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Diagnostic confusion surrounding AD/HD, ODD, and bipolar disorder in youth had led to research examining the symptoms that are unique to each condition, as well as symptoms that are shared among the disorders. However, limited research has assessed domains of functional impairment across these three conditions. The purpose of the current study was to examine whether symptoms of these conditions are differentially associated with impairment in various domains of functioning.

Fifty-two parents from clinical and community populations completed measures of their adolescent's psychopathology and functional impairment. Symptoms of AD/HD were consistently the strongest predictor of academic, family, and overall impairment. Symptoms of ODD tended to predict interpersonal impairment, in terms of relationships with parents, siblings, and peers. Mania was a significant predictor of parent and peer impairment in post-hoc analyses. These results highlight the potential utility of functional impairment in distinguishing among these diagnoses, as well as the necessity for examining areas of impairment for assessment and intervention purposes.

IMPAIRMENT ASSOCIATED WITH SYMPTOMS OF AD/HD, ODD, AND MANIA IN ADOLESCENCE

by

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION

Many researchers question current conceptualizations of bipolar disorder in youth, particularly because of the similar presentation and shared symptoms with other disorders, primarily Attention-Deficit/Hyperactivity Disorder (AD/HD) and Oppositional Defiant Disorder (ODD). There is specific concern that severe cases of AD/HD with comorbid ODD and other externalizing disorders are misdiagnosed as bipolar disorders, or conversely, that bipolar disorders in youth are misdiagnosed as AD/HD and ODD (Kim & Miklowitz, 2002). Of primary concern in this debate is the risk of misdiagnosis and subsequent improper treatment. This diagnostic confusion had led to research examining the symptoms that are unique to each condition, as well as symptoms that are shared among the disorders. However, limited research has assessed domains of functional impairment across these three conditions. There is no question that children with these disorders suffer impairment; they experience deficits in their functioning at home, at school, and in the community. Indeed, impairment in several domains of functioning is a diagnostic requirement for each of these conditions. However, there are limited data regarding qualitative or quantitative differences in impairment among these diagnoses.

As a result, this study assessed domains of impairment associated with AD/HD, ODD, and mania symptoms, which may provide an important step toward gaining a

clearer understanding of the similarities and differences among these conditions. As background for this study, this paper will first provide a brief overview of each of these conditions, including primary features, developmental course, etiology, comorbidity, and impairment. Next, a review of the previous research comparing impairment among these conditions will be presented, and gaps within this literature will be highlighted. Lastly, the specific goals and hypothesis of the proposed study will be provided.

CHAPTER II

REVIEW OF THE LITERATURE

Attention-Deficit/Hyperactivity Disorder

Primary Features. AD/HD is characterized by a persistent pattern of developmentally inappropriate inattention and/or hyperactivity/impulsivity symptoms that are present before age seven (American Psychiatric Association, 2000). In order to meet *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition-Text Revision* (DSM-IV-TR; APA, 2000) criteria for AD/HD, an individual must exhibit impairment in at least two domains of functioning, such as at school, at home, or with peers. The individual must also exhibit at least six out of nine possible symptoms of inattention and/or six out of nine possible symptoms of hyperactivity/impulsivity for at least six months in duration. These symptoms must be developmentally deviant, and also be present before age seven. Finally, the symptoms must not be better accounted for by other conditions.

Overall, the prevalence of AD/HD is approximately 5-7% of the general population, with boys outnumbering girls by approximately 3:1 to 9:1 (American Psychiatric Association, 2000). Across studies of clinic-referred samples of children, the average proportion of boys to girls with AD/HD is 6:1. Although the validity for diagnostic criteria of AD/HD in non-Caucasian samples is questionable, Cuffe, Moore, and McKeown (2005) reported similar prevalence rates for boys across ethnic groups:

5.65% in African Americans, 4.33% in Caucasians, and 3.06% in Hispanics.

Developmental Course. Symptoms of AD/HD appear to emerge at different points across development. The peak age of onset of AD/HD appears to occur around 3-4 years of age (Barkley, Fischer, Edelbrock, & Smallish, 1990). Typically, it is the hyperactive-impulsive behaviors that are observed at this age, and inattentive symptoms often emerge slightly later, around 5-7 years of age (Loeber, Green, Lahey, Christ, & Frick, 1992). Often, inattentive symptoms become evident as a child progresses to a more structured classroom environment. While inattention symptoms have been found to remain relatively constant over time, hyperactive-impulsive symptoms appear to steadily decrease; however, it also appears that the presentation of hyperactive symptoms may change as a child gets older. For example, behavioral hyperactivity (e.g., having trouble staying seated) often shifts to verbal hyperactivity (e.g., excessive talkativeness). Longitudinal studies have also demonstrated that AD/HD persists at a clinically significant level into adolescence and young adulthood for about up to 80% of children with AD/HD (Barkley, 2006).

Etiology. Although there are multiple etiologies that may lead to AD/HD, the strongest contributors appear to be neurological and genetic factors (Barkley, 2006). Twin and family studies have consistently demonstrated that the majority of variation in the behavioral traits constituting AD/HD is the result of genetic factors. AD/HD may also be caused by unique events that are experienced by a single child and are not shared by family members, including neurological injury due to alcohol and tobacco exposure in utero, premature birth, lead poisoning, stroke, and brain trauma, among others. Much

research has also demonstrated that AD/HD does not result from purely social factors, such as parenting, family conflict, marital problems, insecure attachment, television or video games, or interactions with peers (Barkley, 2006). These social factors may, however, have some influence on these children, particularly on impairment in functioning that the child may experience or the risk of developing comorbid disorders.

Comorbidity. A diagnosis of AD/HD conveys a significant risk for other co-occurring psychiatric disorders, with up to 60% of the child and adolescent population having at least one other disorder (Barkley, 2006). A review of the comorbidity literature by Barkley (2006) indicated that ODD was the most prevalent comorbid condition (in approximately 40% to 60% of children with AD/HD), followed by Conduct Disorder (in approximately 35-45%), Major Depressive Disorder (in approximately 25-30%), and anxiety disorder(s) (in approximately 25-35%).

Bipolar disorder has also been seen in children and adolescents with AD/HD, although prevalence rates vary widely depending upon the criteria being used to define the requisite “manic” episode in youth. Milberger, Biederman, Faraone, Murphy, and Tsaung (1995) found that 11% of their sample of children with AD/HD also had bipolar disorder; among girls with AD/HD, this rate was 10% (Biederman et al., 1996). In a study by Wilens and colleagues (2002) on comorbidity in AD/HD, the authors reported that 26% of preschool children and 18% of school-age children qualified for an additional diagnosis of bipolar disorder. These three studies were all conducted by a group at Massachusetts General Hospital that is well-known for their work in this area; however, this group commonly uses more liberal diagnostic criteria than other research groups in

diagnosing bipolar disorder in youth. Thus, although rates of comorbid bipolar disorder appear to range from 0% to 26% (Angold, Costello & Erkanli, 1999), most other research groups have found rates of bipolar disorder in AD/HD samples to be closer to 0%, including the Multimodal Treatment of AD/HD study (Jensen et al., 2001; Jaideep, Reddy, & Srinath, 2006).

Impairment. AD/HD is associated with impairment in psychosocial functioning, including multiple academic, social, emotional, cognitive, and family difficulties (Barkley, 2006). Children with AD/HD frequently struggle academically; almost all clinic-referred children with AD/HD are doing poorly in school and are underperforming relative to their aptitude (Barkley, 2006). Poor performance is thought to result from inattentive, impulsive, and restless behavior in the classroom, as well as executive functioning deficits associated with AD/HD, including deficits in working memory, emotion regulation, internal language (e.g., problem-solving), and reconstitution (i.e., the ability to synthesize and analyze thoughts and behavior) (Barkley, 1997). Children with AD/HD are also more likely than their non-disordered peers to have learning disabilities, lower GPAs, and higher rates of course failure (Barkley, 2006; Kent et al., 2010).

Children with AD/HD also frequently experience impairment in their interactions with peers. Children and adolescents with AD/HD have been found to exhibit poorer social and communication skills than youth without AD/HD, leading to difficulties with peer interactions and initiating and maintaining friendships (Bagwell, Molina, Pelham, & Hoza, 2001; Barkley, 2006; Klimkeit et al., 2006). Peers, as well as mothers and teachers,

find hyperactive children (especially boys) to be significantly more aggressive, intrusive, noisy, and rejected in their social relations than non-disordered children (Barkley, 2006).

Children with AD/HD also experience impairment in home functioning, particularly in their relationships with parents and siblings. Overall, these families are characterized by greater intra-family conflict, particularly between the parents and the child(ren) with AD/HD, as compared to control families (Danforth, Barkley, & Stokes, 1991; Johnston & Mash, 2001). At home, children with AD/HD are often more talkative, negative, and defiant; more demanding of help from others; and less able to play and work independently (Danforth, Barkley, & Stokes, 1991; Johnston & Mash, 2001).

Little research has directly examined impairment in sibling relationships among children with AD/HD (Mikami and Pfiffner, 2008). Children with AD/HD have been found to exhibit significantly poorer and more conflictual sibling relationships than non-AD/HD children (Greene et al., 2001; Mikami & Pfiffner, 2008). Given the high heritability of AD/HD, some siblings may also have AD/HD themselves, which further contributes to disruption within the family (Barkley, 2006).

Oppositional Defiant Disorder

Primary Features. The diagnostic criteria for ODD include symptoms related to behavioral noncompliance (e.g., arguing with adults, actively defying rules and requests, deliberately annoying others), as well as problems with anger control (e.g., losing temper, being easily annoyed) (American Psychiatric Association, 2000). The DSM-IV-TR requires that at least four of the eight possible ODD symptoms be present for at least six months. Problematic behaviors in ODD are greater than oppositional behavior that is

characteristic of a specific developmental stage, including opposition of children from 18 to 36 months and some incidents of adolescent rebellion (Christophersen & Mortweet, 2001). In addition, the symptoms must lead to impairment in social, academic or occupational functioning (American Psychiatric Association, 2000). The DSM-IV reports estimated prevalence rates of 2-16% of children. In a large and diverse national sample, rates of ODD in Hispanics, African Americans (non-Hispanic), and Caucasian (non-Hispanic) were found to be similar (5.4%, 5.6%, and 5.7%, respectively) (Breslau et al., 2006). ODD has been found to be more prevalent among families of low socioeconomic status (Loeber, Burke, Lahey, Winters, & Zera, 2000).

