difficulty Playing Quietly", the relative risk of girls being impaired over girls not impaired would increase by a factor of 2.32. For one unit change in the comorbid predictor, Parent BASC-2 Internalizing composite score, the relative risk of girls being impaired over girls not impaired would increase by a factor of 1.06. Results are presented in Table 30.

*Predicting Impairment within the Social Domain Based on Parent Data*

First, a forward logistic regression was conducted to predict family impairment using parent-completed DSM-IV AD/HD items as predictors. It was found that the DSM-IV item, "Fidgets" contributed significantly to the model. Thus, for one unit change in the variable "Fidgets," the relative risk of girls being impaired over girls not impaired would increase by a factor of 2.32. Results are presented in Table 31. Second, a forward logistic regression was conducted with parent-completed gender-sensitive AD/HD items in addition to the predictive DSM-IV item from first analysis in order to determine if any of the gender-sensitive items also contributed significantly to impairment. It was found that the DSM-IV item ("Fidgets") still contributed to the overall model of impairment. In addition, the gender-sensitive items, "Forgetful in Social Activities" and "Impulsively Changes Friends," also significantly contributed to the model. Specifically, for one unit

change in the variable, "Forgetful in Social Activities," the relative risk of girls being impaired over girls not impaired would increase by a factor of .40. Lastly, for one unit change in the variable, "Impulsively Changes Friends," the relative risk of girls being impaired over girls not impaired would increase by a factor of 3.47. Results are presented in Table 32.

In a third analysis, a final forward logistic regression was conducted in order to ascertain whether or not comorbid predictors contributed significantly to impairment in this model. The significant DSM-IV item ("Fidgets"), significant gender-sensitive items ("Forgetful in Social Activities" and "Impulsively Changes Friends"), and comorbid predictors were entered into this final forward logistic regression. It was found that the DSM-IV item and both gender-sensitive items all significantly contributed to impairment in the final model. No comorbid predictors significantly contributed to impairment in the final model. Results are presented in Table 33.

*Predicting Impairment within the Social Domain Based on Teacher Data*

First, a forward logistic regression was conducted to predict family impairment using teacher-completed DSM-IV AD/HD items as predictors. It was found that the no DSM-IV items contributed significantly to the model. Results are presented in Table 34. Second, a forward logistic regression was conducted with teacher-completed gender-sensitive AD/HD items in order to determine if any of the gender-sensitive items contributed significantly to impairment. It was found that no gender-sensitive items significantly contributed to the impairment in this model. Results are presented in Table 35.

In a third analysis, a final forward logistic regression was conducted in order to ascertain whether or not comorbid predictors contributed significantly to impairment in this model. Comorbid predictors and medication status were entered into this final forward logistic regression. It was found that only one comorbid predictor contributed significantly to impairment in the final model. Specifically, for one unit change in the comorbid predictor, teacher-completed BASC-2 Aggression, the relative risk of girls being impaired over girls not impaired would increase by a factor of 1.05. Results are presented in Table 36. See Table 37 for overview of items found to be predictive of specific domains of impairment.

CHAPTER IV

DISCUSSION

Psychological disorders of childhood are much more commonly diagnosed in boys than in girls. Attention-Deficit/Hyperactivity Disorder (AD/HD) is no exception, with male-to-female ratios ranging from 2:1 to 9:1, depending on the sample (APA, 1994). Among the childhood psychological disorders, AD/HD has received copious research attention. However, limited research has been conducted in an effort to better understand the differential prevalence rates of AD/HD across gender. Moreover, the research that has been conducted may be biased by the fact that it primarily relied on samples of boys and girls who had already been diagnosed with AD/HD based on the established symptom criteria, which, as this paper points out, may not fully capture how females express the disorder. Thus, it remains unclear whether these differential prevalence rates are due to actual differences in psychopathology between males and females or if they are merely the result of biases in ascertainment, definition, or assessment of the disorder that result in an over-identification of boys with AD/HD, an under-identification of girls with the disorder, or both. A potential under-identification of females with the disorder would be costly, as AD/HD-related psychiatric problems and functional impairments extend into adolescence and perhaps even worsen over time (Hinshaw, 2006; Hinshaw, 2007; Lahey, 2007). Thus, early identification of the disorder is imperative and likely to lead to early intervention, which can then alter the trajectory of the disorder.

This study aimed to further examine the existing debate in the literature regarding gender differences in symptom expression of AD/HD. Although genetic factors and sociocultural influences have been implicated, this study focused on biases in the way in which the disorder is assessed, with an emphasis on how AD/HD is diagnosed in girls. Specifically, this study examined the utility and appropriateness of the current DSM-IV symptom descriptions for girls. Recent literature has suggested that perhaps the current content of the DSM-IV symptom criteria for AD/HD is simply not indicative of how the disorder is manifested in females, and perhaps more gender-sensitive symptom items could better capture how girls express the symptoms of hyperactivity-impulsivity and inattention (Ohan & Johnston, 2005). Thus, this study put that theory to the test by evaluating the ability of the current DSM-IV symptoms and the newly proposed gender-sensitive items to predict impairment in an elementary school age population of girls.

### *Analysis of Findings*

The following questions were addressed in this study: To what extent do the current DSM-IV symptoms for AD/HD account for variance in impairment in elementary school girls? Does the addition of gender-sensitive items for AD/HD add to the predictive ability of the current DSM-IV items? Furthermore, would a combination of DSM-IV and gender-sensitive items explain more variance in impairment than the DSM-IV items alone? It was hypothesized that some current DSM-IV items would account for significant variance in impairment in elementary school girls. In particular, DSM-IV items that are more relational in nature (i.e., "Talks Excessively" and "Interrupts Others") will likely be more indicative of impairment. It was also hypothesized that the addition of

gender-sensitive items would account for additional variance in impairment above and beyond what was accounted for by DSM-IV items alone. Lastly, it was hypothesized that a combination of some DSM-IV items and some gender-sensitive items would best predict impairment in elementary school girls. Additionally, on an exploratory basis, comorbid predictors were examined in order to determine their contribution to impairment.

*Analyses Predicting Overall Impairment from Parent Data*

Similar to previous studies, this study examined global impairment defined as the CIRS overall impairment score. However, this study also examined impairment more specifically by identifying girls who are impaired in various domains of functioning, including academic, parent-child/family, and social domains. According to DSM-IV guidelines, in order to receive a diagnosis of AD/HD, children must be impaired in two or more settings. Thus, following these guidelines, those girls who were impaired in two or more domains were then identified as being impaired overall. This study also examined the contribution of comorbid predictors to variance in impairment.

For parent-completed data, using a global measure of impairment, four DSM-IV items and one gender-sensitive item emerged as significant predictors of impairment in overall functioning in preliminary analyses. In the final analysis, all five variables, including one gender-sensitive item ("Forgetful in Social Activities") and four DSM-IV items ("Interrupts Others," "Fidgets," "Forgetful in Daily Activities," and "Difficulty Organizing Tasks") emerged as significant predictors, accounting for 75% of the variance together. Comorbid predictors were not significant and did not account for additional

variance in impairment above and beyond what was accounted for by the DSM-IV and gender-sensitive items. These findings are consistent with all hypotheses. Some DSM-IV items significantly contributed to variance in impairment, including one of the more relational items. Moreover, the gender-sensitive item, "Forgetful in Social Activities," accounted for additional variance in impairment above and beyond what was initially accounted for by DSM-IV items alone. Ultimately, a combination of DSM-IV and gender-sensitive items best predicted impairment. Lastly, as predicted, comorbid predictors did not account for additional variance in impairment.

For parent-completed data examining impairment defined more specifically (i.e., impaired in 2 or more settings), one DSM-IV item and one gender-sensitive item emerged as significantly contributing to overall impairment in preliminary analyses. In the final analysis, these variables, including the DSM-IV item ("Difficulty Waiting Turn") and the gender-sensitive item ("Changes Friends Impulsively") emerged as significantly contributing to the model. Comorbid predictors did not contribute significantly to impairment in this model. For logistic regressions, it can not be said that predictors accounted for variance in impairment. It can only be said that significant predictors contributed to the model, such that a one unit increase in a significant predictor variable increases the likelihood of girls being impaired by a given amount. In this case, the endorsement of the identified DSM-IV item and gender-sensitive item increased the likelihood that a girl was defined as impaired in two or more settings, which is generally consistent with stated hypotheses. In addition, consistent with predictions, comorbid variables did not contribute significantly to overall impairment in this model.

*Analyses Predicting Overall Impairment from Teacher Data*

Using a global measure of impairment, two DSM-IV items were significant predictors of impairment in preliminary analyses. In the final analysis, however, the two DSM-IV items ("Easily Distracted" and "Does Not Listen) retained their predictive ability and one comorbid predictor (Teacher-completed BASC-2 Internalizing Problems composite) also emerged as contributing significantly to variance in impairment. Together, these variables accounted for 67% of the variance in impairment. Contrary to hypotheses, only DSM-IV items emerged as significant predictors of impairment, and the items were not relational in nature. Gender-sensitive items did not account for additional variance in impairment above and beyond what was accounted for by DSM-IV items. In addition, one comorbid predictor accounted for significant variance in impairment in this model.

An examination of impairment defined more specifically yielded findings that two DSM-IV items emerged as significant contributors to the overall model in analyses of parent-completed data. In the final analysis, however, these two DSM-IV items ("Makes Mistakes" and "Easily Distracted") and participant's medication status significantly contributed to the model. Contrary to predictions, gender-sensitive items did not contribute significantly to impairment in this model. However, consistent with predictions, comorbid predictors did not contribute significantly to this model. It should also be noted that although the DSM-IV item, "Makes Mistakes," contributed significantly to impairment in this model, earlier analyses revealed a non-significant correlation between this predictor and overall impairment. In order for a predictor

variable to be considered significant, both the correlation and the parameter estimate should be significant. Thus, the DSM-IV item, "Makes Mistakes," was not ultimately considered to be a significant predictor of impairment in this model.

*Analyses Predicting Specific Domains of Impairment Based on Parent Data*

In general, a combination of DSM-IV items and gender-sensitive items were predictive of impairment within the various domains based on parent-completed data. Specifically, for the academic domain, the DSM-IV items ("Makes Careless Mistakes" and "Blurts Out Things"), as well as the gender-sensitive items ("Giggles" and "Impulsively Changes Friends") were indicative of impairment. Similarly, for the social domain, one DSM-IV item ("Fidgets") and two gender-sensitive items ("Forgetful in Social Activities" and "Impulsively Changes Friends") were predictive of impairment within the social domain. However, within the family domain, only one DSM-IV item ("Difficulty Playing Quietly") and one comorbid predictor (Parent-completed BASC Internalizing Problems) were indicative of impairment within the family domain.

