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Comorbidity of Attention-Deficit/Hyperactivity Disorder and Internalizing Symptoms

by

Kim M. Galbraith

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## **ABSTRACT**

The present study investigated the relationship between AD/HD and internalizing conditions (mood and anxiety) in a self-referred sample of adults. In addition, gender differences in AD/HD subtyping and comorbidity patterns were examined. Participants were 26 men and 39 women between the ages of 24 and 56. The Adult Attention Deficit Disorders Evaluation Scale (A-ADDES) was used for confirmation of AD/HD diagnosis. the Structured Clinical Interview for the DSM-IV (SCID-I) was used for assessment of internalizing disorders, and the Beck Depression Inventory – Second Edition (BDI-II) and the Beck Anxiety Inventory (BAI) were used to determine the severity level of symptoms. Adults with AD/HD had high comorbidity rates; however, no gender differences were found for internalizing comorbidity patterns. Participants of the AD/HD combined subtype had more severe AD/HD symptomatology, and were more likely to be on stimulant medication; females in the AD/HD predominantly inattentive subtype were more likely to have a mood disorder.

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## TABLE OF CONTENTS

APPROVAL PAGE.....	ii
ABSTRACT.....	iii
ACKNOWLEDGMENTS .....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES.....	viii
LIST OF FIGURES .....	ix
CHAPTER ONE: INTRODUCTION.....	1
Overview.....	1
Comorbidity .....	3
AD/HD and Comorbid Internalizing Disorders.....	4
Comorbidity with Anxiety Disorders .....	5
Comorbidity with Mood Disorders.....	7
Gender.....	9
Subtype .....	12
Goals and Hypotheses.....	16
Research Objectives.....	16
Goals .....	16
Hypotheses.....	16
CHAPTER TWO: METHODS.....	18
Participants.....	18
Exclusionary Criteria .....	18
Socioeconomic Status.....	19
Other Demographic Information .....	19

Actual Sample.....	20
Measures .....	20
Screening .....	20
Confirmation of AD/HD Diagnosis.....	21
Interview for Internalizing Disorders .....	22
Rating Scales for Internalizing Symptoms .....	23
Procedure .....	24
Participant Recruitment .....	24
Testing Procedure .....	25
Ethical Considerations .....	25
CHAPTER THREE: RESULTS.....	27
Description of the Sample.....	27
Degree of Internalizing Symptoms via Rating Scales .....	36
Internalizing Disorders via Structured Interview.....	38
Overview of Logistic Regression Results.....	40
Additional Analyses.....	40
Mood/Anxiety Disorders .....	40
Symptom Severity on BDI-II and BAI .....	43
Congruence between Symptoms and Disorders .....	44
Stimulant Medication.....	45
Analysis by Subtype .....	45
CHAPTER FOUR: DISCUSSION .....	52
Implications of Findings Regarding Hypotheses.....	52
Additional Findings .....	52

Strengths and Limitations of the Findings.....	57
Directions for Future Research .....	59
Conclusions.....	61
REFERENCES .....	63
APPENDIX A: Diagnostic Criteria for AD/HD.....	72
APPENDIX B: Recruitment Poster .....	76
APPENDIX C: Consent Form .....	78
APPENDIX D: Attention Deficit Disorder Checklist .....	81
APPENDIX E: Recruitment Letter.....	83

## LIST OF TABLES

Table 1: Sample Size and Percentage Rates by Subtype and Gender.....	28
Table 2: Participants' Ages and Number of Children.....	29
Table 3: Marital Status, Education Level and SES of Participants .....	31
Table 4: Frequency of Previous AD/HD, Mood Disorder and Anxiety Disorder Diagnoses.....	32
Table 5: Frequency of Medications for AD/HD, Mood Disorders and Anxiety Disorders.....	33
Table 6: Frequency of Subtype as Reported on Adult Attention Deficit Disorders Evaluation Scale .....	34
Table 7: Mean Scores on A-ADDES (self-report form), BDI-II and BAI .....	35
Table 8: Frequency of Ranges on the BDI-II and BAI.....	37
Table 9: Frequency of Comorbid Disorders as Determined by the SCID-I .....	39
Table 10: Logistic Regression Analysis of Presence/Absence of Mood Disorder as a Function of Gender .....	41
Table 11: Logistic Regression Analysis of Presence/Absence of Anxiety Disorder as a Function of Gender .....	42
Table 12: Mean Scores on ADDES (self-report), BAI and BDI-II for the AD/HD Subtypes .....	46
Table 13: Frequency of AD/HD Diagnosis and Medication by Subtype .....	47
Table 14: Frequency of Ranges on the BDI-II and BAI by Subtype.....	48
Table 15: Frequency of Mood/Anxiety Disorders in each Subtype .....	50