Although ODD is more prevalent in males than females before puberty, the rates appear to be equal after puberty (American Psychiatric Association, 2000). However, males may display more overt, aggressive, and confrontational behavior, as well as persistent symptoms than females. Both males and females display nondestructive and more covert behaviors, such as truancy, lying, and defiance (Keenan, Loeber, & Green, 1999). Oppositional behavior is often setting-specific, occurring more often in the presence of parents or other familiar adults such as teachers or babysitters, than in the presence of adults with whom the child has less frequent contact (Chistophersen & Mortweet, 2003).

Developmental Course. The earliest indicators of ODD-like behaviors may be difficult temperamental characteristics in early childhood (e.g., high reactivity, difficulty being soothed), although this is not specific to ODD (American Psychiatric Association, 2000; Loeber, 1990). Early symptoms, particularly aggressive behavior, appear to emerge

around age three to four. Indeed, the primary developmental pathway for serious conduct problems in adolescence and adulthood appears to be established during the preschool years (Webster-Stratton & Reid, 2003). Oppositional symptoms often emerge in the home setting but over time may appear in other settings as well (American Psychiatric Association, 2000). Diagnosable ODD is typically evident before the age of eight, and onset is usually gradual, occurring over the course of months or years. The number and severity of symptoms tends to increase with age (American Psychiatric Association, 2000; Burke, Loeber, & Birmaher, 2002; Loeber, Wung, Keenan, & Giroux, 1993). In a significant proportion of cases, ODD is a developmental precursor to Conduct Disorder (CD), characterized by a repetitive and persistent pattern of behavior in which the basic rights of others or societal norms are violated in an age-inappropriate way (American Psychiatric Association, 2000).

Etiology. In contrast to the neurobiological and genetic underpinnings of AD/HD (Barkley, 2006), antisocial behavior appears to be caused by a combination of biological and psychosocial variables (Burke, Loeber, & Birmaher, 2002). Parent-child interactions are believed to be a mechanism through which a child learns antisocial behavior (Patterson, Reid & Dishion, 1992). Through increasingly coercive and negative interactions, a child learns to use arguing, tantrums, and other antisocial behaviors to delay or avoid unwanted demands (e.g., chores, going to bed). When increasingly problematic behavior results in a parent withdrawing a demand, these interactions become negatively reinforcing for the child.

ODD also appears to be more common in families in which at least one parent has a history of a Mood Disorder, ODD, CD, AD/HD, Antisocial Personality Disorder, or a Substance-related disorder (American Psychiatric Association, 2000). Some research has found that mothers with a depressive disorder are more likely to have a child with oppositional behavior, but it remains unclear to what extent maternal depression is a cause or a result of a child's oppositional behavior. ODD is also more common in families in which there is severe marital discord.

Comorbidity. ODD commonly occurs in the presence of other psychiatric conditions. Much research has indicated that AD/HD is common in children with ODD (American Psychiatric Association, 2000; Greene et al., 2002). In a study of comorbidity and impairment in youth with ODD and CD, Greene and colleagues (2002) found that clinic-referred youth with ODD with and without CD had a significantly higher rate of AD/HD (80% to 85%), severe major depression (30% to 55%), bipolar disorder (30% to 45%) and multiple anxiety disorders (36% to 42%), compared to psychiatric comparison subjects (who were also clinic-referred but did not have ODD or CD).

Impairment. Individuals with ODD maybe impaired in several domains of functioning, although the majority of the literature points to impaired family functioning. Difficulties at home include conflicts with parents and siblings, family distress, and parenting distress (Greene et al., 2002). Greene and colleagues (2002) used parent-report on the Social Adjustment Inventory for Children and Adolescents and the Family Environment Scale to assess social and family functioning in families of youth with ODD. The authors found that these families were characterized by significantly poorer

cohesion and higher conflict, compared to families of non-disordered youth. Moreover, the authors report that impaired social functioning in these youth was reported across multiple domains (i.e., in school, with parents, with siblings, and with peers).

There has also been some evidence of impairment at school, including reading problems (Maughan et al., 1996) and school refusal (Harnda, Yamazaki, & Saitoh, 2002) in youth with ODD. Learning disorders and communication disorders also tend to be associated with ODD (American Psychiatric Association, 2000); however, a 2002 review by Burke, Loeber, and Giroux indicated that this relationship is almost entirely accounted for by comorbid AD/HD.

Bipolar Disorder

Primary features. A diagnosis of Bipolar I disorder is characterized by the presence of one or more episodes of mania[1], defined as a discrete, one-week period of abnormally and persistently elevated, expansive, or irritable mood (criterion A) that represents a qualitative shift from the individual's typical mood (American Psychiatric Association, 2000). A manic episode requires at least three additional symptoms (criterion B; four if the mood is only irritable), including inflated self-esteem or grandiosity; decreased need for sleep; feeling that thoughts are racing; distractibility; psychomotor agitation; and excessive involvement in pleasurable activities that have a high risk of dangerous consequences (American Psychiatric Association, 2000). In addition, lability of mood is commonly seen, in which the person alternates between

[1] Although the term mania is technically subsumed under bipolar disorder, these terms will be used interchangeably in this document, as this is standard practice in the child psychiatry literature (Klein, Pine, & Klein, 1998).

euphoric and irritable states. Symptoms must also be sufficiently severe to cause clinically significant impairment in functioning. Individuals with Bipolar I disorder have typically experienced at least one major depressive episode, which requires a two-week period of depressed mood or loss of interest or pleasure that represents a change from the individual's previous functioning. Thus, individuals with Bipolar I disorder commonly experience alternating episodes of mania and major depression. A diagnosis of Bipolar I disorder can also be met if the person has experienced a mixed episode, in which the criteria are met for both a manic episode *and* a depressive episode nearly every day for a one-week period; mixed episodes seem to be more common in adolescents and young adults than in older adults (American Psychiatric Association, 2000).

The current DSM-IV criteria for mania were developed for adults with bipolar disorders and do not account for developmental differences between adults and children or adolescents with the disorder (Kowatch, Fristad, Findling & Post, 2009). Indeed, the defining features of mania in younger populations have been a subject of great debate; as a result, there is great variability in mania criteria that are used within the research on pediatric bipolar disorder. Although Bipolar I disorder may be diagnosed in youth using adult criteria (Wozniak et al., 2005), many experts believe that the presentation of the disorder in childhood or adolescence is a more severe and chronic form of the illness, with patterns of continuous and rapid cycling rather than discrete episodes typical of adult Bipolar I Disorder (Geller et al., 1995; Perlis et al., 2004). Others have argued that it is inappropriate to define mania as continuous, as clinical descriptions of mania have consistently indicated a distinct episode (Klein, Pine, & Klein, 1998).

Some researchers have also suggested that the cardinal symptoms of mania in youth differ from those of mania in adults. Specifically, rather than euphoria and grandiosity, some experts have argued that rage attacks and severe irritability more accurately characterize mania in youth (Carlson, 1984; Fergus et al., 2003; Wozniak et al., 2005). However, there is a strong argument against using severe irritability as the hallmark symptom of mania in youth, as irritability is not unique to mania and is seen in other pediatric psychiatric conditions, including AD/HD and ODD, as well as normal adolescence. In addition, overlap between other symptoms of mania and symptoms of AD/HD and ODD is a key contributor to the bipolar controversy (see Appendix A) (Pavuluri, Birmaher & Naylor, 2005). In general, the features of pediatric bipolar disorder that are uniformly agreed upon are a chronic course with long episodes; predominantly mixed episodes and/or rapid cycling; predominant irritability; and a high rate of comorbid AD/HD and anxiety disorders (Birmaher et al., 2002; Findling et al., 2001; Geller et al., 1998; Wozniak et al., 1995). Although mania in preadolescence remains highly controversial, mania in adolescence is slightly less so, as most experts agree that the older the child, the more the mania symptoms may mimic the adult presentation (Carlson, 2005; Pavuluri, Birmaher, & Naylor, 2005).

With lifetime prevalence rates varying from 0.4% to 1.6%, bipolar disorders appear equally prevalent in men and women (American Psychiatric Association, 2000). In youth, rates of bipolar disorder in clinic populations vary widely (0.6% to 15%) depending upon the measure and diagnostic criteria used to obtain diagnoses, the referral

source, and the specialization of the clinic (Biederman et al., 1996; Lewinsohn, Klein & Seeley, 1995; Geller et al., 2001).

Developmental Course. Bipolar disorder was first considered a disorder of adulthood, and more recently has been recognized to manifest in children and adolescents (Lewinsohn, Seeley & Klein, 2003). According to the DSM-IV-TR, the mean age of onset of the first manic episode is in the early 20s, but some cases start in adolescence and others start after age 50 (American Psychiatric Association, 2000). In two large national studies, the majority of adults with bipolar disorder reported that their initial onset of mania or depression occurred at age 19 or earlier (Lish, Dime-Meenan, Whybrow, Price & Hirschfeld, 1994; Chengappa et al., 2003), and another large-scale study reported that between 15% and 28% of their sample experienced illness onset before age 13 (Perlis et al., 2004).

Currently, there is not sufficient evidence to indicate that children with bipolar disorder will go on to develop the adult form of the illness (Harrington & Myatt, 2003). However, adolescent-onset mania, particularly when associated with psychotic symptoms, appears to more closely resemble bipolar disorder in adulthood (McClellan, McCurry, Snell, & DuBose, 1999; Carlson, 2005; Pavuluri, Birmaher, & Naylor, 2005).

Etiology. Bipolar disorder is among the most heritable of disorders, with heritability estimates ranging from .85 to .93 (Miklowitz & Johnson, 2008). Although meta-analyses have suggested that there are several possible genetic regions linked to bipolar disorder, no genetic region has consistently been replicated across studies. Bipolar disorder is thought to be a result of dysregulation in dopamine and serotonin

systems. Specifically, it is currently theorized that dopamine function is overactive during manic states and underactive during depressive states. It is also thought that deficits in the functioning of the serotonin system allow for greater variation in the functioning of the dopamine system.

Psychosocial variables can also affect the nature of the disorder (Miklowitz & Johnson, 2008). It has been theorized that individuals with bipolar disorder are over-reactive in their response to rewards and successes in their environment. In other words, these individuals are more likely to react with strong emotions to reward or achievement.