*Analyses Predicting Specific Domains of Impairment Based on Teacher Data*

Teacher-completed data was only used to predict girls' functioning within the academic and social domains, as both measures of impairment within the family domain were completed by mothers, and teachers do not likely have sufficient knowledge regarding a child's functioning within the family domain. Thus, within the academic domain, one DSM-IV item ("Difficulty Playing Quietly") and medication status emerged as predictors of impairment. Within the social domain, only one comorbid predictor

(Teacher-completed BASC-2 Aggression) emerged as a significant predictor of impairment.

### *Interpretation of Findings*

The results of this study lend some support for the utility of gender-sensitive items as predictors of overall impairment. Similar to the findings of Ohan and Johnston (2005), the DSM-IV and gender-sensitive items were significantly correlated. In addition, when examining parent-completed data, the DSM-IV items did not adequately predict impairment on their own. The more relational gender-sensitive symptoms of inattention (i.e., "Forgetful in Social Activities") and hyperactivity-impulsivity ("Changes Friends Impulsively") also contributed significantly to models predicting overall impairment in girls. However, in secondary analyses looking at teacher data, only DSM-IV items contributed significantly to impairment defined globally and specifically.

The specific gender-sensitive items that were found to be predictive of global impairment in parent-completed data varied depending on how impairment was defined, making it difficult to make assumptions about the overall utility of the items. The inattention item ("Forgetful in Social Activities") was a significant predictor of global impairment, whereas the hyperactive-impulsive item ("Changes Friends Impulsively") contributed significantly to the model predicting impairment more specifically in two or more domains of functioning. Though the specific items that emerged as significant predictors in the analyses using parent data were different, the common thread in the items seems to be that they represent a more interpersonally-oriented and typically feminine expression of the underlying symptoms of AD/HD.

In addition, the results of this study also support the fact that some DSM-IV items do significantly predict impairment in girls. An examination of DSM-IV items found to contribute significantly to impairment defined both globally and more specifically revealed differences in informant. All DSM-IV items that significantly contributed to impairment (both globally and specifically) in teacher-completed data were inattention items, whereas for parent-completed data, a combination of inattention and hyperactive-impulsive items contributed to impairment. Specifically, for parent-completed data, three hyperactive-impulsive DSM-IV items ("Interrupts Others," "Fidgets," and "Difficulty Waiting Turn") and two inattention items ("Difficulty Organizing Tasks" and "Forgetful in Daily Activities") significantly contributed to impairment, whereas for teacher-completed data, three inattention items ("Easily Distracted," "Does Not Listen," and "Makes Careless Mistakes") significantly contributed to impairment. However, due to its non-significant correlation with impairment, the DSM-IV item, "Makes Careless Mistakes," was not ultimately considered a significant predictor of impairment. It is also noteworthy here that the DSM-IV item, "Easily Distracted," emerged as a significant predictor of both global and specific impairment based on teacher-completed data. In addition, DSM-IV items that emerged as significant predictors in teacher-completed data were generally task-oriented, which may have to do with the nature of the classroom setting, in which completion of tasks is essential to success in school. Thus, it follows that expression of these symptoms would map onto impairment as defined by teachers.

In general, comorbid predictor variables did not account for significant variance in global impairment or contribute to impairment defined more specifically, with one

exception. For teacher-completed data, the BASC-2 Internalizing composite subscale score emerged as a significant predictor of global impairment in the final model, accounting for a small, but significant portion of variance. In addition, medication status was also found to contribute significantly to the model predicting impairment in girls in two or more domains of functioning based on teacher data. No comorbid predictors were found to contribute significantly to global or specific impairment in parent-completed data.

### *Integration of Findings*

The results of this study add to the existing literature in a number of ways. First, the current study utilized both parent and teacher report to determine the appropriateness and predictive ability of the newly proposed gender-sensitive symptom items for AD/HD instead of relying on parent report only, as had been done in previous studies (i.e., Ohan & Johnston, 2005). In addition, this study examined gender-sensitive items individually to determine the unique predictive ability of each item. Prior research (Ohan and Johnston, 2005) averaged ratings across gender-sensitive items to develop one overall rating score, and then simply used that score in analyses to determine the utility of the items as a whole in predicting impairment. The current study also built upon the existing literature by defining impairment more broadly than previous research (i.e., Ohan and Johnston, 2005; Waschbusch & King, 2006), examining impairment both globally and specifically within various domains of functioning. Lastly, a criticism of past research in this area has been that it did not take into account the fact that functional impairment in females with AD/HD may have been influenced by the presence of comorbid conditions

(Eiraldi et al., 2006). The current study assessed for the presence of underlying comorbid symptomatology and determined the contribution of comorbid predictors to impairment, in order to accurately speak to the predictive ability of the AD/HD items.

Overall, the findings of this study highlight the shortcomings of the current AD/HD symptom descriptions. Only seven DSM-IV items total were shown to be useful for predicting impairment in girls in this study. Given this information, it follows that girls would have a difficult time reaching the threshold for a diagnosis of AD/HD based on current symptom lists and diagnostic criteria. Specifically, it is difficult for girls to reach the threshold of having at least six symptoms of either inattention or hyperactivity-impulsivity given that only a few of the nine symptoms from either list are accurately depicting how girls manifest the primary symptoms of AD/HD. Thus, although girls may be exhibiting elevated levels of inattention and hyperactivity-impulsivity, parents and teachers are not endorsing elevated levels of symptomatology on rating scales based on current symptom lists, because the items do not fully capture how girls express the disorder. Similarly, recent research examining adult AD/HD has demonstrated that existing diagnostic criteria do not accurately reflect how AD/HD is experienced by adults (Barkley, Murphy, & Fischer, 2008).

The findings of this study also provide preliminary support for incorporating more gender-sensitive symptom descriptions into the DSM-IV symptom items for AD/HD. Based on the results of this study, it appears that the traditionally masculine symptom items of the DSM-IV alone are not adequately capturing how girls manifest the disorder. (Maccoby, 2002; Martin, 1995). Indeed, the gender-sensitive items that accounted for

significant variance in impairment were more interpersonally-oriented, a value which is traditionally considered to be female and more often emphasized in girls' playgroups (Maccoby, 2002; Martin, 1995). In addition, the findings of this study suggest that, like the aggression literature (Crick & Grotpeter, 1995; Hinshaw & Anderson, 1996), differences in how boys and girls express AD/HD may be closely tied with how each gender is socialized to express these symptoms from an early age, even though the underlying psychopathology may be the same. Thus, continued examination of how girls express the symptoms of hyperactivity-impulsivity and inattention in a social setting may provide valuable information with regard to how they manifest the disorder.

### *Future Directions*

Though the current study sheds some light on how girls express the symptoms of AD/HD and the utility of the current DSM-IV symptoms in assessing girls for AD/HD, many questions remain unanswered. First, though some of the current DSM-IV items and newly proposed gender-sensitive items have been shown to be predictive of impairment, many were not. The gender-sensitive items utilized in this study were first proposed by Ohan and Johnston (2005), who found in preliminary analyses that mothers described the items as more female descriptive than the current DSM-IV items. Though these particular items seem to be a good start in terms of understanding how girls might express the symptoms of AD/HD, they are by no means an exhaustive list. It is likely that other items yet to be developed may also capture how girls express inattention and hyperactivity-impulsivity, perhaps even better than the newly proposed items. Thus, future development of items should continue to focus on how girls express the symptoms of

AD/HD, with a particular focus on interpersonal interactions. Furthermore, if it is the case that girls express AD/HD symptoms in a more interpersonal way, it follows that perhaps greater deficits in impairment would become more apparent in the social domain for girls as they enter pre-adolescence and adolescence, as this is a time in their development in which reliance on social skills is of utmost importance. Thus, assessing girls at this crucial age may provide greater understanding in terms of specific areas of deficit.

A greater understanding of how girls manifest the symptoms of AD/HD would also aid in our understanding of who gets referred and why. If girls do express the symptoms of AD/HD in a more relational and social way, these behaviors may be considered less overtly problematic and may even go unnoticed by adults and teachers, who are typically the individuals referring children to clinics for assessment. It makes sense that if boys express symptoms of AD/HD in more overtly disruptive ways than girls, their behaviors would be more disruptive to a typical classroom setting. Thus, they may be more likely to be referred to clinics for testing. A greater understanding of how the symptoms are expressed may yield more appropriate referrals for impaired girls.

Further, teacher ratings of children's behavior at school are heavily relied upon when assessing for AD/HD. If teachers are rating girls' behaviors based on norms influenced by overtly disruptive boys, it follows that girls' interpersonally-oriented deficits pale in comparison. They are much less likely to stand out as problematic. Indeed, Abikoff and colleagues (1993) found that teacher ratings of AD/HD symptoms were inflated when a child engaged in overtly oppositional behaviors in the classroom.

However, the aggression literature has demonstrated that girls are more likely to express relational aggression than overt aggression (Hinshaw & Anderson, 1996), which may actually lead to fewer ratings of AD/HD symptoms in girls. Thus, future research should further examine biases evident in teacher perceptions, and how these perceptions influence who gets referred to clinics for assessment of AD/HD. Additionally, as clinicians, we are looking to see if a child who presents for an AD/HD evaluation is experiencing impairment both at home and at school in order to make an accurate diagnosis based on the current criteria. If teachers' rating scale responses are also influenced by norms based on more overtly disruptive boys, then it follows that fewer girls would then appear impaired on teacher rating scales. Perhaps one solution would be to give teachers questionnaires with more gender-sensitive items in order to trigger them to make within gender comparisons in terms of impairment in functioning, instead of comparing females to norms set by boys.

### *Clinical Implications*

This research has a number of clinical implications for assessing young girls for AD/HD. First, it has highlighted that the current symptom items in the DSM-IV for AD/HD may not be entirely applicable to girls who have the disorder. Given that the results of the this study indicate that only a few of the current DSM-IV items are capturing how girls manifest the primary symptoms of AD/HD, then it follows that girls would have a more difficult time reaching the threshold for receiving a diagnosis based on the current diagnostic criteria (i.e., presence of six or more symptoms of IA and/or HI). Indeed, the current items may be capturing a subset of girls who express symptoms

in more stereotypically masculine ways, at the expense of girls who express inhibitory and regulatory deficits in more feminine ways. Thus, a careful consideration of the variety of ways that inattention and hyperactivity-impulsivity may be expressed in girls' lives is warranted. More specifically, an examination of these symptoms particularly within a social context appears to be of great importance, and deficits within interpersonal domains seem to be linked to overall impairment. Clinicians assessing for the presence of AD/HD in females need to be aware of how females may express the symptoms differently than males and incorporate assessments that take these differences into account when conducting evaluations. As mentioned previously, providing parents and teachers with rating scales that pull for more female specific impairment may help to eliminate the common tendency to compare girls to a norm influenced by overtly disruptive boys.