## LIST OF FIGURES

Figure 1: Percent of AD/HD adults who have a least one comorbid disorder.....	51
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## INTRODUCTION

### Overview

Attention-Deficit/Hyperactivity Disorder (AD/HD) is a common childhood behavioural disorder. The prevalence of AD/HD in school-aged children has been estimated to be between 3% and 5% (APA, 1994). Childhood AD/HD is currently one of the most common referrals to mental health clinics in North America (Barkley, 1997; Biederman, Newcorn, & Sprich, 1991) (see Appendix A for diagnostic criteria for AD/HD).

Recent evidence from several sources has suggested the continued existence of AD/HD into adulthood. For example, longitudinal studies of children diagnosed with AD/HD and followed through adolescence and into adulthood have found that 50% – 80% continued to experience AD/HD symptoms and related problems (Murphy & Gordon, 1998). In addition, as stated by Biederman, Faraone, Spencer, Wilens, Mick et al. (1994), studies of clinically referred adults have demonstrated patterns of symptoms and impairments similar to those which are characteristic of children with AD/HD. A review of the existing literature on psychopharmacological interventions also found that adults responded favorably to the stimulant treatments commonly used to treat children with AD/HD (Biederman et al., 1994). As well, family genetic studies have found high prevalence rates of AD/HD in the parents and first-degree relatives of children diagnosed with AD/HD (Biederman et al., 1994). Thus, evidence from a variety of sources has strongly supported the persistence of AD/HD in adulthood.

Although there has been a surge of research in the last few years into AD/HD in adulthood, the prevalence of this disorder is still unclear. Different studies have stated

prevalence rates of 1% - 20% depending on how the disorder was defined and how the criteria were used (Jackson & Farrugia, 1997). In fact, the Diagnostic and Statistical Manual for Mental Disorders – Fourth Edition (DSM-IV) does not specify any figures for adults, stating that the research on prevalence rates is too limited (APA, 1994). A recent study estimated prevalence rates obtained from epidemiological and follow-up studies of children to be 2% – 7% (Work Group on Quality Issues, 1997). Even if clinicians were to take a conservative approach and estimate the prevalence rate as being closer to 2%, the number of adults afflicted with this disorder is substantial.

AD/HD is a complex, heterogeneous disorder with potentially different etiologic and risk factors (Biederman, Newcorn, & Sprich, 1991). Individuals with AD/HD are also at risk for developing problems such as comorbid psychiatric conditions, cognitive difficulties, developmental delays, academic problems and emotional difficulties (Barkley, 1998). Recent studies suggesting significant differences between males and females with AD/HD have emphasized the importance of studying the complexities of gender differences (Gaub & Carlson, 1997). In an attempt to improve classification and to reduce the complexity associated with AD/HD, the DSM-IV Committee reorganized the symptoms into two clusters: hyperactive-impulsive, and inattentive. The reorganization of the core symptoms resulted in the creation of three subtypes: predominantly inattentive, hyperactive-impulsive and combined. The impact of these new diagnostic criteria on research and clinical practice has yet to be determined.

The objective of this study involved investigating AD/HD in adults, and more specifically, investigating gender differences and subtyping patterns associated with

comorbid internalizing disorders. The literature on comorbidity in AD/HD will be briefly examined, followed by specific examples of research on comorbid anxiety and mood disorders in children and adults. A summary of information on gender differences in AD/HD plus internalizing disorders will be given, followed by a review of subtyping issues in AD/HD.

### Comorbidity

Despite thousands of studies on AD/HD, the study of its comorbidity with other conditions has been virtually neglected. Only recently has evidence been accumulating regarding the high occurrence of comorbid conditions in children and adults with AD/HD. According to Barkley (1998), up to 44% of children with AD/HD have a comorbid psychiatric disorder. Consistent with findings observed in children, adults with AD/HD have also demonstrated high levels of comorbidity (Biederman, Faraone, & Kiely, 1996).