Comorbidity. The majority of individuals with bipolar disorder have a lifetime history of other psychiatric disorders (Miklowitz & Johnson, 2008). Much attention has been given in research studies to the comorbidity of AD/HD in youth with bipolar disorder. Several studies report high rates of comorbid AD/HD in pediatric bipolar samples, ranging from 57% to 98% in children (Angold, Costello, & Erkanli, 1999; Miklowitz & Johnson, 2008; Wozniak, Biederman, Kiely & Ablon, 1995) and 20% to 69% in adolescents (Faraone et al., 1997; Geller et al., 1995). The large ranges of these rates are likely to be at least partially due to the varying definitions of mania used by different research groups, or perhaps to the fact that AD/HD and bipolar disorders share several core symptoms, including inattention, racing thoughts, distractibility, hyperactivity, and impulsivity (West, McElroy, Strakowski, Keck, & McConville, 1995). However, rates between 60% to 90% have been found in samples even when overlapping symptoms were removed from consideration (Miklowitz & Johnson, 2008).

Rates of ODD in bipolar samples range from 46% to 75% (Pavuluri, Birmaher & Naylor, 2005). ODD also shares symptoms with mania, including being easily annoyed; being angry and resentful; and often losing one's temper. Other comorbid disorders include CD (found in 5.6% to 37% of bipolar youth), anxiety disorders (found in 12.5% to 56%), substance abuse disorders (found in 0% to 40%), and Asperger's disorder (found in 11%). A review by Pavuluri, Birmaher and Naylor (2005) also concluded that comorbidity varies with age; children with bipolar disorder tend to have higher rates of AD/HD than do adolescents with bipolar disorder, whereas the latter tend to have higher rates of substance abuse.

Impairment. Although mania has a broad impact in several domains of functioning, the majority of the literature points to deficits in family and peer relationships (Geller, 2002). Geller and colleagues (2002) found that their sample of youth with DSM-IV bipolar disorder experienced substantial impairment in family functioning, as they had poor relationships with siblings and strained relationships with parents. Specifically, the authors found low levels of warmth and high levels of hostility in mother-child relationships, as well as poor agreement between parents regarding parenting practices. The authors also found that more than half of their sample of bipolar youth had poor social skills, lacked friendships, and were the target of teasing from other children. Additionally, a study of adolescents with bipolar disorder by Goldstein, Mullen and Miklowitz (2006) found that they demonstrated significant interpersonal deficits, even when asymptomatic, compared with non-disordered controls.

Little research has examined academic impairment that is unique to bipolar disorder (i.e., that is not better accounted for by comorbid AD/HD). Studies of adults with bipolar disorder have reported deficits in executing functioning, such as planning, working memory, and resistance to interference, as well as aspects of sustained attention, verbal learning, and memory (Bearden et al., 2001), which may impact academic functioning. In one of the few studies on neuropsychological functioning in bipolar youth, Robertson, Kutcher, and Lagace (2003) compared adolescents with bipolar disorder to controls and found that the bipolar group performed significantly lower than controls on only one subtest (oral arithmetic) of the WISC-III. In the same sample, these researchers also found that bipolar youth had significantly lower scores on achievement in mathematics, but not in reading, spelling, or nonverbal intelligence (Lagace, Kutcher, & Robertson, 2003).

Comparing Impairment in AD/HD, ODD, and Bipolar Disorder

AD/HD, ODD and bipolar disorder have a substantial impact on a child's functioning in academic, parent, sibling, and peer domains. Such impairment is likely to predict future negative outcomes for these children (Evans & Youngstrom, 2006); however, research examining the differences in type or severity of impairment among these conditions is limited. Indeed, very few studies have directly compared differential impairment in groups of AD/HD, ODD and bipolar disorder youth. In one example, Geller and colleagues (2000) examined interpersonal functioning with family and peers and found that children with Bipolar I or II disorder showed significantly greater impairment in terms of mother-child warmth, mother-child and father-child tension, and

in peer relationships, as compared to children with AD/HD and control children. Overall, this work suggests that children and adolescents with bipolar disorders experience greater impairment in family and social functioning than children with AD/HD and healthy children.

Other investigators have compared impairment in a "pure" group with one disorder alone to a "comorbid" group presenting with more than one disorder. In terms of academic impairment, an early study by Wozniak and colleagues (1995) found that children and adolescents meeting criteria for both AD/HD and mania had higher rates of reading disabilities, as compared to youth with AD/HD only. A more recent study by Henin and colleagues (2007) examined neuropsychological impairments in children and adolescents with AD/HD and bipolar disorder, youth with AD/HD alone, and healthy controls; the authors found that the AD/HD plus bipolar disorder group and the AD/HD-only group were equally impaired on measures of verbal learning and arithmetic achievement, and demonstrated similar rates of receiving special services (e.g., school tutoring, special education placement) at school. On all measures, both AD/HD groups demonstrated significantly greater functional impairment as compared to healthy control youth. The authors conclude that AD/HD symptoms, rather than mania symptoms, may account for neuropsychological (and, subsequently, academic) impairment in these youth. They argue that this finding may be logical in light of the fact that AD/HD often onsets prior to bipolar disorder, and therefore could be responsible for early academic impairment. However, this study examined clinic-referred youth only and their bipolar group was unmedicated and acutely symptomatic at the time of testing; it remains unclear

the extent to which illness severity may have impacted these results, or whether such results would also be seen in less severe or community-based samples.

In terms of family functioning, Barkley, Anastopoulos, Guevremont and Fletcher (1992) examined adolescents with AD/HD, adolescents with AD/HD and comorbid ODD, and non-disordered controls and found that both AD/HD groups displayed more topics of conflict and more angry conflicts at home than in control families. Specifically, it was the group with both AD/HD and ODD that displayed greater communication difficulties, greater family conflicts and anger during conflicts (with both mothers and fathers) than the control group. This group was also more likely to exhibit greater use of negative behaviors during neutral conversations, and the mothers of these children also displayed more extreme and unreasonable beliefs about parent-adolescent relations than mothers of controls. The AD/HD-only group scored in between the AD/HD and ODD and the control group on these measures. The authors concluded that the presence of ODD in adolescents with AD/HD seems to increase the risk for negative communications, angry family interactions and unreasonable beliefs about parent-teen relations.

In a recent study of impairment in interpersonal functioning (with both family and peers) in adolescents with bipolar disorder, Goldstein and colleagues (2009) found that bipolar youth with comorbid AD/HD reported greater impairment compared to bipolar youth without AD/HD. Similarly, bipolar youth with comorbid ODD reported greater impairment in interpersonal functioning than bipolar youth without ODD. This evidence appears to suggest that the combination of symptoms of bipolar disorder and comorbid

AD/HD or ODD had an additive effect in terms of the amount of impairment experienced. Indeed, other research including pure and comorbid groups appears to suggest an additive effect in terms of impairment experienced when more than one disorder is present. For example, research on youth with AD/HD has demonstrated that impairment in social difficulties, delinquent behavior, and substance abuse tends to be even greater when comorbid disorders such as ODD or CD are present (Hazell, 2010; Wilens et al., 2002).

In this same vein, Wozniak and colleagues (1995) assessed overall impairment and found that children meeting criteria for both AD/HD and mania had higher rates of comorbid conditions and were significantly more impaired compared to children meeting criteria for AD/HD only. In particular, children with AD/HD and mania had lower Global Assessment of Functioning (GAF) scores than children with AD/HD only. In a longitudinal study, Biederman and colleagues (1996) found that children with AD/HD and comorbid bipolar disorder had significantly higher rates of comorbid conditions, psychiatric hospitalization, and severe impairment in psychosocial functioning (e.g., lower GAF scores, higher scores on measures of delinquent behavior and social problems) at both baseline and four-year follow-up than other AD/HD children.

Summary

Many researchers question current conceptualizations of bipolar disorder in children and adolescents, primarily because of the extent of overlap with symptoms of AD/HD and ODD. This diagnostic confusion has led to research examining features that are unique to each condition, as well as features that are shared. Children diagnosed with

AD/HD, ODD, and bipolar disorder are often impaired in several domains of functioning, including academics and interpersonal relationships with parents, siblings, and peers. What has been largely absent in the research, however, is an examination of differential severity of functional impairment among these conditions, as well as qualitative differences in terms of the domain of functioning impacted. A closer examination of severity and domains of functional impairment associated with symptoms of mania, AD/HD, and ODD may provide important information in the ongoing investigation of the relationships among these diagnoses.

Some research suggests that mania is associated with more severe global impairment than AD/HD or ODD, although differences in terms of specific domains of impairment were not identified. In contrast, some research has suggested that symptoms of AD/HD may account for impairment in the academic domain, even for youth who may also have bipolar disorder. However, the existing body of research on this topic is small. Some studies have examined impairment between AD/HD and ODD samples, very few studies have compared AD/HD and bipolar samples, and no studies have compared bipolar and ODD samples. Another limitation is that much of the existing research includes only studies involving acutely symptomatic, clinic-referred youth. One problem with this approach is that clinical samples depend upon using diagnostic criteria for which there is questionable validity. In a classic example of circular reasoning, researchers ultimately base their conclusions about diagnostic criteria after using those very diagnostic criteria to classify the groups in their sample. Utilizing community samples would allow for a more dimensional examination of impairment associated with

these symptom clusters, rather than relying on uncertain diagnostic categories. Moreover, including community-based samples could allow for examinations of functional impairment in subsyndromal manifestations of these conditions.

Current Study

In an effort to shed further light on the relationship among AD/HD, ODD, and mania, this study examined the extent to which symptoms of each diagnosis map onto indices of impairment in several domains of functioning, as well as severity of impairment associated with each condition, in a sample of both clinic-referred and community-based participants. In particular, the following hypotheses were proposed about the relation between symptoms of AD/HD, ODD, and mania, and domains and severity of functional impairment:

Hypothesis 1. Based on the pervasive nature of AD/HD on functioning in multiple domains, AD/HD was expected to be the strongest predictor of overall functional impairment.

Hypothesis 2. Each diagnosis would differentially be associated with indices of impairment; specifically, AD/HD was expected to be the strongest predictor of academic impairment, while ODD was expected to predict impairment in family functioning, and mania was expected to predict impairment in family and peer relationships.