### *Limitations*

Although promising, the results of this study must be tempered by a consideration of several limitations. First, the analyses utilized in this study represent an initial effort to understand the relative contribution of specific gender-sensitive AD/HD items to the established item list and are exploratory in nature. Thus, they do not represent the most stringent and conservative approach to data analysis, but are appropriate given the exploratory nature of this study. Second, the findings of the current study are limited by the relatively small sample size of participants. Most notably, the small amount of teacher data in the secondary analyses tempers our ability to make generalizations from this data set and may have contributed to the lack of significant findings within this sample. Third,

the relatively homogeneous nature of the sample makes it difficult to generalize the findings to various populations. Fourth, although efforts were made to ensure that a broad range of DSM-IV item responses was acquired in both parent and teacher data, this was not always the case. In particular, teacher data identified girls as much less impaired overall on DSM-IV items than parent data, which could be accounted for by the smaller sample size, as well as the relatively large number of girls taking medication for behavior management purposes. Fifth, although medication status of participants was monitored, psychosocial treatment status was not. It is possible that some girls were either currently receiving or had previously received some psychosocial intervention for AD/HD related symptoms, which then may have affected the way that parents and teachers rated their behavior.

Another limitation of the current study is the relatively impaired nature of the sample of participants. Mean scores on measures of functioning within various domains were generally within the more impaired range than a normal population sample, indicating greater impairment overall within the current sample of participants. This greater level of impairment was likely due to a sampling bias, in which many participants who were referred to the study were either siblings or friends of children referred to the AD/HD Clinic for an evaluation or another research study. Thus, they are at increased risk of having elevated levels of AD/HD themselves.

Additionally, the current study utilized a sample of girls only. The decision to use a sample of all girls was made due to the fact that previous research had lent support for the fact that the current DSM-IV item list does not adequately capture how girls manifest

the symptoms of AD/HD, though it does seem to adequately capture how boys manifest the disorder (Farley, 2004). Moreover, previous research provided initial support for the utility of the gender-sensitive item list for females (Ohan & Johnston, 2005). However, a limitation of the study is that it remains unknown as to how predictive the gender-sensitive items utilized in this study are for boys. Also, the age range of the sample was also limited, such that it was comprised of elementary school girls only. As mentioned earlier, perhaps due to the relational nature of the newly developed items, they would have been more appropriate for older girls who are at a stage in their development in which reliance on social skills is essential.

Lastly, in the current study, the newly proposed gender-sensitive items were presented to mothers and teachers in a format similar to that of the ADHD Rating Scale. Mothers and teachers were asked to rate girls' behaviors, scoring items on a four-point Likert scale, ranging from "never or rarely" indicative of behavior to "very often" indicative of behavior. Due to the new development of this scale, its effectiveness for these purposes is unknown. Thus, the results of this study were limited by parents and teachers responses to this format. Another potential way to present the items to parents and teachers would be to randomly intersperse them within the ADHD Rating Scale instead of creating a new rating scale altogether.

### *Conclusions*

The findings of the current study lend preliminary support to the notion that girls may express the symptoms of inattention and hyperactivity-impulsivity differently than

boys. In addition, the findings highlight the fact that we may not be capturing how elementary school-aged girls express these symptoms with the current DSM-IV symptom criteria. Specifically, the findings demonstrate that gender-sensitive items, more indicative of deficits in interpersonal relatedness, are predictive of impairment in elementary school girls, and in some cases account for variance in impairment above and beyond what DSM-IV items alone predict. Thus, similar to the aggression literature, these findings provide preliminary support for the idea that although boys and girls may have the same underlying psychopathology, girls express the symptoms of AD/HD in a more interpersonal way. Failure to assess for these seemingly gender-specific deficits may be resulting in an under-identification of girls who are functionally impaired and could benefit from services. Moreover, if only a few of the current DSM-IV items are capturing how girls manifest the primary symptoms of AD/HD, then it follows that girls would have a more difficult time reaching the threshold for receiving a diagnosis based on the current diagnostic criteria. Thus, expanding the current criteria to include more gender-sensitive descriptions of inattention and hyperactivity-impulsivity would likely lead to more accurate diagnoses and clinical interventions for impaired girls. It is hoped that these findings serve as an impetus for future research and development of clinical interventions that may lead to accurate identification and treatment of affected girls.

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APPENDIX A

TABLES AND FIGURES

Table 1

*Gender-sensitive Items for AD/HD (Ohan, J.L. & Johnston, C., 2005)*

Inattentive Items

_____

(a) Forgetful in social activities (e.g., forgets/is late to meet friends)

(b) Doodles instead of completing work

_____

Hyperactive-Impulsive Items

_____

*Hyperactivity*

(c) Giggles and/or talks excessively

(d) Whispers or talks to peers during classtime instead of paying attention to work

*Impulsivity*

(e) Blurts out things to others without thinking

(f) Writes or passes notes instead of completing classwork

(g) Changes friends impulsively or without thinking

(h) Impulsively changes conversation topics

_____

Table 2

*Percentage of Participants Classified as Functionally Impaired Across Domains*

|  | Percentage Impaired |
|---|---|
| Academic Functioning | 49.2% |
| Parent-Child/ Family Functioning | 57.1% |
| Social Functioning | 39.7% |
| Overall Functioning | 47.6% |

Table 3

*Correlations between Parent-completed DSM-IV Items and Outcome Variables*

|  | Parent CIRS Overall Impairment Score | Impaired in 2 or More Domains |
|---|---|---|
| Makes Careless Mistakes | .497** | .365** |
| Difficulty Sustaining Attn | .705** | .442** |
| Does Not Listen | .600** | .405** |
| Does Not Finish Work | .548** | .277* |
| Difficulty Organizing | .634** | .172 |
| Avoids Tasks | .400** | .313* |
| Loses Things | .469** | .177 |
| Easily Distracted | .598** | .394** |
| Forgetful | .539** | .262* |
| Fidgets | .701** | .434** |
| Leaves | .645** | .377** |
| Runs or Climbs Excessively | .638** | .323* |
| Difficulty Playing Quietly | .663** | .448** |
| On the Go | .696** | .440** |
| Talks Excessively | .594** | .408** |
| Blurts Out Answers | .549** | .413** |
| Difficulty Waiting Turn | .666** | .465** |
| Interrupts Others | .720** | .401** |

*Note.* **$p < .01$. * $p < .05$; CIRS = Children's Impairment Rating Scale

Table 4

*Correlations between Parent-completed Gender-sensitive Items and Outcome Variables*

|  | Parent CIRS Overall Impairment Score | Impaired in 2 or More Domains |
|---|---|---|
| Forgetful in Social Activities | .665** | .423** |
| Giggles | .582** | .444** |
| Doodles Instead of Completing Work | .447** | .316* |
| Whispers or Talks During Class | .517** | .362** |
| Blurts Out | .570** | .455** |
| Passes Notes | .339** | .309* |
| Changes Friends Impulsively | .509** | .448** |
| Impulsively Changes Conversation Topics | .662** | .460** |

*Note.* **$p < .01$. * $p < .05$; CIRS = Children's Impairment Rating Scale.

Table 5

*Correlations between Parent-completed Indices of Comorbidity and Outcome Variables*

| | Parent CIRS Overall Impairment Score | Impaired in 2 or More Domains |
|---|---|---|
| BASC-2 Aggression Subscale | .551** | .401** |
| BASC-2 Internalizing Composite | .583** | .399** |

*Note.* **$p < .01$. * $p < .05$; CIRS = Children's Impairment Rating Scale; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 6

*Correlations between Teacher-completed DSM-IV Items and Outcome Variables*

| | Teacher CIRS Overall Impairment Score | Impaired in 2 or More Domains |
|---|---|---|
| Mistakes Careless Mistakes | .449** | .021 |
| Difficulty Sustaining Attn | .701** | .199 |
| Does Not Listen | .762** | .282 |
| Does Not Finish Work | .517** | .036 |
| Difficulty Organizing | .527** | .151 |
| Avoids Tasks | .590** | .043 |
| Loses Things | .575** | .179 |
| Easily Distracted | .777** | .419** |
| Forgetful | .402** | .025 |
| Fidgets | .579** | .392** |
| Leaves | .585** | .130 |
| Runs or Climbs Excessively | .403** | .314* |
| Difficulty Playing Quietly | .535** | .345* |
| On the Go | .613** | .298* |
| Talks Excessively | .353* | .400** |
| Blurts Out Answers | .581** | .411** |
| Difficulty Awaiting Turn | .630** | .370* |
| Interrupts Others | .522** | .334* |

*Note.* **$p < .01$. * $p < .05$; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition; CIRS = Children's Impairment Rating Scale

Table 7

*Correlations between Teacher-completed Gender-sensitive Items and Outcome Variables*

| | Teacher CIRS Overall Impairment Score | Impaired in 2 or More Domains |
|---|---|---|
| Forgetful in Social Activities | .528** | .231 |
| Giggles | .536** | .255 |
| Doodles Instead of Completing Work | .605** | .094 |
| Whispers or Talks During Class | .563** | .238 |
| Blurts Out | .572** | .368* |
| Passes Notes | .184 | .173 |
| Changes Friends Impulsively | .447** | .193 |
| Impulsively Changes Conversation Topics | .487** | .177 |

*Note.* **$p < .01$. * $p < .05$; CIRS = Children's Impairment Rating Scale

Table 8

*Correlations among Teacher-completed Indices of Comorbid Functioning, Medication Status, and Outcome Variables*

|  | Teacher CIRS Overall Impairment Score | Impaired in 2 or More Domains |
|---|---|---|
| BASC-2 Aggression Subscale | .573** | .352* |
| BASC-2 Internalizing Composite | .562** | .275 |
| Medication Status | -.191 | -.395* |

*Note.* **$p < .01$. * $p < .05$; CIRS = Children's Impairment Rating Scale; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 9