Understanding the implications of psychiatric comorbidity is essential because of its influence on diagnosis, prognosis and treatment (Maser & Cloninger, 1990). The presence of a co-occurring disorder can affect the diagnosis of AD/HD by making it difficult to determine which symptoms arise due to which disorder. A clinician must have a good understanding of the symptom patterns for various disorders in order to identify and separate the multiple symptoms (Hornig, 1998). Psychiatric comorbidity can also complicate the prognosis of an individual because it is more difficult to determine the effectiveness of more than one treatment intervention. Also, psychiatric comorbidity can make it more difficult to assess the person's ability to cope with two different yet coexisting disorders. Comorbid disorders can also interfere in the treatment of an

individual with AD/HD. For example, according to Brown (1995), treating only the comorbid disorder can cause the patient to continue to experience the debilitating effects of AD/HD. Thus it is critical to gain a thorough understanding of comorbid patterns.

#### AD/HD and Comorbid Internalizing Disorders

Of the research generated to date on comorbidity and AD/HD, the majority of studies have focused on Conduct Disorder and learning disorders as opposed to internalizing disorders (Jensen, Shervette, Zenakis, & Richters, 1993). Even though the number of studies examining comorbid internalizing disorders is small in comparison to the number of studies of other comorbid conditions, significant comorbidity has been reported by some, particularly epidemiological and clinical studies (Biederman, Newcorn, & Sprich, 1991; Tzelepis, Schubiner, & Warbasse, 1995).

Further evidence of an association between AD/HD and internalizing conditions has come from family genetic studies. For example, family studies have found that the risk for anxiety disorders was significantly greater in the relatives of the individuals who had AD/HD plus comorbid anxiety than in the relatives of individuals with 'pure' AD/HD (Biederman, Faraone, Keenan, Steingard, & Tsuang, 1991). Family studies have also found that the relatives of individuals with AD/HD and AD/HD plus comorbid Major Depressive Disorder have an increased risk for depression as compared to the relatives of normal individuals (Biederman, Faraone, & Kiely, 1996). These studies suggest a relationship between AD/HD and internalizing syndromes; however, initial studies suggest that AD/HD and anxiety disorders transmit independently in families but that AD/HD and depressive disorders may share common familial risk factors (Biederman, Faraone, et al., 1991). The

findings of the family genetic studies are confusing since one of the most common comorbid conditions for depression is anxiety disorders (Hammen & Rudolph, 1996). Given the relative paucity of family studies, these conflicting results must be interpreted cautiously.

### Comorbidity with Anxiety Disorders

Epidemiological and clinical samples of children and adolescents have provided significant evidence of the co-occurrence of AD/HD and anxiety disorders (Biederman, Newcorn et al., 1991). A review of the existing literature on the comorbidity of AD/HD and anxiety found a range of 10% to 40%, with an average rate of 25% in children with AD/HD (Biederman, Newcorn, et al., 1991; Tannock, in press). In the general population, the number of children meeting the criteria for an anxiety syndrome is 5% to 15% which demonstrates the significantly higher occurrence of anxiety problems in children with AD/HD (Pliszka, 1998).

Children diagnosed with both AD/HD and an anxiety syndrome have been found to display distinctive clinical characteristics. Some researchers have even suggested the creation of a distinct AD/HD + anxiety subtype because of the uniqueness of its clinical profile (Biederman, Faraone et al., 1991; Tannock, Ickowicz, & Schachar, 1995). For example, the finding that children with AD/HD and comorbid anxiety disorder are less impulsive than children with 'pure' AD/HD was demonstrated by Pliszka (1992), who compared their teacher ratings, behavioural observations on an arithmetic problem, and performance on a Continuous Performance Test. He found that children in the AD/HD plus comorbid overanxious disorder group were less impulsive and/or hyperactive than both the

AD/HD group and the control group (overanxious disorder has since been eliminated in the DSM-IV and instead was merged into generalized anxiety disorder). In addition, Pliszka (1992) found that children with AD/HD and comorbid anxiety disorder showed fewer Conduct Disorder symptoms. Other researchers have also reported that children with both AD/HD and anxiety have lower levels of externalizing behaviours as recorded by the Child Behavior Checklist (Jensen, Shervette, Xenakis, & Richters, 1993).