CHAPTER III

METHOD

Participants

Fifty-two parents of an adolescent between the ages of 13 and 17 participated in this study. As shown in Table 1, the mean age of the adolescents was 15.30 (*SD* = 1.47), and all were enrolled in grades 6 through 12. Sixty-five percent (N = 34) were male. Racial composition of the adolescent sample was 82.7% Caucasian/White, 9.6% African American/Black, 5.8% multiracial, and 1.9% Asian. None of the adolescents were of Hispanic ethnicity. Two children were adopted; all others lived with at least one biological parent. Forty-eight percent (N = 25) of the sample carried a psychiatric diagnosis, including 20 diagnosed with AD/HD, 5 diagnosed with depression, and 3 diagnosed with an anxiety disorder. Of the adolescents with a psychiatric diagnosis, 22 reported ever taking psychotropic medication(s).

Parents ranged in age from 30 to 71 (*M* = 46.50, *SD* = 6.90). All but one parent participant were female. Racial composition of the parents was 84.6% Caucasian/White, 9.6% African American/Black, 3.8% Asian, and 1.9% multiracial. None of the parents reported being of Hispanic ethnicity. In terms of marital status, 75.0% reported being married, 15.4% reported being divorced, 3.8% of parents reported being single; 3.8% reported being in a relationship but not married; and 1.9% reported being separated. In regards to educational background, 48.1% of parents reported completing college, 34.6%

reported earning a graduate degree, 9.6% reported completing some college, 5.8% reported completing some high school, and 1.9% reported earning a high school diploma. In terms of parental psychopathology, 38% (N = 20) of parents reported carrying a psychiatric diagnosis, including 16 diagnosed with depression, 5 diagnosed with an anxiety disorder, and 2 diagnosed with AD/HD. All 20 of these parents reported ever having taken psychotropic medication(s).

Materials

Demographics. Parents completed a brief demographic questionnaire about themselves and their adolescent. Parents also provided information about psychiatric history for themselves and their adolescent, including the name of any diagnosis received and medication history.

Symptoms of AD/HD, ODD, and Mania. In order to assess symptoms of AD/HD, ODD, and mania in adolescents, a parent-rated questionnaire was created comprised of items from valid and reliable rating scales of AD/HD, ODD, and mania. The rating scales from which the items are drawn are on a very similar 4-point Likert scale (0 = *never or rarely*; 1 = *sometimes*; 2 = *often*; 3 = *very often*), which was retained in the new questionnaire. Items from each rating scale were listed randomly.

Attention-Deficit Hyperactivity Disorder Rating Scale-IV (ADHD RS-IV). Inattention and hyperactivity-impulsivity items were drawn from the ADHD RS-IV (DuPaul, Power, Anastopoulos & Reid, 1998), which is a narrow-band rating scale containing the 18 DSM-IV items exclusively evaluating AD/HD in home and school contexts. Parents were asked to indicate the frequency of AD/HD symptoms on a 4-point

Likert scale ranging from *never or rarely* (0) to *very often* (3), with higher scores indicating greater AD/HD-related behavior. The ADHD RS-IV is a psychometrically sound instrument that has demonstrated substantial reliability and validity. Adequate internal consistency was found (Cronbach's α = .86 for Inattention, .88 for Hyperactivity/Impulsivity). Scores were also found to be consistent over a four-week period (Pearson product-moment correlation coefficients = .78 for Inattention and .86 for Hyperactivity/Impulsivity).

The ODD Rating Scale (Anastopoulos, 1999). Symptoms of Oppositional Defiant Disorder were drawn from the ODD Rating Scale, which is an 8-item measure reflecting the 8 ODD symptoms from the DSM-IV-TR (American Psychiatric Association, 2000), and was modeled after the ADHD Rating Scale-IV (DuPaul, Power, Anastopoulos & Reid, 1998). Each symptom is rated on a 4-point Likert scale ranging from *not at all* (0) to *very often* (3). Items are then summed to yield a total ODD score ranging from 0 to 24, with higher scores indicating greater symptom severity. The ODD Rating Scale demonstrates good concurrent validity (r = .61) with the BASC-2 aggression T-score. All 8 items were incorporated into the proposed questionnaire, with the purpose of evaluating ODD symptoms.

Child Mania Rating Scale (CMRS). Mania symptoms were drawn from the Child Mania Rating Scale, Parent Version (CMRS-P; Pavuluri, Henry, Devineni, Carbray & Birmaher, 2006), which is a 21-item parent-completed screening tool for ages 5 to 17 exclusively evaluating symptoms of mania in children and adolescents in the past month. All items correspond to DSM-IV criteria for a manic episode. Parents respond to each

item on a 4-point Likert scale ranging from *never/rarely* (0) to *very often* (3), which is nearly identical to that of the ADHD Rating Scale-IV and the CPRS-R. Although the CMRS-P asks parents to rate the presence of the symptoms within the past month, an open-ended time frame was used in the current study in order to capture a wider range of all symptoms (Pavuluri, Henry, Devineni, Carbray & Birmaher, 2006). However, given that the present study aims to examine symptoms on the bipolar spectrum rather than a manic episode diagnosis, and that mania symptoms have been reported to be more chronic than episodic in youth (Geller, 1995; Geller et al., 2000), we did not retain the specification that the symptoms must have occurred within the past month.

The CMRS-P is a sound psychometric measure, with excellent internal consistency (Cronbach's $\alpha = .96$) and test-retest reliability ($r = .96$) at one week. The authors also examined the construct validity of the CMRS-P by assessing the correlations between the CMRS-P and three clinician-administered rating scales also designed to measure manic symptoms, all of which had established reliability and validity. The CMRS-P demonstrated adequate construct validity, as the CMRS-P total score correlated significantly with the YMRS ($r = .78$), the K-SADS MRS ($r = .80$), and the WASH-U-KSADS Mania Module ($r = .83$). The authors also report Area Under the Curve (AUC) analyses of .91 for discriminating bipolar disorder from AD/HD, and .96 for discriminating bipolar disorder from healthy controls. Principal components analyses revealed that the CMRS-P is a unidimensional scale, as 91.8% of the variance was accounted for by a single dimension of mania (Henry, Pavuluri, Youngstrom & Birmaher, 2008).

Compared to other parent-report mania rating scales or mood disorder rating scales for children and adolescents (including the Young Mania Rating Scale, the Mood Disorder Questionnaire and the General Behavior Inventory), the CMRS-P appears to cover DSM-IV criteria most thoroughly. Although the number of items outweighs the number of criteria for a manic episode, the CMRS-P includes more than one item for many of the criteria. For example, the CMRS-P includes five items that correspond to different aspects of Criterion A, which addresses elevated, expansive, or irritable mood lasting at least one week. For purposes of the proposed study, all 21 items will be incorporated into the proposed questionnaire in order to assess symptoms of mania.

Conners Comprehensive Behavior Rating Scale. The Conners Comprehensive Behavior Rating Scale (CBRS; Conners, 2008) is a broadband measure with parent, teacher, and self-report versions, which assesses for a broad range of behavioral, emotional, social and academic concerns and disorders that have occurred within the past month in children and adolescents aged 6 to 18. It includes AD/HD, ODD and mania subscales, as well as impairment items that assess impairment at home, at school, and with peers. The CBRS consists of 202 items, all rated on a 4-point Likert scale ranging from *not true at all; never; seldom* (0) to *very much true; very often; very frequently* (3). Internal consistency is very good, with coefficients ranging from .69 to .96. Test-rest reliability is also very good, with two- to four-week test-retest reliability coefficients ranging from .56 to .96. Convergent and divergent validity between the CBRS and related measures were also supported. This measure was used in the present study to further

assess AD/HD, ODD, and mania symptoms, as well as impairment in several areas of functioning.

Impairment. The Impairment Rating Scale (IRS; Fabiano & Pelham, 2002; Fabiano et al., 2006) is a multidimensional parent-rated measure that assesses various domains of functioning, including peer relationships, academic progress and family functioning. The IRS asks the rater to place an "x" on a seven-point scale that ranges from *No problem; definitely does not need treatment or special services* to *Extreme problem; definitely needs treatment or special services*. The IRS exhibits concurrent, discriminant, and convergent validity, and good temporal stability between preschool and elementary school-age (Pelham, Fabiano & Massetti, 2005). Preliminary psychometric data have demonstrated the utility of the IRS for ages 11 to 14 (G.A. Fabiano, personal communication, September 18, 2009). The IRS was used in the present study in order to assess impairment in functioning.

Procedure

Parents of adolescents were recruited through a range of organizations and agencies that work with teens and families, including the Center for Cognitive Behavior Therapy, Family Psychological Associates, the Developmental and Psychological Center, Counseling Services, Inc., the Hill Center, Partnership Village, Greensboro Day School, the AD/HD Clinic at UNCG, the AD/HD Parent Support Group, and one private practitioner. Presentations were offered to organizations whose administrators permitted the researcher to recruit. Of these sites, only five yielded any results. Recruitment was also conducted through dissemination of flyers at the AD/HD Clinic at UNCG, the

UNCG Psychology Clinic, and AD/HD Parent Support Group meetings. Previous clients of the AD/HD Clinic at UNCG were contacted directly in order to apprise them of the opportunity to participate in this study. Of the total sample for this study, 21% of participants were recruited from the AD/HD Clinic at UNCG, 19% from the AD/HD Parent Support Group, 15% from Greensboro Day School, 7.7% from the Developmental and Psychological Center, and 3.8% from Partnership Village. An additional 9.6% were recruited through the Piedmont Parent newsletter, 5.8% from flyers posted in the UNCG Psychology Clinic, and 19% through referrals from other participants.

The standard procedure for recruitment involved distributing parent packets containing two copies of the consent form, the study questionnaires, and a postage-paid envelope, after the purpose of the project and confidentiality procedures were explained. All participants completed study materials by mail. Three organizations allowed in-person distribution of packets to interested parents. Informed consent was obtained from all participants. Through the consent form, parents were informed of the study procedures, the risks and benefits associated with their participation, and that they may withdraw from the study at any time. As compensation, the first 35 participants were offered entry into a raffle for a $100 gift card to a local business. Three participants declined to be entered into the raffle. The remaining participants were each compensated with a $10 gift card to a local business, as a supply of gift cards became available for use midway through recruitment for this study. All study participants were also given the option to request a summary of the results of their questionnaires. Contact information for each participant was also obtained, so that proper referrals could be made in the event

that a participant reported that his or her child may be at risk to himself or others. This issue did not arise for any of the participants.

Confidentiality was maintained by using a unique code number for each participant; only the code number appeared on the completed measures. Consent forms (Appendix C), containing participants' full names, were kept in a separate locked cabinet apart from the data.