*Stepwise Multiple Linear Regression Using Parent-completed DSM-IV AD/HD Items to Predict Global Impairment*

|  | $\Delta R^2$ | *B* | *SE B* | *β* | *p* |
|---|---|---|---|---|---|
| **Predictor Variables in Final Model** | | | | | |
| Interrupts Others | **.51** | .77 | .17 | .45 | **<.001** |
| Difficulty Organizing Tasks | **.11** | .75 | .18 | .42 | **<.001** |
| Fidgets | **.05** | .65 | .17 | .38 | **<.001** |
| Forgetful in Daily Activities | **.02** | -.48 | .21 | -.26 | **<.05** |
| **Excluded variables** | | | | | |
| Makes Careless Mistakes | | | | .07 | .45 |
| Difficulty Sustaining Attention | | | | .12 | .38 |
| Does not Finish Work | | | | -.06 | .62 |
| Avoids Tasks | | | | .12 | .18 |
| Loses Things | | | | .002 | .99 |
| Easily Distracted | | | | .05 | .66 |
| Leaves Seat | | | | .05 | .64 |
| Runs or Climbs Excessively | | | | .03 | .82 |
| Difficulty Playing Quietly | | | | .19 | .06 |
| On the Go | | | | .19 | .08 |
| Talks Excessively | | | | .11 | .26 |
| Blurts Out Answers | | | | .06 | .53 |
| Difficulty Waiting Turn | | | | .11 | .33 |

*Note.* DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 10

*Stepwise Multiple Linear Regression Using Parent-completed Gender-sensitive Items to Predict Global Impairment*

| | $\Delta R^2$ | *B* | *SE B* | *β* | *p* |
|---|---|---|---|---|---|
| **Predictor Variables in Final Model** | | | | | |
| DSM-IV Items | | | | | |
| Interrupts Others | **.52** | .61 | .16 | .36 | **<.001** |
| Difficulty Organizing Tasks | **.11** | .66 | .16 | .37 | **<.001** |
| Fidgets | **.05** | .68 | .15 | .40 | **<.001** |
| Forgetful in Daily Activities | **.03** | -.89 | .22 | -.49 | **<.001** |
| Gender-sensitive Item | | | | | |
| Forgetful in Social Activities | **.06** | .77 | .20 | .40 | **<.001** |
| **Excluded Variables** | | | | | |
| Giggles | | | | -.04 | .69 |
| Doodles | | | | .05 | .54 |
| Whispers or Talks | | | | -.07 | .44 |
| Blurts Out Things | | | | -.06 | .50 |
| Passes Notes | | | | .04 | .55 |
| Changes Friends Impulsively | | | | .04 | .66 |
| Impulsively Changes Conversation Topics | | | | .17 | .09 |

*Note.* DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition

Table 11

*Hierarchical Stepwise Multiple Linear Regression Analysis for Predicting Global Impairment Based on Parent-completed Data*

| | $\Delta R^2$ | *B* | *SE B* | *β* | *p* |
|---|---|---|---|---|---|
| **Predictor Variables in Final Model** | | | | | |
| Block 1 – Gender-Sensitive Item | | | | | |
|    Forgetful in Social Activities | **.44** | .77 | .20 | .40 | **<.001** |
| Block 2 – DSM-IV Items | | | | | |
|    Interrupts Others | **.18** | .68 | .15 | .36 | **<.001** |
|    Fidgets | **.05** | .61 | .16 | .36 | **<.001** |
|    Forgetful in Daily Activities | **.03** | -.89 | .22 | -.49 | **<.001** |
|    Difficulty Organizing Tasks | **.07** | .66 | .16 | .37 | **<.001** |
| **Total Adj. R² = .75** | | | | | |
| Excluded variables | | | | | |
|    Parent BASC-2 Aggression | | | | .04 | .63 |
|    Parent BASC-2 Internalizing Problems | | | | .05 | .54 |

*Note.* BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 12

*Forward Logistic Regression Using Parent-completed DSM-IV AD/HD Items to Predict Impairment in Two or More Domains of Functioning*

| | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in Final Model | | | | | | |
| Difficulty Waiting Turn | .94 | .27 | 11.76 | 1 | **.001**[*] | 2.56 |
| Excluded Variables | | | | | | |
| Makes Careless Mistakes | | | | 1 | .15 | |
| Difficulty Sustaining Attention | | | | 1 | .07 | |
| Does Not Listen | | | | 1 | .17 | |
| Does Not Finish Work | | | | 1 | .59 | |
| Difficulty Organizing Tasks | | | | 1 | .38 | |
| Avoids Tasks | | | | 1 | .15 | |
| Loses Things | | | | 1 | .66 | |
| Easily Distracted | | | | 1 | .22 | |
| Forgetful | | | | 1 | .99 | |
| Fidgets | | | | 1 | .06 | |
| Leaves Seat | | | | 1 | .19 | |
| Runs or Climbs Excessively | | | | 1 | .91 | |
| Difficulty Playing Quietly | | | | 1 | .13 | |
| On the Go | | | | 1 | .18 | |
| Talks Excessively | | | | 1 | .21 | |
| Blurts Out Answers | | | | 1 | .10 | |
| Interrupts Others | | | | 1 | .42 | |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 13

*Forward Logistic Regression Using Parent-completed Gender-sensitive Items to Predict Impairment in Two or More Domains of Functioning*

|  | **B** | **SE** | **Wald** | **df** | **Sig.** | **Exp(B)** |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| DSM-IV Item |  |  |  |  |  |  |
| Difficulty Waiting Turn | .67 | .30 | 4.80 | 1 | **.03**[*] | 1.95 |
| Gender-Sensitive Item |  |  |  |  |  |  |
| Changes Friends Impulsively | .77 | .38 | 4.06 | 1 | **.04**[*] | 2.16 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Forgetful in Social Activities |  |  |  | 1 | .82 |  |
| Giggles |  |  |  | 1 | .17 |  |
| Doodles |  |  |  | 1 | .58 |  |
| Whispers or Talks During Class |  |  |  | 1 | .65 |  |
| Blurts Out Things |  |  |  | 1 | .18 |  |
| Passes Notes |  |  |  | 1 | .77 |  |
| Impulsively Changes Conversation Topics |  |  |  | 1 | .54 |  |

*Note.* *p<.05

Table 14

*Forward Logistic Regression Predicting Impairment in Two or More Domains of Functioning from Parent-completed Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Difficulty Waiting Turn | .66 | .30 | 4.80 | 1 | **.03**[*] | 1.95 |
| Changes Friends Impulsively | .77 | .38 | 4.06 | 1 | **.04**[*] | 2.16 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Parent BASC-2 Aggression |  |  |  | 1 | .19 |  |
| Parent BASC-2 Internalizing Problems |  |  |  | 1 | .41 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 15

*Stepwise Multiple Linear Regression Using Teacher-completed DSM-IV AD/HD Items to Predict Global Impairment*

|  | Δ $R^2$ | B | SE B | β | p |
|---|---|---|---|---|---|
| **Predictor Variables in Final Model** | | | | | |
| Easily Distracted | **.60** | .79 | .26 | .47 | **<.01** |
| Does Not Listen | **.05** | .74 | .29 | .39 | **<.05** |
| **Excluded variables** | | | | | |
| Makes Careless Mistakes | | | | -.09 | .43 |
| Difficulty Sustaining Attention | | | | .05 | .76 |
| Does Not Finish Work | | | | .06 | .60 |
| Avoids Tasks | | | | .14 | .24 |
| Loses Things | | | | .08 | .59 |
| Forgetful | | | | -.13 | .25 |
| Fidgets | | | | -.10 | .47 |
| Leaves Seat | | | | -.06 | .68 |
| Runs or Climbs Excessively | | | | -.22 | .07 |
| Difficulty Playing Quietly | | | | -.05 | .69 |
| On the Go | | | | -.03 | .82 |
| Talks Excessively | | | | -.05 | .58 |
| Blurts Out Answers | | | | .10 | .41 |
| Difficulty Waiting Turn | | | | .09 | .49 |
| Interrupts Others | | | | -.15 | .27 |

*Note.* DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 16

*Stepwise Multiple Linear Regression Using Teacher-completed Gender-sensitive Items to Predict Global Impairment*

|  | $\Delta R^2$ | $B$ | $SE\ B$ | $\beta$ | $p$ |
|---|---|---|---|---|---|
| **Predictor Variables in Final Model** |  |  |  |  |  |
| DSM-IV Items |  |  |  |  |  |
| Easily Distracted | **.60** | .79 | .26 | .47 | **<.01** |
| Does Not Listen | **.05** | .74 | .29 | .39 | **<.05** |
| Excluded variables |  |  |  |  |  |
| Forgetful in Social Activities |  |  |  | .01 | .94 |
| Giggles |  |  |  | .16 | .14 |
| Doodles |  |  |  | .20 | .07 |
| Whispers or Talks During Class |  |  |  | .06 | .65 |
| Blurts Out Things |  |  |  | -.04 | .77 |
| Passes Notes |  |  |  | -.07 | .51 |
| Changes Friends Impulsively |  |  |  | .05 | .67 |
| Impulsively Changes Conversations |  |  |  | -.06 | .60 |

Table 17

*Hierarchical Stepwise Multiple Linear Regression Analysis for Predicting Global Impairment Based on Teacher-completed Data*

| | $\Delta R^2$ | *B* | *SE B* | *β* | *p* |
|---|---|---|---|---|---|
| Predictor Variables in Final Model | | | | | |
| Block 1– DSM-IV Items | | | | | |
| Easily Distracted | **.60** | .73 | .25 | .43 | **<.01** |
| Does Not Listen | **.05** | .59 | .29 | .31 | **<.05** |
| Block 2 – Comorbid Predictors | | | | | |
| TBASC-2 Internalizing Problems | **.03** | .03 | .01 | .21 | **<.05** |
| **Total Adj. R² = .67** | | | | | |
| Excluded variables | | | | | |
| Teacher BASC-2 Aggression | | | | -.03 | .86 |
| Medication Status | | | | -.10 | .26 |

*Note.* DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 18

*Forward Logistic Regression Using Teacher-completed DSM-IV AD/HD Items to Predict*

*Impairment in Two or More Domains of Functioning*

| | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| **Predictor Variables in** <br> <u>Final Model</u> | | | | | | |
| Makes Careless Mistakes | -1.38 | .68 | 4.05 | 1 | **.04**[*] | .25 |
| Easily Distracted | 1.73 | .63 | 7.61 | 1 | **.01**[*] | 5.64 |
| <u>Excluded Variables</u> | | | | | | |
| Difficulty Sustaining Attention | | | | 1 | .10 | |
| Does Not Listen | | | | 1 | .99 | |
| Does Not Finish Work | | | | 1 | .43 | |
| Difficulty Organizing Tasks | | | | 1 | .40 | |
| Avoids Tasks | | | | 1 | .36 | |
| Loses Things | | | | 1 | .30 | |
| Forgetful | | | | 1 | .42 | |
| Fidgets | | | | 1 | .28 | |
| Leaves Seat | | | | 1 | .12 | |
| Runs or Climbs Excessively | | | | 1 | .30 | |
| Difficulty Playing Quietly | | | | 1 | .47 | |
| On the Go | | | | 1 | .83 | |
| Talks Excessively | | | | 1 | .28 | |
| Blurts Out Answers | | | | 1 | .16 | |
| Difficulty Waiting Turn | | | | 1 | .88 | |
| Interrupts Others | | | | 1 | .93 | |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 19