Researchers have also found that children with a comorbid anxiety condition show a different response to stimulant treatment as compared to individuals with 'pure' AD/HD. Several studies have found that children with AD/HD and a comorbid anxiety disorder do not respond positively to methylphenidate (MPH) as indexed by teacher ratings of behaviour and behavioural observations during an academic task (DuPaul, Barkley, & McMurray, 1994; Pliszka, 1989). Thus, the poor response to stimulants observed in AD/HD children with comorbid anxiety disorder suggests the possibility of a unique subtype; however, the underlying mechanisms have yet to be determined.

Few studies have examined adulthood AD/HD and comorbid anxiety disorders, and those in the existing literature reported conflicting results. Longitudinal studies such as the one by Mannuzza, Klein, Bessler, Malloy, and LaPadula (1993) found no relationship between anxiety and AD/HD. However, Biederman, Faraone, Spencer, Wilens, Norman, et al. (1993) examined 84 adults who had been referred to a local hospital for treatment of AD/HD and found that 50% had multiple anxiety disorders. In the same study, Biederman and his colleagues also examined 43 non-referred adult relatives of AD/HD children and found that 42% of these adults with AD/HD had multiple anxiety disorders. These results

demonstrated that both referred and non-referred adults with AD/HD had significant comorbid anxiety disorders. A recent study by Rucklidge and Kaplan (1997) that focused on women with AD/HD found that 62.7% of their sample reported high levels of anxiety. For example, 31.4% of the women with AD/HD reported having suffered from panic attacks and 37.3% reported experiencing social anxiety. A study by Murphy and Barkley (1996) which looked at additional psychiatric disorders in adults diagnosed with AD/HD found that 31.6% of the AD/HD group had a comorbid anxiety disorder. Shekim, Asarnow, Hess, Zaucha and Wheeler (1990) also found high rates of comorbid diagnoses when they interviewed 56 adults with AD/HD. With regard to anxiety disorders, they found that 53% of the sample met criteria for Generalized Anxiety Disorder and 15% met criteria for Panic Disorder. Mannuzza and his colleagues have suggested an explanation for the discrepancy between their findings from the longitudinal study and the findings from epidemiological and clinical studies. Mannuzza et al. (1993) believe that the subjects in the longitudinal study, with an average age of 25.5 years, may not have passed through the risk period for developing anxiety disorders when evaluated. Thus, most of the results from the studies were consistent with research findings in children, thereby providing further support for the co-occurrence of AD/HD and anxiety syndromes in adults.

### Comorbidity with Mood Disorders

Epidemiological and clinical samples of children and adolescents have provided significant evidence of the co-occurrence of AD/HD and depressive disorders (Biederman, Newcorn, et al., 1991). Major Depressive Disorder and Dysthymic Disorder (a chronic and persistent disorder with a duration of at least 2 years) have both been studied (APA, 1994).

A review of the existing literature on the co-occurrence of AD/HD and Major Depressive or Dysthymic Disorder in children found that they occur together in 15% and 75% of epidemiological and clinical samples; however, most studies show prevalence rates of 9% to 32% for depressive disorders in children with AD/HD (Biederman, Newcorn, et al., 1991; Barkley, 1998).

Very few studies have directly compared children with AD/HD and comorbid Major Depressive Disorder to children with AD/HD without comorbid Major Depressive Disorder. For example, no studies have compared the stimulant responsiveness of children in these two groups. However, several studies have looked concurrently at depressive and anxiety syndromes and have found that children with AD/HD and internalizing conditions are more likely to have experienced higher stress levels during the past year than the 'pure' AD/HD group (Jensen, Martin, & Cantwell, 1997). For example, in a study by Biederman, Milberger, and Faraone (1995), higher scores on an index of psychosocial adversity were related to increased AD/HD symptomatology and to the presence of comorbid conditions. In addition, follow-up studies have suggested that the presence of depression in children with AD/HD is associated with the likelihood of greater disability and a poorer outcome (Biederman, Mick, & Faraone, 1998).

A review of the research literature yielded few studies specifically examining AD/HD and comorbid mood disorders in adults. While some follow-up studies have not found high levels of comorbid depression in adults with AD/HD (e.g., Mannuzza et al., 1993), other studies, such as the Milwaukee follow-up study, have found significantly high levels of major depression among AD/HD subjects (Barkley, 1998). A review of several

studies by Barkley (1998) found that 16% to 37% of adults with AD/HD met the criteria for Major Depressive Disorder and 19% to 37% of adults with AD/HD met the criteria for Dysthymic Disorder. For example, one of the studies which Barkley included in his review reported that 25% of adults with AD/HD in their sample met criteria for Dysthymic Disorder (Shekim et al., 1990). Other researchers such as Murphy and Barkley (1996) have found that 17.6% of their sample of adults with AD/HD met criteria for Major Depressive Disorder. High rates of depression were also recently found in a study on AD/HD in women: 70.6% had a history of depression (Rucklidge & Kaplan, 1997). Further research is required before any major conclusions can be drawn regarding the association between AD/HD and depression in adults.