CHAPTER IV

RESULTS

Preliminary Inspection of the Data

An examination of the data indicated that six variables violated assumptions of normality: AD/HD Hyperactive-Impulsive symptom count, AD/HD Hyperactive-Impulsive severity, mania total score, mania symptom count, mania total impairment score, and mania average impairment score. These six variables were log transformed, resulting in normally distributed variables. Final skew statistics for all variables ranged from -.27 to 1.30; final kurtosis statistics for all variables ranged from -1.50 to .74. Therefore, all data fulfilled the assumptions of the planned analyses.

Psychometric Characteristics of the Adolescent Behavior Questionnaire

Internal consistency of the 47 items on the Adolescent Behavior Questionnaire was found to be excellent (Cronbach's $\alpha = .97$). Reliability was also assessed for each of the three symptom groups individually. The AD/HD symptom items yielded an excellent reliability score (Cronbach's $\alpha = .95$). Internal consistency was also very good for the 8 ODD items (Cronbach's $\alpha = .91$) and the 21 mania items (Cronbach's $\alpha = .90$).

Description of the Sample

In terms of AD/HD symptom counts, 28.85% (N = 15) of parents reported at least six symptoms of inattention and/or hyperactivity-impulsivity (i.e., met the clinical cutoff

for AD/HD) in their adolescent. Overall, parents reported an average of 2.87 counts of inattention (*SD* = 3.45), and .96 counts of hyperactivity/impulsivity (*SD* = 1.84) in their teen. In terms of ODD symptom counts, 17.31% (N = 9) of parents rated at least 4 symptoms of ODD (i.e., met the clinical cutoff for ODD) in their adolescent; overall, parents reported an average of 1.44 (*SD* = 2.17) counts of ODD in their teen. In terms of mania symptom counts, parents reported an average of 1.45 (*SD* = 2.36) counts of mania in their teen. The CMRS does not provide a clinical cutoff score based on symptom counts; based on severity scores, 11.5% (N = 6) of adolescents met the clinical cutoff (a score of 20 or higher) for mania. These results indicate that this was a primarily non-AD/HD, non-ODD, and non-mania sample. However, because the sample for this study was recruited from both clinical and community settings, this result was anticipated. As a result, symptom severity scores were used instead of symptom counts in the analyses.

Descriptive statistics for symptom and impairment variables appear in Table 2. In terms of AD/HD severity, mean scores were 9.52 (*SD* = 7.49) for inattention, 4.29 (*SD* = 5.03) for hyperactivity-impulsivity, and 13.81 (*SD* = 11.37) for overall AD/HD symptoms. The mean score for ODD severity was 5.75 (*SD* = 5.43), and the mean score for mania severity was 7.15 (*SD* = 7.56).

In terms of functional impairment on the Child Impairment Rating Scale, parents reported a mean overall impairment score of 1.92 (*SD* = 2.05). Parents also reported a mean academic impairment score of 2.32 (*SD* = 2.39). In terms of social functioning, parents reported mean scores of 1.92 (*SD* = 2.13) for family impairment, 2.02 (*SD* =

2.10) for impairment in relationships with parents, 1.43 (*SD* = 1.96) for impairment in sibling relationships, and 1.34 (*SD* = 1.84) for friendship impairment.

For purposes of secondary analyses, the Conners Comprehensive Behavior Rating Scale was included to evaluate AD/HD, ODD, and mania symptomatology. Parents reported an average T score of 59.31 (*SD* = 15.39) on the DSM-IV AD/HD Inattention subscale, and an average T score of 53.85 (*SD* = 14.56) on the DSM-IV AD/HD Hyperactivity-Impulsivity subscale. On the ODD subscale, parents reported an average T score of 54.85 (SD = 14.67); on the Manic Episode subscale, they reported an average T score of 56.00 (SD = 14.63). Again, these scores fall below the cutoff for clinical significance (i.e., a T score of 65), suggesting that the sample is predominantly sub-clinical in their level of symptomatology.

Correlations among Variables

Table 3 depicts results of correlational analyses conducted among symptom and impairment variables. One participant's data was excluded from these analyses because the CIRS was not completed. These analyses yielded numerous significant associations among the symptom severity and CIRS impairment variables. AD/HD Total, AD/HD Inattention, AD/HD Hyperactive-Impulsive, ODD, and Mania severity scores were all highly correlated with impairment on each of the CIRS impairment domains. These correlations were all positive, indicating that greater symptom severity is associated with greater functional impairment.

Predicting Domains of Impairment

To address the hypothesis that the three symptom categories would differentially predict specific domains of impairment, multiple regression analyses were conducted. Academic, family, parent, sibling, friendship, and overall impairment scores were regressed separately on total AD/HD severity, ODD severity, and Mania severity (transformed) scores. Results of these regression analyses are presented in Table 4. For all impairment domains except impairment in sibling relationships and friendships, total AD/HD severity was the only significant predictor. These models also accounted for a substantial proportion of variance in the impairment domains, with R^2 values ranging from 0.29 to 0.72. Total AD/HD severity significantly predicted overall impairment ($\beta = .78$, $p < .001$; model $R^2 = 0.72$), academic impairment ($\beta = .81$, $p < .001$; model $R^2 = 0.50$), family impairment ($\beta = .77$, $p < .001$; model $R^2 = 0.59$), and impairment in parent relationships ($\beta = .40$, $p < .05$; model $R^2 = 0.52$). In contrast, none of the symptom groups significantly predicted sibling or friendship impairment. In these analyses, only ODD severity approached significance as a predictor of impairment in sibling relationships ($\beta = .42$, $p = .06$; model $R^2 = 0.29$). Mania severity was not a significant predictor for any domain of impairment.

Post-hoc Analysis 1

In light of the results suggesting that total AD/HD severity is a significant predictor of impairment in several domains of functioning, multiple regression analyses were run using AD/HD Inattention and AD/HD Hyperactivity-Impulsivity severity scores as separate predictors. In addition, as a result of the finding that ODD approaches

significance as a predictor of impairment in sibling relationships, variables were created in order to examine the predictive power of ODD symptoms relating to noncompliant behavior separately from ODD symptoms relating to anger. Therefore, five predictors (AD/HD-IA, AD/HD-HI, ODD-NC, ODD-AN, and Mania) were entered simultaneously into multiple regression analyses for each impairment domain.

The results for overall, academic, and family impairment were mostly consistent with the a priori results. For overall impairment, AD/HD inattention severity was a significant predictor ($\beta = .55$, $p < .001$; model $R^2 = 0.75$), as was AD/HD hyperactivity-impulsivity severity ($\beta = .35$, $p < .05$). This time, ODD anger severity was a significant predictor as well ($\beta = .33$, $p < .05$). For academic impairment, AD/HD inattention severity was the sole significant predictor ($\beta = .78$, $p < .001$; model $R^2 = 0.52$). For family impairment, AD/HD inattention severity and AD/HD hyperactivity-impulsivity severity were both significant predictors ($\beta = .53$, $p < .01$ and $\beta = .48$, $p < .05$ respectively; model $R^2 = 0.65$). This time, ODD anger severity approached significance as well ($\beta = .37$, $p = .06$).

The results for parent, sibling, and friendship impairment were somewhat discrepant from the a priori results. In terms of impairment in relationships with parents, ODD anger severity was the only significant predictor ($\beta = .40$, $p < .05$; model $R^2 = 0.56$). This contrasts from the previous analysis, in which total AD/HD severity, and not ODD, was a significant predictor of impairment in parent relationships. For impairment in relationships with siblings, ODD anger severity was the only significant predictor ($\beta = .47$, $p < .05$; model $R^2 = 0.41$), although AD/HD hyperactivity-impulsivity approached

significance (β = .48, p = .07). This is somewhat contrary to the a priori results, in which ODD severity reached only trend levels. Finally, in terms of friendship impairment, only ODD Anger severity was significant (β = .61, p < .01, R^2 = 0.49). This contrasts with the a priori analysis, in which none of the predictors were significant. Of note, mania severity was not a significant predictor of impairment in any of these analyses.

Post-hoc Analysis 2

The CBRS is a new measure that includes AD/HD, ODD, and mania subscales; a second series of post-hoc analyses was conducted in order to examine its utility as an alternative measure of these constructs and to determine if it offers any advantages over the other measures included in this study. Multiple regression analyses were run using the AD/HD Inattention, AD/HD Hyperactivity-Impulsivity, ODD, and Manic Episode subscales from the CBRS as predictors of impairment. Results are reported in Table 6. Consistent with previous analyses, AD/HD inattention was a significant predictor of overall impairment (β = .54, p < .001; model R^2 = 0.73), academic impairment, (β = .61, p < .001; model R^2 = 0.59), and family impairment (β = .60, p < .001; model R^2 = 0.62). AD/HD hyperactivity-impulsivity was not a significant predictor in any of these domains.

In terms of parent impairment, AD/HD inattention was a significant predictor (β = .41, p < .01; model R^2 = 0.57), which is consistent with the a priori results, as was Manic Episode (β = .42, p < .05). Next, the results for sibling impairment are similar to a priori results, with ODD being the strongest predictor (β = .35, p = .06; model R^2 = 0.41), although only reaching trend levels. Finally, in terms of friendship impairment, ODD was a significant predictor (β = .58, p < .01; model R^2 = 0.54), which is consistent with the

first post-hoc analyses on this domain. In this domain, and contrary to previous results, AD/HD Hyperactivity-Impulsivity and Manic Episode were both significant predictors (β = -.51, $p < .05$ and β = .46, $p < .05$, respectively). However, the negative value of the AD/HD hyperactivity-impulsivity coefficient indicates that this association is in the opposite direction than would be expected; greater friendship impairment is associated with *lower* levels of hyperactivity-impulsivity. It is unclear why this association might be.

Assessment of Multicollinearity

To address the possibility that the findings were an artifact of high correlations among AD/HD, ODD, and mania symptoms, analyses were conducted to examine the extent of multicollinearity among these predictors. For each of the a priori, post-hoc 1 and post-hoc 2 analyses, variance inflation factor values were calculated by regressing each predictor on all other predictors. All VIF results were substantially lower than 10, the value commonly believed to indicate extreme multicollinearity. For the a priori analyses, total AD/HD severity, ODD severity, and mania severity (transformed) VIF scores ranged from 2.69 to 3.36; for post-hoc 1 analyses, AD/HD Inattention severity, AD/HD Hyperactivity-Impulsivity severity (transformed), ODD Noncompliance severity, ODD Anger severity, and mania severity (transformed) VIF scores ranged from 2.47 to 3.92; and for post-hoc 2 analyses, CBRS AD/HD Inattention, CBRS AD/HD Hyperactivity-Impulsivity, CBRS ODD, and CBRS Manic Episode VIF scores ranged from 2.09 to 3.80.