*Forward Logistic Regression Using Teacher-completed Gender-sensitive Items to Predict Impairment in Two or More Domains of Functioning*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Makes Careless Mistakes | -1.38 | .68 | 4.05 | 1 | **.04**[*] | .25 |
| Easily Distracted | 1.73 | .63 | 7.61 | 1 | **.01**[*] | 5.64 |
|  |  |  |  |  |  |  |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Forgetful in Social Activities |  |  |  | 1 | .73 |  |
| Giggles |  |  |  | 1 | .93 |  |
| Doodles |  |  |  | 1 | .59 |  |
| Whispers or Talks During Class |  |  |  | 1 | .51 |  |
| Blurts Out Things |  |  |  | 1 | .88 |  |
| Passes Notes |  |  |  | 1 | .89 |  |
| Changes Friends Impulsively |  |  |  | 1 | .75 |  |
| Impulsively Changes Conversation Topics |  |  |  | 1 | .41 |  |

*Note.* *p<.05

Table 20

*Forward Logistic Regression Predicting Impairment in Two or More Domains of Functioning from Teacher-completed Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| **Predictor Variables in** <u>Final Model</u> |  |  |  |  |  |  |
| Makes Mistakes | -1.49 | .74 | 4.12 | 1 | **.04**[*] | .22 |
| Easily Distracted | 1.89 | .66 | 8.16 | 1 | **.004**[*] | 6.63 |
| Medication Status | -2.20 | .83 | 7.12 | 1 | **.008**[*] | .11 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Teacher BASC-2 Aggression |  |  |  | 1 | .89 |  |
| Teacher BASC-2 Internalizing Problems |  |  |  | 1 | .81 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 21

*Items Found to be Predictive of Overall Impairment in Elementary School Girls in Final Analyses Based on Informant and Type of Impairment*

|  | Global Impairment Based on Overall Impairment Score on CIRS | Specific Impairment Defined as Impaired in Two or More Domains |
|---|---|---|
| Parent-Completed Data | DSM-IV items:<br>　"Interrupts Others"<br>　"Fidgets"<br>　"Forgetful in Daily Activities"<br>　"Difficulty Organizing Tasks"<br>Gender-Sensitive item:<br>　"Forgetful in Social Activities" | DSM-IV item:<br>　"Difficulty Waiting Turn"<br>Gender-Sensitive item:<br>　"Changes Friends Impulsively" |
| Teacher-Completed Data | DSM-IV items:<br>　"Easily Distracted"<br>　"Does Not Listen"<br>Comorbid Predictor:<br>　Teacher BASC-2 Internalizing Subscale | DSM-IV items:<br>　*"Makes Careless Mistakes"<br>　"Easily Distracted"<br>Medication Status |

*Note.* DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition; CIRS = Children's Impairment Rating Scale.
* Although, DSM-IV item, "Makes Careless Mistakes," contributed significantly to impairment based on logistic regression analyses, it was not ultimately considered to be predictive of impairment because correlation between this item and impairment was non-significant.

Table 22

*Forward Logistic Regression Using Parent-completed DSM-IV AD/HD Items to Predict*

*Academic Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in Final Model |  |  |  |  |  |  |
| Makes Careless Mistakes | 1.14 | .42 | 7.45 | 1 | .01* | 3.14 |
| Blurts Out Things | .85 | .34 | 6.30 | 1 | .01* | 2.33 |
| Excluded Variables |  |  |  |  |  |  |
| Difficulty Sustaining Attention |  |  |  | 1 | .27 |  |
| Does Not Listen |  |  |  | 1 | .76 |  |
| Does Not Finish Work |  |  |  | 1 | .94 |  |
| Difficulty Organizing Tasks |  |  |  | 1 | .42 |  |
| Avoids Tasks |  |  |  | 1 | .22 |  |
| Loses Things |  |  |  | 1 | .57 |  |
| Forgetful |  |  |  | 1 | .73 |  |
| Fidgets |  |  |  | 1 | .89 |  |
| Leaves Seat |  |  |  | 1 | .84 |  |
| Runs or Climbs Excessively |  |  |  | 1 | .73 |  |
| Difficulty Playing Quietly |  |  |  | 1 | .77 |  |
| On the Go |  |  |  | 1 | .63 |  |
| Talks Excessively |  |  |  | 1 | .12 |  |
| Easily Distracted |  |  |  | 1 | .89 |  |
| Difficulty Waiting Turn |  |  |  | 1 | .54 |  |
| Interrupts Others |  |  |  | 1 | .92 |  |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 23

*Forward Logistic Regression Using Parent-completed Gender-sensitive AD/HD Items to Predict Academic Impairment*

| | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> | | | | | | |
| Makes Careless Mistakes | 1.48 | .52 | 8.08 | 1 | **.004**[*] | 4.38 |
| Blurts Out Things | 1.58 | .52 | 9.42 | 1 | **.002**[*] | 4.85 |
| Giggles | -1.70 | .66 | 6.54 | 1 | **.01**[*] | .18 |
| Impulsively Changes Conversations | .94 | .42 | 4.97 | 1 | **.03**[*] | 2.56 |
| <u>Excluded Variables</u> | | | | | | |
| Forgetful in Social Activities | | | | 1 | .71 | |
| Doodles | | | | 1 | .94 | |
| Whispers or Talks During Class | | | | 1 | .51 | |
| Blurts Out Things | | | | 1 | .35 | |
| Passes Notes | | | | 1 | .80 | |
| Changes Friends Impulsively | | | | 1 | .98 | |

*Note.* *p<.05

Table 24

*Forward Logistic Regression Predicting Academic Impairment from Parent-completed Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Makes Careless Mistakes | 1.48 | .52 | 8.08 | 1 | **.004**[*] | 4.38 |
| Blurts Out Things | 1.58 | .52 | 9.42 | 1 | **.002**[*] | 4.85 |
| Giggles | -1.70 | .66 | 6.54 | 1 | **.01**[*] | .18 |
| Impulsively Changes Conversations | .94 | .42 | 4.97 | 1 | **.03**[*] | 2.56 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Parent BASC-2 Aggression |  |  |  | 1 | .88 |  |
| Parent BASC-2 Internalizing Problems |  |  |  | 1 | .63 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 25

*Forward Logistic Regression Using Teacher-completed DSM-IV AD/HD Items to Predict Academic Impairment*

| | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> | | | | | | |
| Difficulty Playing Quietly | 1.05 | .39 | 7.20 | 1 | **.01**$^{*}$ | 2.86 |
| <u>Excluded Variables</u> | | | | | | |
| Makes Careless Mistakes | | | | 1 | .48 | |
| Difficulty Sustaining Attention | | | | 1 | .36 | |
| Does Not Listen | | | | 1 | .71 | |
| Does Not Finish Work | | | | 1 | .58 | |
| Difficulty Organizing Tasks | | | | 1 | .25 | |
| Avoids Tasks | | | | 1 | .52 | |
| Loses Things | | | | 1 | .28 | |
| Easily Distracted | | | | 1 | .23 | |
| Forgetful | | | | 1 | .20 | |
| Fidgets | | | | 1 | .46 | |
| Leaves Seat | | | | 1 | .66 | |
| Runs or Climbs Excessively | | | | 1 | .37 | |
| Blurts Out Things | | | | 1 | .91 | |
| On the Go | | | | 1 | .94 | |
| Talks Excessively | | | | 1 | .36 | |
| Difficulty Waiting Turn | | | | 1 | .27 | |
| Interrupts Others | | | | 1 | .83 | |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 26

*Forward Logistic Regression Using Teacher-completed Gender-sensitive AD/HD Items to Predict Academic Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Difficulty Playing Quietly | 1.23 | .44 | 7.84 | 1 | **.01**\* | 3.43 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Forgetful in Social Activities |  |  |  | 1 | .29 |  |
| Giggles |  |  |  | 1 | .22 |  |
| Doodles |  |  |  | 1 | .94 |  |
| Whispers or Talks During Class |  |  |  | 1 | .93 |  |
| Blurts Out Things |  |  |  | 1 | .39 |  |
| Passes Notes |  |  |  | 1 | .60 |  |
| Changes Friends Impulsively |  |  |  | 1 | .14 |  |
| Impulsively Changes Conversations |  |  |  | 1 | .80 |  |

*Note.* \*p<.05

Table 27

*Forward Logistic Regression Predicting Academic Impairment from Teacher-completed Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in Final Model |  |  |  |  |  |  |
| Difficulty Playing Quietly | 1.11 | .44 | 6.43 | 1 | **.01**[*] | 3.04 |
| Medication Status | -2.30 | .80 | 8.30 | 1 | **.004**[*] | .10 |
| Excluded Variables |  |  |  |  |  |  |
| Teacher BASC-2 Aggression |  |  |  | 1 | .17 |  |
| Teacher BASC-2 Internalizing Problems |  |  |  | 1 | .15 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 28

*Forward Logistic Regression Using Parent-completed DSM-IV AD/HD Items to Predict Family Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Difficulty Playing Quietly | 1.27 | .37 | 12.04 | 1 | **.001**[*] | 3.55 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Makes Careless Mistakes |  |  |  | 1 | .51 |  |
| Difficulty Sustaining Attention |  |  |  | 1 | .59 |  |
| Does Not Listen |  |  |  | 1 | .90 |  |
| Does Not Finish Work |  |  |  | 1 | .13 |  |
| Difficulty Organizing Tasks |  |  |  | 1 | .22 |  |
| Avoids Tasks |  |  |  | 1 | .78 |  |
| Loses Things |  |  |  | 1 | .53 |  |
| Easily Distracted |  |  |  | 1 | .94 |  |
| Forgetful |  |  |  | 1 | .39 |  |
| Fidgets |  |  |  | 1 | .72 |  |
| Leaves Seat |  |  |  | 1 | .93 |  |
| Runs or Climbs Excessively |  |  |  | 1 | .44 |  |
| Blurts Out Things |  |  |  | 1 | .86 |  |
| On the Go |  |  |  | 1 | .50 |  |
| Talks Excessively |  |  |  | 1 | .12 |  |
| Difficulty Waiting Turn |  |  |  | 1 | .96 |  |
| Interrupts Others |  |  |  | 1 | .30 |  |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 29