### Gender

Traditionally, AD/HD has been predominantly studied in males. The disorder was thought to occur more frequently in males as exemplified by the male to female ratio of 9:1 observed in clinical settings and the 4:1 ratio observed in the general population (APA, 1994). However, a recent finding of male to female ratios of 2:1 in adult epidemiological samples suggests that AD/HD may be underidentified in girls (Biederman, 1998; Brown, Madan-Swain, & Baldwin, 1991).

One explanation suggested for the discrepancy between the prevalence of AD/HD in children and adults is gender referral bias. In childhood, most referrals to clinics are instigated by parents or teachers, and many of these referrals occur when the child has displayed overt behavioural difficulties. Since boys have been found to typically display more externalizing behaviours than girls, their likelihood of being referred to a clinic is

greater (Biederman, Faraone, Spencer, Wilens, Mick et al., 1994; Gaub & Carlson, 1997). Supporting the theory of gender referral bias is the finding that as individuals with AD/HD reach adulthood, and seek help on their own initiative, the gender ratio approaches an equal representation (Biederman, Faraone, Spencer, Wilens, Mick et al., 1994). The above findings suggest that as children, females may be under-diagnosed and not receiving the treatment needed to help them cope with their disorder.

Although AD/HD has been studied extensively, only recently have studies been specifically investigating gender differences in children with AD/HD. According to Gaub and Carlson (1997), their meta-analysis of studies on gender differences has yielded inconsistent findings. While some studies have found no differences between boys and girls (Breen, 1989; Breen & Altepeter, 1990; Horn, Wagner, & Jalongo, 1989; McGee, Williams, & Silva, 1987), others have reported that girls have poorer cognitive and academic functioning, more peer related problems, and more language and neurological disorders (Berry, Shaywitz, & Shaywitz, 1985; Brown, Madan-Swain, & Baldwin, 1991; James & Taylor, 1990). These findings are limited in part due to inconsistencies and difficulties in methodologies such as referral bias, diagnostic classification difficulties, developmental differences and comorbidity issues; thus conclusions based on these studies must be made cautiously (Gaub & Carlson, 1997).

A review of the literature reveals few studies specifically examining gender differences in AD/HD comorbidity patterns (Arnold, 1996). Of the research done to date, several studies have found no gender differences in comorbidity patterns (Brown et al., 1991; Horn et al., 1989). However, other studies have suggested that girls have less

externalizing pathology (Berry et al., 1985; de Haas, 1986; Gaub & Carlson, 1997). For example, Gaub and Carlson (1997) found that females demonstrated less hyperactivity and had lower rates of externalizing conditions relative to males with AD/HD. Other studies have also suggested that girls have more internalizing pathology. For example, Brown, Abramowitz, Madan-Swain, Eckstrand, and Dulcan evaluated a group of clinically referred children and found that the girls had more internalizing symptoms than did the boys (as cited in Barkley, 1998).

The number of studies done on gender differences in adults with AD/HD is extremely small. Biederman, Faraone, Spencer, Wilens, Mick, et al. (1994) performed one study which looked at 128 referred adults with AD/HD. With regard to comorbidity patterns, they found that females did not have higher rates of depressive and anxiety disorders as compared to males but had significantly lower levels of Conduct Disorder. In addition, inconsistent with childhood research, adult females did not differ from their male counterparts with regard to cognitive abilities, academic functioning, and psychosocial difficulties. In another study by Arcia and Conners (1998), no gender differences in cognitive or neuropsychological abilities were found; however, females did report poorer self-perceptions than males. Future studies are needed to determine if these findings can be replicated in order to help clinicians understand and appropriately treat men and women with AD/HD.