CHAPTER V

DISCUSSION

AD/HD, ODD, and bipolar disorder are debilitating conditions that impact a child's functioning in a variety of domains. However, there is limited existing research directly examining differences in domain or severity of impairment among these disorders. A small number of studies have compared impairment in children with one of these disorders to children with one or more disorders, and even fewer have directly compared impairment in children with one disorder to children with another disorder. This study aimed to examine the extent to which symptoms of AD/HD, ODD, and mania map onto indices of impairment in several domains of functioning, as well as overall impairment.

AD/HD, ODD, Mania and Domains of Impairment

The first hypothesis, that AD/HD would be the strongest predictor of overall impairment, was fully supported across both a priori and post-hoc analyses. These results are consistent with existing research which suggests that AD/HD is a pervasive condition that affects virtually all aspects of a child's life (Barkley, 2006).

Findings from this study show full support for the hypothesis that AD/HD would be the strongest predictor of academic impairment. Across both a priori and post-hoc analyses, AD/HD was consistently the strongest predictor of academic impairment. Specifically, Inattention significantly predicted academic impairment in both post-hoc

analyses. These results are consistent with a small body of previous research suggesting that academic impairments in children with AD/HD and bipolar disorder are attributable to symptoms of AD/HD and not to symptoms of mania (Henin, 2007). Prior research had included clinic-referred, acutely symptomatic youth only; the current study extended this work by including a more asymptomatic sample, and utilized multiple assessments of symptomatology.

Findings from this study show partial support for the hypotheses that ODD would predict impairment in family functioning, and mania would predict impairment in family and peer relationships. In terms of family impairment, AD/HD, and not ODD, was consistently the strongest predictor. In post-hoc analyses, Inattention in particular was the strongest predictor, although Hyperactivity-Impulsivity as measured by the ADHD-RS in post-hoc analysis 1 was also significant. In this analysis only, ODD anger approached significance. These results are consistent with existing research indicating that AD/HD is associated with impairment in family functioning; however, it was expected that ODD and mania, rather than AD/HD, would emerge as the strongest predictor when entered simultaneously into these analyses. These results may suggest that, in contrast to expectations, family functioning is more heavily impacted by AD/HD than by ODD or mania symptoms. However, these results may have been influenced by the skewed nature of the sample, as AD/HD symptoms were more commonly endorsed than ODD or mania symptoms.

Results were mixed in terms of impairment in relationships with parents. In contrast to the hypotheses, a priori analyses indicated that AD/HD total severity, and not

ODD, was a significant predictor. When AD/HD and ODD were split in post-hoc analyses, however, ODD anger emerged as the only significant predictor. As measured by CBRS subscales, AD/HD Inattention and Manic Episode significantly predicted impairment in parent relationships. All symptom groups appear to be associated with impairment in this domain; due of the mixed nature of these results, however, firm conclusions about the strongest predictor of impairment in parent relationships cannot be made at this time.

In partial support for the hypotheses, ODD approached significance as a predictor of impairment in sibling relationships in a priori analyses. When ODD was split into noncompliance and anger components in post-hoc analysis 1, ODD anger emerged as a significant predictor. In post-hoc analysis 2, the ODD subscale of the CBRS also approached significance as a predictor (no other subscales were significant). Although little research has specifically examined impairment in sibling relationships in any of these conditions, this result is consistent with a small body of work suggesting that children with ODD have more conflicts with siblings than non-disordered children (Greene et al., 2002). The current study extended this work by assessing sibling impairment in the context of AD/HD and mania symptoms as well as ODD symptoms, and included a predominantly subclinical sample.

Contrary to expectations, no symptom group emerged as a significant predictor of impairment in friendships in a priori analyses. In post-hoc analysis 1, however, ODD anger was a significant predictor. This is consistent with the post-hoc findings on impairment with parents and siblings, in which ODD anger was also the only significant

predictor. This result seems logical, as this type of behavior (e.g., losing temper, being easily annoyed, acting in a spiteful way), is likely to lead to interpersonal conflicts. Some researchers argue that severe anger, or "explosive irritability," is the hallmark symptom of mania in youth (Carlson, 1984; Fergus et al., 2003; Wozniak et al., 2005). In these analyses, ODD anger, and not mania, emerged as a significant predictor of impairment in interpersonal relationships. This may have been due to the low rates of mania symptoms endorsed in this sample; future research may examine whether anger attributed to ODD symptoms or anger attributed to mania is associated with greater impairment in interpersonal functioning. In post-hoc analysis 2, however, the CBRS subscales of AD/HD Hyperactivity-Impulsivity, ODD, and Manic Episode emerged as significant predictors of friendship impairment. Overall, these mixed results preclude any firm conclusions about differential associations between these conditions and friendship impairment.

The CBRS was included in this study as a concurrent measure of AD/HD, ODD, and mania symptoms; it is a new measure and is unique in that it includes a mania subscale. AD/HD inattention, AD/HD hyperactivity-impulsivity, ODD, and Manic Episode subscale scores on the CBRS were highly correlated with corresponding rating scale total severity scores ($p < .001$ in all cases), indicating good concurrent validity. In general, findings of multiple regression analyses using CBRS subscale T-scores as predictors of impairment were similar to analyses using AD/HD, ODD, and mania rating scale severity scores, particularly as AD/HD inattention significantly predicted academic, family, and overall impairment in both analyses. In contrast to analyses using the rating

scale measures, analyses using the CBRS also found mania to be a significant predictor of parent and friendship impairment. Thus, including the CBRS was helpful for providing a secondary measure in order to fully capture the range of mania symptoms in the sample.

Implications

The results of this study provided evidence that symptoms of AD/HD, ODD, and mania may be differentially associated with various domains of functional impairment. AD/HD was consistently the strongest predictor of academic, family, and overall impairment, though results surrounding the association between ODD and mania and parent, sibling, and friendship impairment were somewhat mixed. The relation among ODD, mania, and interpersonal impairment might be clarified in future studies that include a sample reporting a higher rate of these symptoms. In general, pending replication in future studies, these results could point to areas of impairment as key features that are unique to each condition. This may provide an important step towards clarifying the distinguishing features among these commonly overlapping and diagnostically confusing disorders (Kim & Miklowitz, 2002).

However, more research is needed in order to examine the extent to which AD/HD, ODD, and mania represent truly unique conditions. In particular, future research might examine the extent to which items assessing symptoms of mania will group together independently from items assessing symptoms of AD/HD and ODD. Confirmatory factor analysis may be used to determine whether items evaluating mania symptoms create a unique factor, or if these items load onto factors of AD/HD and ODD.

Diagnostic clarity among these conditions remains a considerable public health concern, as diagnostic labels have direct implications for treatment selection and prognosis.

Future research might also incorporate a longitudinal analysis in which symptoms and impairment are assessed prospectively in order to evaluate how symptoms affect impairment in various domains, and vice versa, across development. For example, perhaps impairment in parent relationships is a risk factor for ODD in children with AD/HD. Such research may aid in early identification and intervention efforts. A longitudinal design may also allow for an examination of causality, in terms of whether symptoms cause impairment or perhaps some areas of impairment (such as rejection by peers) cause symptoms (such as anger associated with ODD). Ultimately, longitudinal research may also track the course of these disorders into adulthood in order to determine if the disorders have unique trajectories.

Clinically, results from this study highlight the importance of attending to areas of functional impairment, in addition to symptoms, during assessments and when selecting targets for intervention. In particular, the results provide strong evidence to the small body of previous literature suggesting that AD/HD is associated with academic impairment even in the presence of ODD or mania symptoms. Some research has conceptualized the association between AD/HD and academic underachievement within a developmental framework, such that symptoms of AD/HD and achievement delays in childhood give way to delinquency and school failure in adolescence (Hinshaw, 1992). These findings point to the necessity of careful assessment of impairment, as well as the importance of early intervention efforts, especially within a school context.

Although general family impairment seems to be most highly associated with AD/HD symptoms, impairment in parent, sibling, and peer relationships seems to be more highly associated with ODD-type symptoms, particularly anger. Given that ODD symptoms commonly occur in the presence of another disorder (American Psychiatric Association, 2000), this study provides additional evidence that ODD may be uniquely associated with interpersonal impairment, above and beyond other areas of impairment that might already exist as a function of a co-occurring disorder like AD/HD. This is consistent with a small body of prior research suggesting that ODD, in combination with AD/HD and bipolar disorder, is more impairing in terms of interpersonal relationships than either disorder alone (Barkley, Anastopoulos, Guevremont & Fletcher, 1992; Goldstein et al., 2009). Moreover, differential results from this study between noncompliant ODD symptoms and anger ODD symptoms suggest that there may be some utility for examining these symptoms separately during assessments for clinical or research purposes. If anger, rather than noncompliance, associated with ODD is truly driving impairment in interpersonal relationships, future research may more closely compare the anger associated with ODD to the higher-level anger that some have attributed uniquely to mania (Mick, Spencer, Wozniak, & Biederman, 2005). This may provide an important step in clarifying the distinction between these two conditions. Overall, these results point toward the need for careful assessment of relationship impairment for these youth, as well as interpersonal-focused interventions. This may be particularly helpful for young children who display emerging ODD symptoms, in order to

potentially improve the trajectory for a child's parent, sibling, friendship, and romantic relationships in the future.

In discussing possible implications of their work, several researchers have noted the importance of learning how to potentially decrease the impact that early symptoms may have on later functioning (Goldstein et al., 2009; Henin, 2007). Indeed, a closer examination of areas of functional impairment associated with these diagnoses may be clinically useful in terms of helping to distinguish among these disorders, but may also inform potential targets of early intervention for youth and their families struggling with these conditions.