*Forward Logistic Regression Using Parent-completed Gender-sensitive AD/HD Items to Predict Family Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Difficulty Playing Quietly | 1.27 | .37 | 12.04 | 1 | **.001**<sup>*</sup> | 3.55 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Forgetful in Social Activities |  |  |  | 1 | .19 |  |
| Giggles |  |  |  | 1 | .13 |  |
| Doodles |  |  |  | 1 | .75 |  |
| Whispers or Talks During Class |  |  |  | 1 | .25 |  |
| Blurts Out Things |  |  |  | 1 | .68 |  |
| Passes Notes |  |  |  | 1 | .46 |  |
| Changes Friends Impulsively |  |  |  | 1 | .63 |  |
| Impulsively Changes Conversations |  |  |  | 1 | .73 |  |

*Note.* *p<.05

Table 30

*Forward Logistic Regression Predicting Family Impairment from Parent-completed Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Difficulty Playing Quietly | .84 | .43 | 3.94 | 1 | **.04**[*] | 2.32 |
| Parent BASC-2 Internalizing Problems | .06 | .03 | 5.00 | 1 | **.03**[*] | 1.06 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Parent BASC-2 Aggression |  |  |  | 1 | .16 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 31

*Forward Logistic Regression Using Parent-completed DSM-IV AD/HD Items to Predict Social Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Fidgets | .84 | .28 | 8.96 | 1 | **.003**[*] | 2.32 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Makes Careless Mistakes |  |  |  | 1 | .75 |  |
| Difficulty Sustaining Attention |  |  |  | 1 | .45 |  |
| Does Not Listen |  |  |  | 1 | .70 |  |
| Does Not Finish Work |  |  |  | 1 | .97 |  |
| Difficulty Organizing Tasks |  |  |  | 1 | .07 |  |
| Avoids Tasks |  |  |  | 1 | .64 |  |
| Loses Things |  |  |  | 1 | .75 |  |
| Easily Distracted |  |  |  | 1 | .45 |  |
| Forgetful |  |  |  | 1 | .24 |  |
| Leaves Seat |  |  |  | 1 | .41 |  |
| Runs or Climbs Excessively |  |  |  | 1 | .33 |  |
| Blurts Out Things |  |  |  | 1 | .59 |  |
| On the Go |  |  |  | 1 | .35 |  |
| Talks Excessively |  |  |  | 1 | .19 |  |
| Difficulty Waiting Turn |  |  |  | 1 | .18 |  |
| Interrupts Others |  |  |  | 1 | .54 |  |
| Difficulty Playing Quietly |  |  |  | 1 | .51 |  |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 32

*Forward Logistic Regression Using Parent-completed Gender-sensitive AD/HD Items to Predict Social Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> | | | | | | |
| Fidgets | .80 | .35 | 5.33 | 1 | **.02**<sup></sup>* | 2.22 |
| Forgetful in Social Activities | -.91 | .47 | 3.81 | 1 | **.04*** | .40 |
| Changes Friends Impulsively | 1.24 | .48 | 6.81 | 1 | **.01*** | 3.47 |
| <u>Excluded Variables</u> | | | | | | |
| Giggles | | | | 1 | .28 | |
| Doodles | | | | 1 | .92 | |
| Whispers or Talks During Class | | | | 1 | .74 | |
| Blurts Out Things | | | | 1 | .27 | |
| Passes Notes | | | | 1 | .16 | |
| Impulsively Changes Conversations | | | | 1 | .47 | |

*Note.* *p<.05

Table 33

*Forward Logistic Regression Predicting Social Impairment from Parent-completed Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Fidgets | .80 | .35 | 5.33 | 1 | **.02**[*] | 2.22 |
| Forgetful in Social Activities | -.91 | .47 | 3.81 | 1 | **.04**[*] | .40 |
| Changes Friends Impulsively | 1.24 | .48 | 6.81 | 1 | **.01**[*] | 3.47 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Parent BASC-2 Aggression |  |  |  | 1 | .17 |  |
| Parent BASC-2 Internalizing Problems |  |  |  | 1 | .63 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition.

Table 34

*Forward Logistic Regression Using Teacher-completed DSM-IV AD/HD Items to Predict Social Impairment*

| | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Excluded Variables | | | | | | |
| Makes Careless Mistakes | | | | 1 | .35 | |
| Difficulty Sustaining Attention | | | | 1 | .14 | |
| Does Not Listen | | | | 1 | .89 | |
| Does Not Finish Work | | | | 1 | .36 | |
| Difficulty Organizing Tasks | | | | 1 | .99 | |
| Avoids Tasks | | | | 1 | .99 | |
| Loses Things | | | | 1 | .97 | |
| Easily Distracted | | | | 1 | .68 | |
| Forgetful | | | | 1 | .56 | |
| Leaves Seat | | | | 1 | .35 | |
| Fidgets | | | | 1 | .05 | |
| Runs or Climbs Excessively | | | | 1 | .55 | |
| Blurts Out Things | | | | 1 | .35 | |
| On the Go | | | | 1 | .95 | |
| Talks Excessively | | | | 1 | .38 | |
| Difficulty Waiting Turn | | | | 1 | .39 | |
| Interrupts Others | | | | 1 | .99 | |
| Difficulty Playing Quietly | | | | 1 | .72 | |

*Note.* *p<.05; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition.

Table 35

*Forward Logistic Regression Using Teacher-completed Gender-sensitive AD/HD Items to Predict Social Impairment*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Excluded Variables |  |  |  |  |  |  |
| Giggles |  |  |  | 1 | .95 |  |
| Doodles |  |  |  | 1 | .78 |  |
| Whispers or Talks During Class |  |  |  | 1 | .40 |  |
| Blurts Out Things |  |  |  | 1 | .84 |  |
| Passes Notes |  |  |  | 1 | .68 |  |
| Impulsively Changes Conversations |  |  |  | 1 | .81 |  |

*Note.* *p<.05

Table 36

*Forward Logistic Regression Predicting Social Impairment from Teacher-completed*
*Predictors*

|  | B | SE | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Predictor Variables in <u>Final Model</u> |  |  |  |  |  |  |
| Teacher BASC-2 Aggression | .04 | .02 | 3.95 | 1 | **.04**[*] | 1.04 |
| <u>Excluded Variables</u> |  |  |  |  |  |  |
| Teacher BASC-2 Internalizing Problems |  |  |  | 1 | .71 |  |
| Medication Status |  |  |  | 1 | .48 |  |

*Note.* *p<.05; BASC-2 = Behavior Assessment System for Children – Second Edition

Table 37

*Items Found to be Predictive of Specific Domains of Impairment in Elementary School Girls in Final Analyses Based on Informant and Type of Impairment*

|  | Parent-Completed Data | Teacher-Completed Data |
|---|---|---|
| Academic Domain | DSM-IV items:<br>  "Makes Mistakes"<br>  "Blurts Out Things"<br>Gender-Sensitive item:<br>  "Giggles"<br>  "Impulsively Changes Friends" | DSM-IV item:<br>  "Difficulty Playing Quietly"<br>Medication Status |
| Family Domain | DSM-IV items:<br>  "Difficulty Playing Quietly"<br>Comorbid Predictor:<br>  Parent BASC-2 Internalizing<br>  Subscale | N/A |
| Social Domain | DSM-IV item:<br>  "Fidgets"<br>Gender-Sensitive item:<br>  "Forgetful in Social Activities"<br>  "Impulsively Changes Friends" | Comorbid Predictor:<br>  Teacher BASC-2 Aggression |

*Note.* DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition; CIRS = Children's Impairment Rating Scale; BASC-2 = Behavior Assessment System for Children – Second Edition.

*Figure 1*

Distribution of hyperactive-impulsive symptom counts based on parent-completed ADHD Rating Scale data.
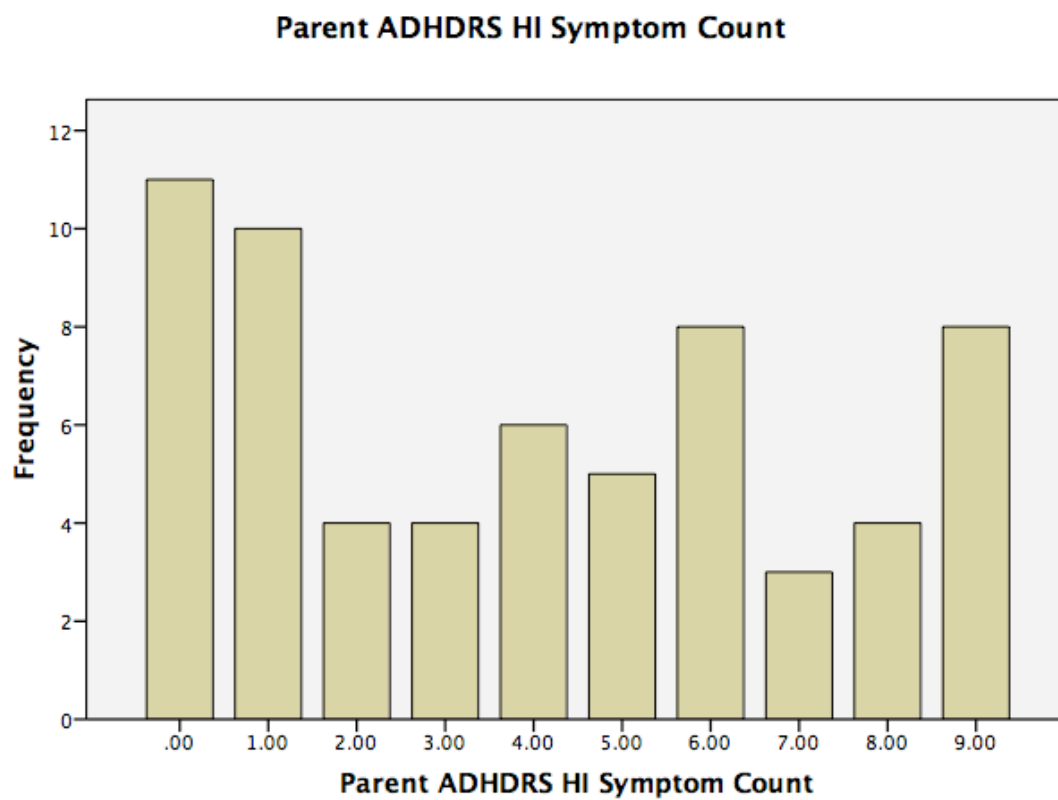
**Parent ADHDRS HI Symptom Count**