Several researchers have suggested that females with disruptive disorders such as AD/HD are more likely to have a comorbid condition than males. The basis of this theory, the gender paradox of comorbidities, suggests that although females have a lower

prevalence of disruptive behaviours, their risk for developing a comorbid condition is higher than in males (Loeber & Keenan, 1994; Zahn-Waxler, Cole, Welsh, & Fox, 1995). According to Zahn-Waxler et al. (1995), higher comorbidity in females occurs because of behaviours such as sensitivity, caring and empathy; these behaviours act as a protective barrier to developing externalizing problems but predispose them to be at a higher risk for developing more internalizing problems. Some researchers have also suggested that AD/HD may be less frequent but more severe in females (Eme, 1992). The evaluation of gender as a risk factor for developing a comorbid condition needs further investigation since it could have important implications for intervention.

#### Subtype

Originally, AD/HD was thought to consist of a triad of symptoms: inattention, hyperactivity and impulsivity. However, research during the last few decades has found that hyperactivity is not a necessary symptom of the disorder. In fact, researchers found that many individuals displayed a more subtle subtype consisting of only inattentive symptoms. For example, Lahey et al. (1988) found through factor analysis that all inattentive items loaded on one factor and all hyperactive items loaded on another factor. As a result, the DSM-IV Committee revised their criteria to reflect these research findings and subsequently, they divided the symptoms of AD/HD into two clusters: inattentive and hyperactive-impulsive. As a result of these changes, three subtypes were developed: the combined type (AD/HD-C), the predominantly inattentive subtype (AD/HD-PI), and the predominantly hyperactive-impulsive subtype (AD/HD-HI).

Diagnosis of a specific subtype depends on the predominant pattern of symptoms. To be diagnosed Attention-Deficit/Hyperactivity Disorder, Combined Type, six (or more) symptoms of inattention and six (or more) symptoms of hyperactivity-impulsivity have persisted for at least 6 months. To be diagnosed Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type, six (or more) symptoms of inattention (but fewer than six symptoms of hyperactivity-impulsivity) have persisted for at least 6 months. To be diagnosed with Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type, six (or more) symptoms of hyperactivity-impulsivity (but fewer than six symptoms of inattention) have persisted for at least 6 months.

The changes to the diagnostic criteria created the need to determine the impact of these revisions on AD/HD comorbidity patterns. Previous studies, using the DSM-III criteria, differentiated between Attention Deficit Disorder with hyperactivity (ADD/H) and without hyperactivity (ADD/WO). In a study by Lahey et al. (1987), a group of outpatient children with ADD/H were compared to a group without hyperactivity: they found that the children with ADD/WO were more likely to have a comorbid internalizing condition. Barkley, DuPaul and McMurray (1990) found that individuals with ADD/WO had higher levels of depressive symptomatology than individuals with ADD/H. A study by Cantwell and Baker (1992), however, did not find any significant differences in the rate of comorbid internalizing conditions in children with ADD/H and ADD/WO. Recent studies suggest that ADD/H and ADD/WO are similar to the combined subtype and the predominantly-inattentive subtype, respectively (Lahey, Applegate, McBurnet, Biederman et al., 1994; Morgan, Hynd, Riccio, & Hall, 1996). The findings by Lahey et al. and Barkley et al. of

high levels of internalizing disorders in children with ADD/WD suggest that the predominantly inattentive subtype may be more likely to display internalizing conditions.

Several recent studies using the DSM-IV diagnostic criteria have not supported the expected relationship of a greater risk of internalizing conditions in the predominantly inattentive subtype (e.g., Cantwell & Baker, 1992). A study by Faraone, Biederman, Weber, and Russell (1998) which involved assessing children and adolescents referred to a clinic for a psychiatric evaluation found that the predominantly inattentive subtype did not have more internalizing disorders as compared to the other two subtypes. Paternite, Loney, and Roberts (1996) also found that patients with the inattentive subtype did not differ from the other subtypes with regard to depression and anxiety symptoms but did have lower levels of externalizing symptoms. Using teacher ratings to determine patterns of psychopathology, a study by Wolraich, Hannah, Pinnock, Baumgaertel and Brown (1996) found no differences in internalizing problems between the predominantly inattentive subtype and the combined subtype but they did find that the predominantly inattentive subtype had lower rates of externalizing disorders. Several other studies also found that the predominantly inattentive subtype did not have greater internalizing symptoms as compared to the combined subtype (Eiraldi, Power, and Nezu, 1997; Morgan et al., 1996).