Limitations

Although consistent with the study's hypotheses, obtained findings must be tempered by a consideration of limitations in the design. First, most of the participants were recruited from sites that predominantly draw families of youth with AD/HD, including the AD/HD Clinic at UNCG and the AD/HD Parent Support Group. As a result, the sample was somewhat skewed in the direction of AD/HD; a sizable percentage of the sample had an AD/HD diagnosis (38.5%), but a much smaller percentage had been diagnosed with ODD (9.6%), and none were diagnosed with bipolar disorder. Symptoms of mania, in particular, were endorsed less frequently than symptoms of AD/HD or ODD. Although none of the parents reported that their child had a bipolar diagnosis, the range of scores on the Manic Episode subscale of the CBRS suggests the presence of mania symptoms in this sample. Despite the skewed distribution, strong and significant associations were consistently found between AD/HD and overall, academic, and family

impairment, and ODD anger emerged as a significant predictor of interpersonal impairment, including relationships with parents, siblings, and peers. Mania, as measured by the CBRS in post-hoc analyses, also emerged as a significant predictor of parent and friendship impairment.

Another possible explanation for these findings is that they are an artifact of the high degree of correlation among the predictors. Extreme multicollinearity can lead to unstable beta coefficients, which makes interpretation of the influence of individual predictors unreliable. To assess this possibility, variance inflation factor (VIF) values were conducted by regressing each predictor on all other predictors within each of the a priori, post-hoc 1, and post-hoc 2 analyses. VIF values indicate that the results of each of the multiple regression analyses were not necessarily a function of multicollinearity, as all values were substantially less than 10, the "rule of thumb" value for diagnosing extreme multicollinearity. However, this does not preclude the possibility that the results were an artifact of methodological issues.

Another potential limitation is that parent report alone was used for this study. Parent report has been demonstrated to have higher diagnostic accuracy than child and adolescent self-reports in both AD/HD and bipolar samples, and youth self-report have been shown to add little information beyond parent reports (Smith, Pelham, Gnagy, Molina & Evans, 2000; Youngstrom et al., 2004). However, utilizing parent report only precludes examination of the adolescent's perspective on their impairment in school and in their relationships with family and friends, which may be different from the parent's perspective. Moreover, how an adolescent perceives his impairment in these domains

may influence his receptiveness to interventions to improve these deficits. In addition, assessment of impairment in this study may have benefited from inclusion of more objective measures, such as report cards or other school records as a measure of academic impairment, or records of physical altercations with peers as a measure of peer functioning.

Additionally, a limitation of this study is its correlational design, which limits the ability to make inferences about causation. Presumably, symptoms of AD/HD, ODD, and mania cause impairment in various domains; however, it may also be the case, as it is with harsh parenting and ODD (Patterson, Reid, & Dishion, 1992), that maladaptive interpersonal relationships or deficits in functioning in other areas may eventually lead to disruptive behavior. Thus, it is unclear in this sample whether externalizing symptoms of AD/HD, ODD and mania began prior to the onset of functional impairment or vice versa.

Finally, although efforts were made to recruit an ethnically and socioeconomically diverse sample, the sample was predominantly Caucasian and well-educated (with 82.69% of parents having an undergraduate degree or higher). Thus, further research must be done in order to determine if the results of this study would generalize to non-white, less economically advantaged youth. Also, the majority of adolescents in this sample live in a two-parent home; therefore, these findings, particularly on family impairment, may not be representative of all family types.

Conclusion

Bearing these limitations in mind, the results of this study lend support for the hypotheses that the three symptom groups would be differentially associated with

domains of impairment. Much of the prior work examining impairment in these conditions has included clinic-referred, acutely ill children and adolescents. Because the current study included a predominantly subsyndromal sample, these findings suggest that associations between symptoms of AD/HD, ODD, and mania, and impairment in school, family, peer, or overall functioning may still be found in relatively healthy adolescents with subclinical presentations of these symptoms. Pending replication, these findings may provide the field with evidence of differential domains of impairment for youth with AD/HD, ODD, and bipolar disorder, which may in turn offer helpful information for distinguishing these diagnoses. Ultimately, assessing areas of functional impairment may be a key feature for accurately diagnosing youth with these conditions.

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APPENDIX A

Overlapping DSM-IV symptoms for AD/HD-Inattentive Type, AD/HD-Hyperactive/Impulsive Type, Oppositional Defiant Disorder, and Manic Episode.

Inattention	Hyperactivity/Impulsivity	ODD	Mania
Fails to give close attention to details	Often fidgets with hands or squirms in seat	**Often touchy or easily annoyed by others; Often loses temper: Often angry or resentful**	A distinct period of elevated, expansive, or **irritable mood**
Often has difficulty sustaining attention	**Often talks excessively**	Often argues with adults	**More talkative than usual or pressure to keep talking**
Often does not seem to listen when spoken to	**Is often "on the go" or acts as if "driven by a motor"**	Often actively defies adults' requests and rules	**Increase in goal-directed activity or agitation**
Often easily distracted	Often leaves seat in classroom or other situation	Often deliberately annoys people	**Distractibility**
Often has difficulty organizing tasks and activities	Often runs about or climbs excessively	Often blames others for his/her mistakes/misbehavior	Decreased need for sleep
Often reluctant to engage in tasks requiring mental effort	Often has difficulty playing quietly	Is often spiteful or vindictive	Excessive involvement in risky behaviors
Often loses things	Often blurts out answers		Flight of ideas or experience that thoughts are racing
Often does not follow through on instructions	Often has difficulty awaiting turn		Inflated self-esteem or grandiosity
Often forgetful	Often interrupts or intrudes on others		

APPENDIX B
Adolescent Behavior Questionnaire

		Circle the number that best describes how often your child displays each behavior:				Also, check how problematic each behavior is for your child at home, at school or with peers:			
		Never or Rarely	Sometimes	Often	Very Often	Not a Problem	Mild Problem	Moderate Problem	Severe Problem
1.	Fidgets with hands or feet or squirms in seat.	0	1	2	3	_____	_____	_____	_____
2.	Fails to give close attention to details or makes careless mistakes in schoolwork.	0	1	2	3	_____	_____	_____	_____
3.	Deliberately annoys other people.	0	1	2	3	_____	_____	_____	_____
4.	Rushes around doing things non-stop.	0	1	2	3	_____	_____	_____	_____
5.	Feels irritable, cranky or mad for hours or days at a time.	0	1	2	3	_____	_____	_____	_____
6.	Thinks that he or she can be anything or do anything (e.g., leader, best basketball player, rap singer, millionaire, princess) beyond what is usual for that age.	0	1	2	3	_____	_____	_____	_____
7.	Often blames others for his or her mistakes or misbehavior.	0	1	2	3	_____	_____	_____	_____
8.	Is forgetful in daily activities.	0	1	2	3	_____	_____	_____	_____
9.	Does things that are unusual for him or her that are foolish or risky (e.g., jumping off heights, ordering CDs with your credit cards, giving things away).	0	1	2	3	_____	_____	_____	_____
10.	Avoids tasks (e.g., schoolwork, homework) that require mental effort.	0	1	2	3	_____	_____	_____	_____

APPENDIX C

CONSENT TO ACT AS A HUMAN PARTICIPANT

Project Title: Assessing Problematic Behaviors and Emotional Reactions in Adolescents
Project Director: Allison Coville Bray, B.A.
Participant's Name: _____

What is the study about?
This is a research project. The purpose of this study is to examine how often adolescents display problematic behaviors and emotional reactions at home, at school, and with friends.

Why are you asking me?
You are being asked to participate because you have a child between 13 and 17 years of age. You are eligible to participate even if your teen does not display problematic behaviors or emotional reactions.

What will you ask me to do if I agree to be in the study?
You are being asked to complete a set of questionnaires. Your questionnaires will ask about your teen's AD/HD, ODD and mania symptoms, as well as any impairment your teen has experienced at home, at school or with friends. This set of questionnaires should take about 45 to 60 minutes to complete. After finishing the questionnaires, you will return the questionnaires and this signed consent form to project staff (if participating in person), or mail back the questionnaires and this signed consent form in the provided envelope to project staff at the AD/HD Clinic at UNC Greensboro (if participating by mail). When you complete study measures at the AD/HD Clinic, the study investigator will make photocopies of signed consent forms for your records. If you choose to participate by mail or at an approved off-site location, you will be asked to sign 2 copies of the same consent form (one for the investigator and one for your own records).

What are the dangers to me?
There is minimal risk associated with participating in this study. Some questionnaires ask about personal information, such as psychological symptoms your teen may have experienced, which may cause you to feel uncomfortable. You may skip any questions that make you feel uncomfortable, and you may call project staff to have your questions answered. Participation is completely voluntary. You may withdraw from the project at any time without penalty.
If you have any concerns about your rights, how you are being treated, or if you have questions, want more information or have suggestions, please contact Eric Allen in the Office of Research Compliance at UNCG at (336) 256-1482. Questions, concerns or complaints about this project or benefits or risks associated with being in this study can be answered by Allison Bray, who may be contacted at 336-346-3196 ext. 306, or Dr. Arthur D. Anastopoulos who may be contacted at (336) 346-3196 x303.

Are there any benefits to me for taking part in this research study?
There are no direct benefits to participants in this study.

Are there any benefits to society as a result of me taking part in this research?
We hope that this project may help us better understand symptoms of AD/HD, ODD and mania in adolescents, and how these symptoms may affect their functioning.

Will I get paid for being in the study? Will it cost me anything?
There are no costs to you or payments made for participating in this study. For completing the questionnaires, you will receive a $10 gift card to a local business. You may also request a summary of the results of your questionnaires.

How will you keep my information confidential?
All information obtained in this study is strictly confidential unless disclosure is required by law. If your answers tell us that your teen may be at risk for harming themselves or being harmed by someone else, we will need to speak to you and your teen. Names will not be on any of the questionnaires. Instead, you will fill out your name and address only on this consent form. Once project staff members at the AD/HD Clinic at UNC Greensboro have received the completed packet with the set of questionnaires and the signed consent form, each participant will be assigned a special ID number before being given their questionnaire. The only people who will see information about you and your teen 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 file cabinets. Passwords will protect information that has been entered on a computer. All information will be destroyed three years after the conclusion of this project.

During or after your involvement with this project, you may become aware of other research studies being conducted in the AD/HD Clinic that may be of interest to you. Another such project is currently underway, investigating: *Risk factors for anxiety in children with AD/HD.* This study uses some of the same behavioral data collection procedures. Should you decide to participate in this project, behavioral data from the current study can be shared with the other research project in order to spare you the trouble of repeating the same data gathering procedures. <u>Only the behavioral data common to each project will be shared, and data will only be shared with projects for which you have given written consent.</u>

What if I want to leave the study?
You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identifiable state.