*Figure 2*

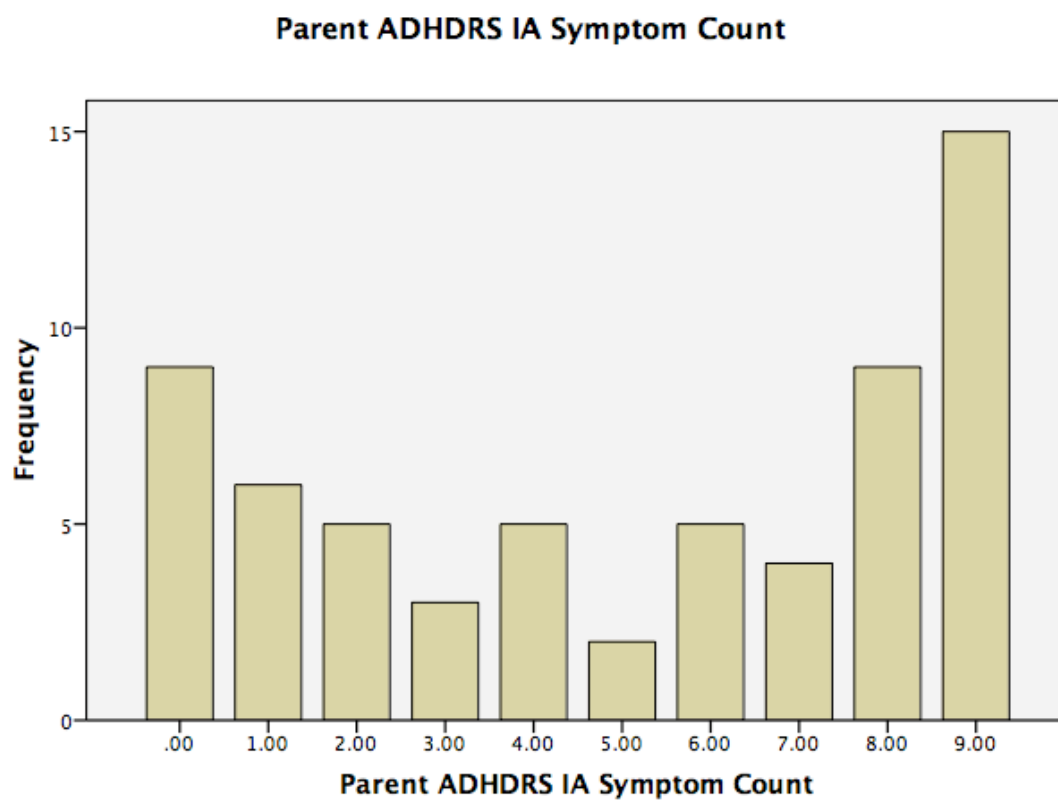Distribution of inattention symptom counts based on parent-completed ADHD Rating Scale data.

*Figure 3*

Distribution of hyperactive-impulsive symptom counts based on teacher-completed ADHD Rating Scale data.
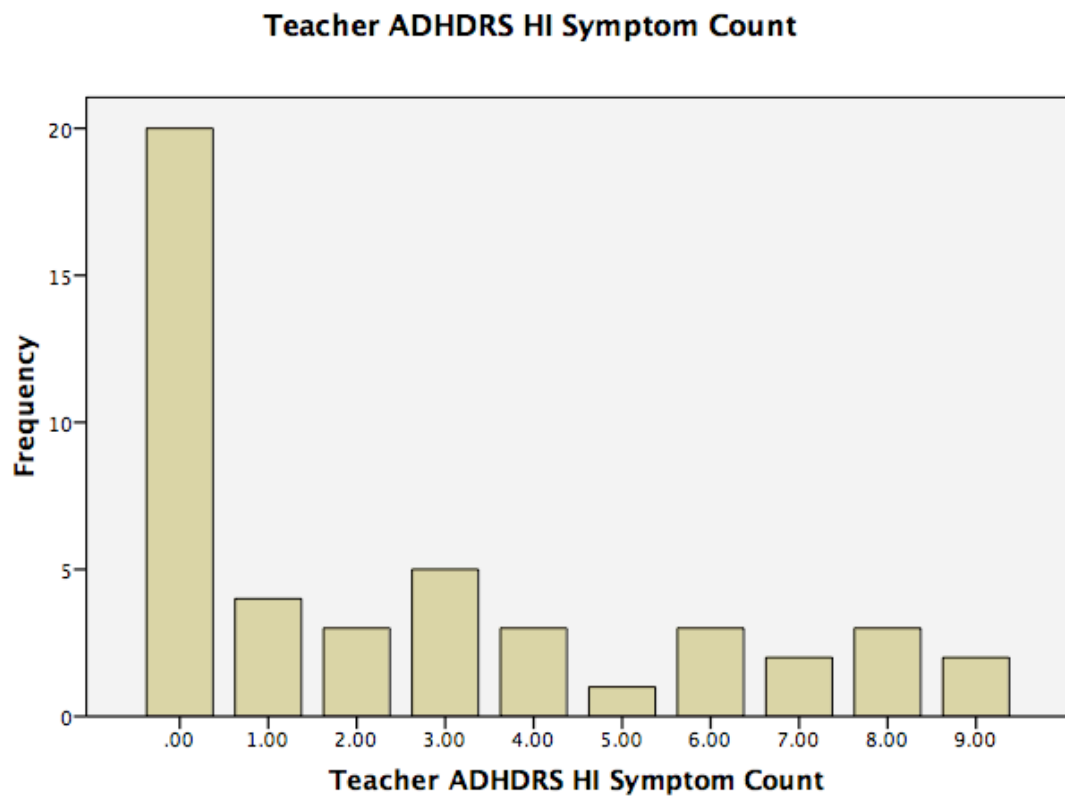


Teacher ADHDRS HI Symptom Count

*Figure 4*

Distribution of inattention symptom counts based on teacher-completed ADHD Rating
Scale data.