What about new information/changes in the study?

If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

Voluntary Consent by Participant:
By signing this consent form you are agreeing that you read, or it has been read to you, and you fully understand the contents of this document and are openly willing consent to take part in this study. All of your questions concerning this study have been answered. By signing this form, you are agreeing that you are 18 years of age or older and are agreeing to participate, or have the individual specified above as a participant participate, in this study described to you by _____.

Signature: _____ **Date**: _____

IF YOU WOULD LIKE TO PARTICIPATE, PLEASE ALSO COMPLETE THESE QUESTIONS:

It would be ok to contact me in the future about similar research projects (please check one):
☐ Yes ☐ No

APPENDIX D

TABLES

Table 1. *Sample Characteristics*

Characteristic	Adolescent (n = 52)	Parent (n = 52)
	% (n)	% (n)
Sex		
Male	65.38 (34)	0.02 (1)
Female	34.62 (18)	98.08 (51)
Grade		
6	3.85 (2)	---
7	7.69 (4)	---
8	21.15 (11)	---
9	21.15 (11)	---
10	21.15 (11)	---
11	15.38 (8)	---
12	9.62 (5)	---
Race		
Asian	1.92 (1)	3.85 (2)
Black/African American	9.62 (5)	9.62 (5)
Multiracial	5.77 (3)	1.92 (1)
White/Caucasian	82.69 (43)	84.62 (44)
Education level		
Some High School	---	5.77 (3)
High School Diploma	---	1.92 (1)
Some College		9.62 (5)
Undergraduate Degree		48.08 (25)
Graduate Degree	---	34.62 (18)
Marital Status		
Single	---	3.85 (2)
In a Relationship	---	3.85 (2)
Married	---	75.00 (39)
Separated	---	1.92 (1)
Divorced	---	15.38 (8)
Diagnostic History		
AD/HD	38.46 (20)	3.85 (2)
ODD	1.29 (1)	---
Depression	9.62 (5)	30.77 (16)
Bipolar Disorder	---	1.92 (1)
Other Mood Disorder	1.92 (1)	---
Anxiety Disorder	5.77 (3)	9.62 (5)
Autism Spectrum Disorder	1.92 (1)	---
Medication history		
Stimulant	32.69 (17)	11.54 (6)
Other AD/HD medication	7.69 (4)	---
Antidepressant	3.85 (2)	30.77 (16)
Antianxiety	7.69 (4)	3.85 (2)
Antipsychotic	1.92 (1)	---

Table 2. *Descriptive Statistics for Symptom and Impairment Variables*

	M	*SD*	Minimum	Maximum	Skew	Kurtosis
Primary Symptom Variables						
ADHD-RS IA Severity	9.52	7.49	0	24	0.45	-1.15
ADHD-RS HI Severity	4.29	5.03	0	22	1.86	3.80
ADHD-RS HI Transformed	1.25	0.94	---	---	0.63	-0.73
ODD-RS Total Severity	13.81	11.37	0	45	0.81	0.02
CMRS Mania Severity	5.75	5.43	0	19	0.81	-0.27
CMRS Mania Transformed	1.63	1.05	---	---	-0.27	-0.96
Secondary Symptom Variables						
CBRS ADHD IA	59.31	15.39	40	90	0.29	-1.23
CBRS ADHD HI	53.85	14.56	39	90	1.15	0.38
CBRS ODD	54.85	14.67	39	90	0.83	-0.49
CBRS Manic Episode	56.00	14.63	41	90	0.76	-0.49
Impairment Variables						
CIRS Overall Impairment	1.92	2.05	0	6	0.71	-0.74
CIRS Academic Impairment	2.32	2.39	0	6	0.42	-1.51
CIRS Family Impairment	1.92	2.13	0	6	0.76	-0.84
CIRS Impairment with Parents	2.02	2.10	0	6	0.63	-0.98
CIRS Impairment with Siblings	1.43	1.96	0	6	1.07	-0.27
CIRS Impairment with Friends	1.34	1.84	0	6	1.20	0.09

Note. ADHD-RS = ADHD Rating Scale; IA = Inattention; HI = Hyperactivity/Impulsivity; CMRS = Child Mania Rating Scale; ODD-RS = Oppositional Defiant Disorder Rating Scale; CIRS = Child Impairment Rating Scale; CBRS = Conners Comprehensive Behavior Rating Scale.

Table 3. *Correlations Among Variables for Overall Sample (N = 51)*

	Variable	1	2	3	4	5	6	7	8	9	10	11
1	ADHD-RS Total Severity	---										
2	ADHD-RS IA Severity	.94**	---									
3	ADHD-RS HI Severity Transformed	.86**	.70**	---								
4	ODD-RS Severity	.76**	.61**	.77**	---							
5	CMRS Mania Severity Transformed	.79**	.68**	.81**	.77**	---						
6	CIRS Friendships	.62**	.58**	.58**	.58**	.56**	---					
7	CIRS Siblings	.45**	.34*	.56**	.57**	.48**	.55**	---				
8	CIRS Parents	.71**	.67**	.71**	.67**	.64**	.63**	.59**	---			
9	CIRS Family	.80**	.77**	.73**	.62**	.60**	.70**	.51**	.87**	---		
10	CIRS Academics	.74**	.78**	.46**	.52**	.52**	.55**	.30*	.62**	.77**	---	
11	CIRS Overall	.87**	.83**	.78**	.69**	.70**	.76**	.51**	.79**	.90**	.83**	---

Note. ADHD-RS = ADHD Rating Scale-IV; IA = Inattention; HI = Hyperactivity/Impulsivity; ODD-RS = ODD Rating Scale; CMRS = Child Mania Rating Scale; CIRS = Child Impairment Rating Scale.
* $p < .05$. ** $p < .01$.

Table 4. *Multiple Linear Regressions Predicting Domains of Impairment*

Analysis	β	R^2	F
Regression 1: Overall Impairment		0.72	33.86***
ADHD-RS Total Severity	.78***		
ODD-RS Severity	.00		
CMRS Mania Severity (transformed)	.09		
Regression 2: Academic Impairment		0.50	13.48***
ADHD-RS Total Severity	.81***		
ODD-RS Severity	-.16		
CMRS Mania Severity (transformed)	-.07		
Regression 3: Family Impairment		0.59	19.27***
ADHD-RS Total Severity	.77***		
ODD-RS Severity	.00		
CMRS Mania Severity (transformed)	.00		
Regression 4: Parent Impairment		0.52	14.77***
ADHD-RS Total Severity	.40*		
ODD-RS Severity	.24		
CMRS Mania Severity (transformed)	.15		
Regression 5: Sibling Impairment		0.29	5.67**
ADHD-RS Total Severity	-.09		
ODD-RS Severity	.42†		
CMRS Mania Severity (transformed)	.22		
Regression 6: Friendship Impairment		0.37	7.86***
ADHD-RS Total Severity	.31		
ODD-RS Severity	.14		
CMRS Mania Severity (transformed)	.20		

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, † trend level

Table 5. *Multiple Linear Regressions for Post-hoc Analysis 1*

Analysis	β	R^2	F
Regression 1: Overall Impairment		0.75	19.43***
ADHD-RS IA Severity	.55 ***		
ADHD-RS HI Severity (transformed)	.35*		
ODD-RS NC Severity	-.12		
ODD-RS AN Severity	.33*		
CMRS Mania Severity (transformed)	-.10		
Regression 2: Academic Impairment		0.52	6.81***
ADHD-RS IA Severity	.78***		
ADHD-RS HI Severity (transformed)	-.17		
ODD-RS NC Severity	.00		
ODD-RS AN Severity	.14		
CMRS Mania Severity (transformed)	-.02		
Regression 3: Family Impairment		0.65	11.80***
ADHD-RS IA Severity	.53**		
ADHD-RS HI Severity (transformed)	.48*		
ODD-RS NC Severity	-.22		
ODD-RS AN Severity	.37†		
CMRS Mania Severity (transformed)	-.25		
Regression 4: Parent Impairment		0.56	8.93***
ADHD-RS IA Severity	.21		
ADHD-RS HI Severity (transformed)	.34		
ODD-RS NC Severity	.04		
ODD-RS AN Severity	.40*		
CMRS Mania Severity (transformed)	-.11		
Regression 5: Sibling Impairment		0.41	4.50**
ADHD-RS IA Severity	-.08		
ADHD-RS HI Severity (transformed)	.48 †		
ODD-RS NC Severity	-.30		
ODD-RS AN Severity	.47*		
CMRS Mania Severity (transformed)	.04		
Regression 6: Friendship Impairment		0.48	5.91***
ADHD-RS IA Severity	.29		
ADHD-RS HI Severity (transformed)	.33		
ODD-RS NC Severity	-.36		
ODD-RS AN Severity	.66**		
CMRS Mania Severity (transformed)	-.15		

Note. IA = Inattention; HI = Hyperactivity-Impulsivity; NC = non-compliance; AN = anger.
* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, † trend level.

Table 6. *Multiple Linear Regressions for Post-hoc Analysis 2*

Analysis	β	R^2	F
Regression 1: Overall Impairment		0.73	30.88***
CBRS AD/HD IN	.54***		
CBRS AD/HD HI	.16		
CBRS ODD	.05		
CBRS Manic Episode	.19		
Regression 2: Academic Impairment		0.59	16.01***
CBRS AD/HD IN	.61***		
CBRS AD/HD HI	.02		
CBRS ODD	-.01		
CBRS Manic Episode	.19		
Regression 3: Family Impairment		0.62	18.20***
CBRS AD/HD IN	.60***		
CBRS AD/HD HI	-.05		
CBRS ODD	.10		
CBRS Manic Episode	.20		
Regression 4: Parent Impairment		0.57	15.41***
CBRS AD/HD IN	.41**		
CBRS AD/HD HI	-.18		
CBRS ODD	.18		
CBRS Manic Episode	.42*		
Regression 5: Sibling Impairment		0.41	7.90***
CBRS AD/HD IN	-.13		
CBRS AD/HD HI	.08		
CBRS ODD	.35†		
CBRS Manic Episode	.35		
Regression 6: Friendship Impairment		0.54	13.18***
CBRS AD/HD IN	.24		
CBRS AD/HD HI	-.51*		
CBRS ODD	.58**		
CBRS Manic Episode	.46*		

Note. NC = non-compliance; AN = anger.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, † trend level.