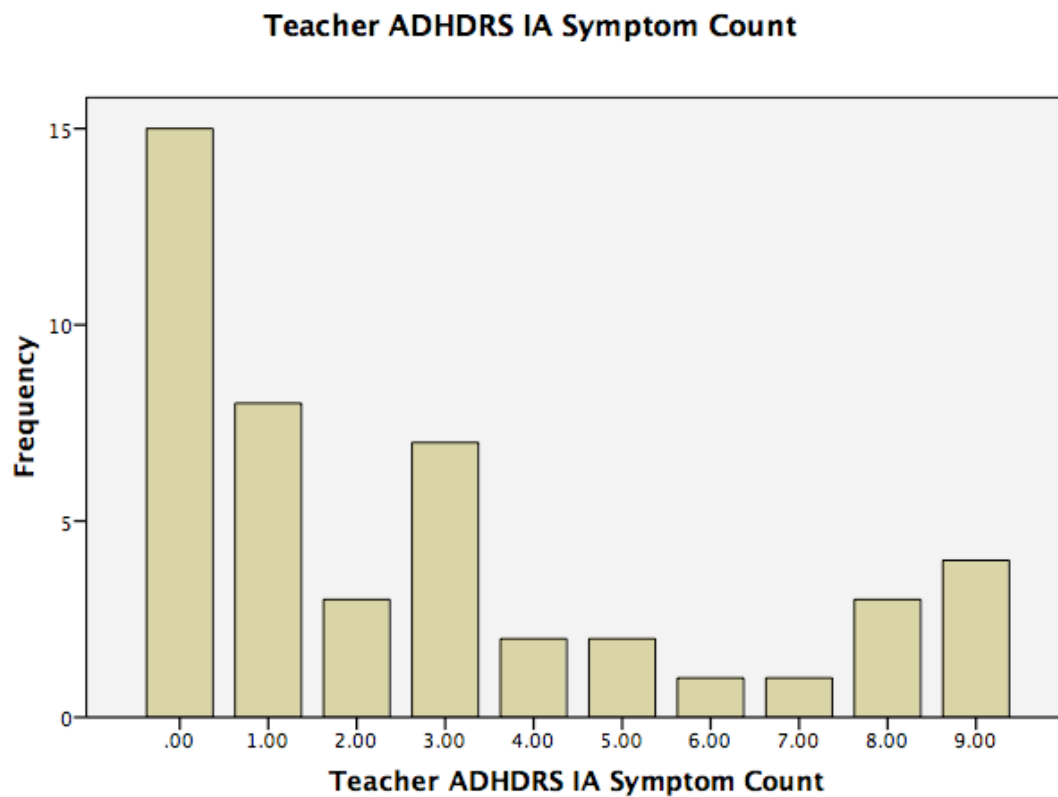

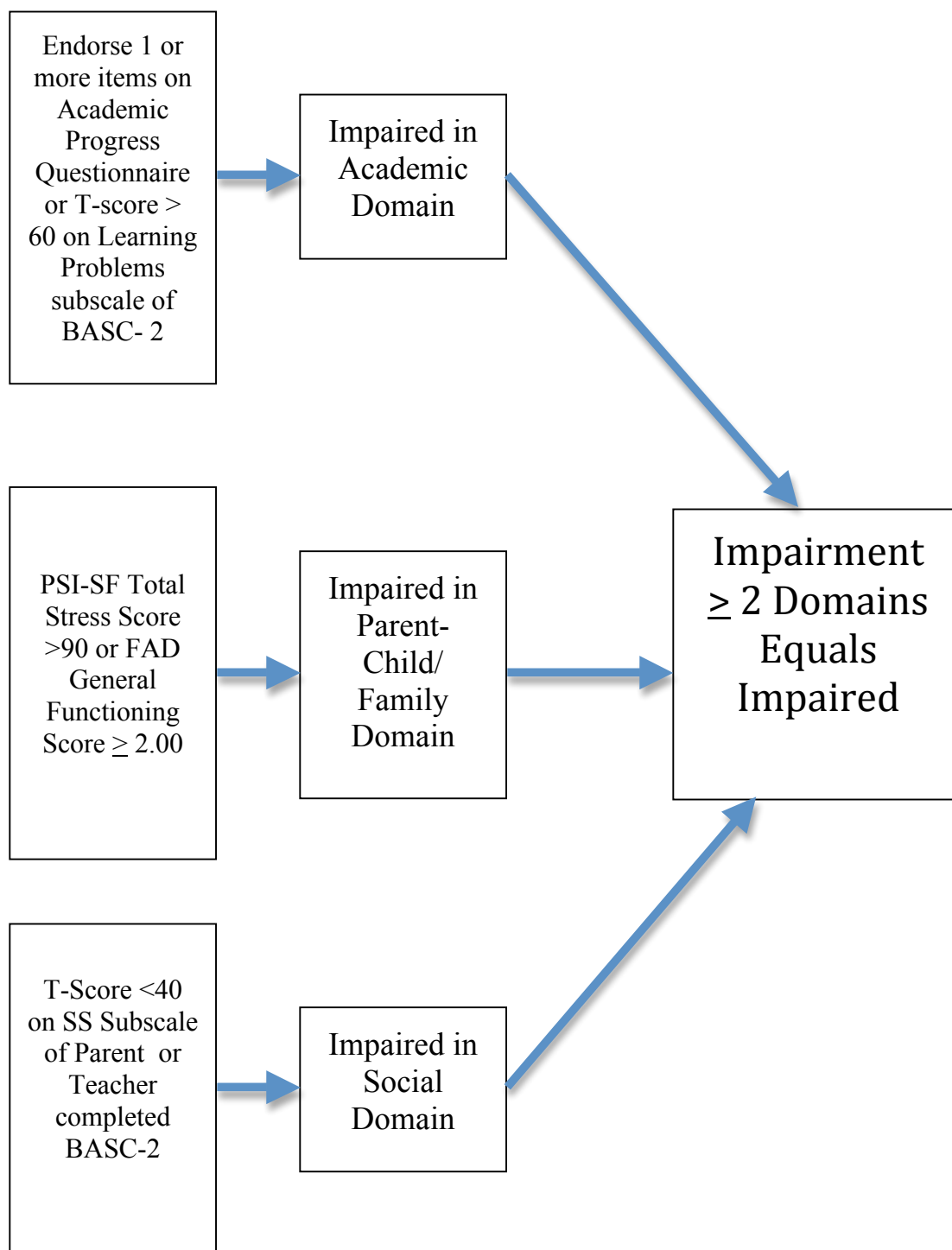**Teacher ADHDRS IA Symptom Count**

*Figure 5*

Overall impairment defined specifically as impairment in two or more domains of
functioning.

APPENDIX B

### *Demographic Questionnaire*

<u>Instructions:</u> Please answer the following questions about your child and your family**.**

1. What is your child's date of birth? _____

2. How would you describe your child's ethnicity?
_____ Caucasian
_____ African American
_____ Latino
_____ Asian American
_____ Native American
_____ Other/ Biracial

3. What is your approximate annual family
   income (for your household)?
_____ $0-15,000
_____ $15,000-30,000
_____ $30,000-45,000
_____ $45,000-60,000
_____ $60,000-75,000
_____ More than $75,000

4. How would you describe your level of
   education?
_____ Did not finish high school
_____ Received GED
_____ Received high school diploma
_____ Attended some college
_____ Received Associate's degree
_____ Received Bachelor's degree
_____ Graduate school

5. Is your child currently taking medication for AD/HD? _____

      *IF YES:* What type of medication(s)? _____

APPENDIX C

### *Academic Progress Questionnaire*

1.  Has your daughter ever received special services/accommodations at school?

    YES                    NO

    If YES, what grades? _____

2.  Has your daughter ever failed a course at school?

    YES                    NO

3.  Has your daughter ever been held back a year in school?

    YES                    NO

4.  Has your daughter ever been suspended or expelled from school?

    YES                    NO

APPENDIX D

*Additional Symptoms of AD/HD Questionnaire – Parent Version*

Child's Name _____ Age _____ Grade _____

Please indicate your relationship to the child: _____

**Circle the number that <u>best describes</u> your child's behavior over the past 6 months.**

| | Never Or Rarely | Sometimes | Often | Very Often |
|---|---|---|---|---|
| 1.   Forgetful in social activities | 0 | 1 | 2 | 3 |
| 2.   Giggles and/or talks excessively | 0 | 1 | 2 | 3 |
| 3.   Doodles instead of completing classwork | 0 | 1 | 2 | 3 |
| 4.  Whispers or talks to peers during classtime instead of paying attention | 0 | 1 | 2 | 3 |
| 5.  Blurts out things to others without thinking | 0 | 1 | 2 | 3 |
| 6.  Writes or passes notes instead of completing classwork | 0 | 1 | 2 | 3 |
| 7.  Changes friends impulsively or without thinking | 0 | 1 | 2 | 3 |
| 8.  Impulsively changes conversation topics | 0 | 1 | 2 | 3 |

APPENDIX E

*Additional Symptoms of AD/HD Questionnaire – Teacher Version*

Child's Name _____ Age _____ Grade _____

Please indicate your relationship to the child: _____

**Circle the number that <u>best describes</u> this student's behavior over the past 6 months.**

| | Never Or Rarely | Sometimes | Often | Very Often |
|---|---|---|---|---|
| 1. Forgetful in social activities | 0 | 1 | 2 | 3 |
| 2. Giggles and/or talks excessively | 0 | 1 | 2 | 3 |
| 3. Doodles instead of completing classwork | 0 | 1 | 2 | 3 |
| 4. Whispers or talks to peers during classtime instead of paying attention | 0 | 1 | 2 | 3 |
| 5. Blurts out things to others without thinking | 0 | 1 | 2 | 3 |
| 6. Writes or passes notes instead of completing classwork | 0 | 1 | 2 | 3 |
| 7. Changes friends impulsively or without thinking | 0 | 1 | 2 | 3 |
| 8. Impulsively changes conversation topics | 0 | 1 | 2 | 3 |

APPENDIX F

*Consent Form*

### THE UNIVERSITY OF NORTH CAROLINA
# GREENSBORO

CONSENT TO ACT AS A HUMAN PARTICIPANT:

Project Title:  AD/HD symptoms in Elementary School Girls

Project Director:  Lisa M. DeGrass, M.A.          Faculty Supervisor:  Arthur D. Anastopoulos, Ph.D.

Parent's Name: _____

Participant's Name:  _____          Date of Birth: _____

Date of Consent: _____

**Purpose**
Girls may express the symptoms of AD/HD (inattention, hyperactivity, and impulsivity) in different ways than boys. The purpose of this study is to determine if symptoms that are more girl-descriptive better predict impairment in girls than current AD/HD symptoms.

**Description and Explanation of Procedures**:
You will complete questionnaires and rating scales which ask questions about your daughter's feelings and behaviors. In addition, some questionnaires ask about how your daughter is doing in school, at home, and with peers. Others ask about your family functioning and your overall level of stress related to parenting your daughter.

Your daughter's teacher will complete questionnaires and rating scales regarding your daughter's feelings and behaviors in the school setting.

**Risks and Discomforts**:
The risks involved in this study are minimal. Some questionnaires ask about personal information, including questions about home and family life. You could feel hesitant about sharing this information with a researcher. If at any time you feel very uneasy about the information being asked, you may skip the questions that make you uncomfortable. You may also withdraw from the project without any consequences.

**Benefits**:
The results of this study will aid in researchers' knowledge about how girls express the symptoms associated with AD/HD. In addition, you and your child's teacher will also receive a gift card or coupon given by a local business.

**Confidentiality:**
The answers you and your child's teacher provide will be kept confidential. Questionnaires and interview information will be identified only by a number. The only people who will see information about you and your child are the researchers involved in this project. Your name will not be used in

any reports from this study. The forms that you complete will be stored in locked cabinets. Passwords will protect information that has been entered on a computer. All information will be destroyed after five years.

During or after your involvement in this project, you may become aware of other research studies being conducted in the AD/HD Clinic that may be of interest to you. Several such projects are currently underway, investigating: *Genetic basis of AD/HD; Maternal depression and parenting stress; Dyadic coping among adults with AD/HD; Risk and protective factors associated with comorbid depression in youth with AD/HD, and; Physical activity, AD/HD symptoms, and executive functioning*. These studies use many of the same data collection procedures. Should you decide to participate in any of these other projects, common data collected from this project can be shared with the other research project in order to spare you the trouble of having to repeat the same data gathering procedures. Only the data common to each project will be shared, and data will only be shared with projects for which you have given written consent.

### Consent:
By signing this consent form, you agree that you understand the procedures and any risks and benefits involved in this research. You are free to refuse to participate or to withdraw your consent to participate in this research at any time without penalty or prejudice; your participation is entirely voluntary. Your privacy will be protected because you will not be identified by name as a participant in this project.

The research and this consent form have been approved by the University of North Carolina at Greensboro Institutional Review Board, which ensures that research involving people follows federal regulations. Questions regarding your rights as a participant in this project can be answered by calling Mr. Eric Allen at (336) 256-1482.  Questions regarding the research itself will be answered by Lisa DeGrass by calling (336) 346-3192, ext. 702 or Dr. Arthur Anastopoulos at (336) 346-3192, ext. 303. Any new information that develops during the project will be provided to you if the information might affect your willingness to continue participation in the project.

By signing this form, you are agreeing to participate and to allow your child's teacher to participate in the project described to you by Lisa DeGrass.


_____		_____
Parent/Guardian Signature			Date


_____
Witness to Signature

APPENDIX G

### *Authorization to Disclose PHI*

Lisa M. DeGrass, M.A. at the University of North Carolina at Greensboro is conducting a study investigating whether the current symptoms used to identify children with AD/HD are appropriate for girls. Because this project requires forwarding protected health information (PHI) to the research team, Lisa DeGrass is asking for your permission to send such information.

By signing below, you are authorizing the AD/HD Clinic at UNCG to release your name, your telephone number, your child's diagnosis (i.e., pertaining to AD/HD), and a summary of questionnaire results from your child's recently completed AD/HD evaluation to Lisa DeGrass. This authorization will expire in 1 year, unless you revoke it in writing before that time. (A revocation will not apply to any personal health information that was released under this authorization before the date of revocation.)

If you choose NOT to authorize release of this information, it will not affect your health care at the AD/HD Clinic.  The AD/HD Clinic will not receive any money or benefit from releasing this information. You have a right to inspect or copy the information to be disclosed. You also have a right to receive a copy of this authorization.

If you allow release of this information to Lisa DeGrass, the information will no longer be subject to the Health Information Portability and Accountability Act (HIPAA). Lisa DeGrass may disclose it without contacting you again for authorization.

I authorize the AD/HD Clinic at UNCG to release the following information to Lisa DeGrass:

Name
Telephone number
Your child's diagnosis pertaining to AD/HD
Summary of questionnaire results from your child's recently completed AD/HD evaluation

Signed:  _____          Date: _____

Patient is unable to sign because s/he is ____ years old or _____ (other reason)


Parent/Guardian (circle) signature:  _____