Interestingly, several studies have found higher levels of depressive symptomatology in the combined and inattentive subtypes as compared to the hyperactive-impulsive and control groups (Faraone et al., 1998; Willcutt, Pennington, Chhabildas, Friedman & Alexander, 1999). Willcutt and his colleagues have suggested that the factor that is linking the comorbidity between AD/HD and depression is the degree of inattention.

The findings from these studies offer many new speculations about the relationship between subtyping and comorbidity. The results of these studies, however, must be interpreted cautiously due to methodological limitations such as small sample size (e.g., Eiraldi et al.), determining subtypes using retrospective information (e.g., Morgan et al., 1996) and the lack of the hyperactive-impulsive subtype to make adequate comparisons (e.g., Willcutt et al., 1999). Future studies are needed to further explore comorbidity patterns within the AD/HD subtypes.

In summary, an investigation into the comorbidity of AD/HD with internalizing disorders is definitely warranted given the lack of congruence among studies to date. AD/HD, anxiety and depressive disorders are highly prevalent in society. Gaining a more thorough understanding of their co-occurrence is critical since the etiology, progression and treatment of the disorder can be affected by their comorbidity. The lack of studies on gender differences is a major public health concern. Given that AD/HD affects hundreds of thousands of females and males, an investigation into gender differences will be very important. Due to the changes in the diagnostic criteria in 1994, patterns of comorbidity and gender differences need to also be examined within the subtypes of AD/HD. The DSM-IV field trials suggested that the inattentive subtype was more likely to be female (Lahey et al., 1994) and as suggested by Gaub and Carlson (1994, as cited in Arnold, 1994), the predominantly inattentive subtype may be more likely to be female with internalizing comorbidity. However, studies to support these relationships have not consistently replicated previous findings and thus more studies are needed to test these hypotheses. Gaining a better understanding of gender differences and subtyping of AD/HD

symptomatology and comorbid patterns could have important implications for mental health service planning and delivery.

### Goals and Hypotheses

#### Research Objectives

This descriptive study set out to examine the relationship between AD/HD and internalizing conditions in a self-referred sample of adults. In addition, the patterns of comorbidity and gender differences were examined within the subtypes of AD/HD.

#### Goals

1. To determine in a self-referred sample whether females with AD/HD are more likely to display comorbid internalizing disorders as compared to males.
2. To determine in a self-referred sample if more females than males are the predominantly inattentive subtype (AD/HD-PI).
3. To examine the associations between the AD/HD subtypes with regards to comorbidity and gender.

#### Hypotheses

1. Females with AD/HD will be more likely to have more internalizing symptoms as compared to males.
2. Females with AD/HD will be more likely to meet diagnostic criteria for internalizing disorders as compared to males.
3. Adults of the AD/HD-PI subtype will be more likely to have more internalizing symptoms as compared to adults of the AD/HD-C subtype.

4. Adults of the AD/HD-PI subtype will be more likely to meet diagnostic criteria for internalizing disorders as compared to adults of the AD/HD-C subtype.
5. Adults of the AD/HD-PI subtype will be more likely to be female in our sample.

## METHODS

### Participants

Adult AD/HD females and males were recruited from several sources: (a) the existing participant pool at the Behavioural Research Unit located at the Alberta Children's Hospital, (b) recruitment posters displayed at the Learning Center, the Disability Center at the University of Calgary, and all Calgary locations of the Provincial Mental Health Clinics (see Appendix B), (c) the Calgary chapter of Children and Adults with Attention Deficit Disorder (CH.A.D.D.), and (d) local support groups.

Although this was a convenience sample of participants with AD/HD, neither anxiety nor depression influenced ascertainment of these participants, thus there was no bias regarding the presence of internalizing disorders. Informed consent was obtained before participants were included in the study (see Appendix C). A minimum age requirement of 24 years and a maximum age requirement of 60 years were used.

A total of 81 men and women participated in the study. Fifty adults were recruited through the participant pool at BRU, 25 adults were recruited from posters, 1 person was recruited through the CH.A.D.D. newsletter and 5 adults were recruited through several support groups.

### Exclusionary Criteria

Participants with a history of neurological problems such as epilepsy, multiple sclerosis, fibromyalgia, chronic fatigue syndrome or with a history of having suffered a head injury with a loss of consciousness were excluded from the study. Given that many participants had experienced various types of injuries as youths, probably in part due to

AD/HD symptoms which increased the likelihood of injury (e.g., impulsive, risky behaviours), some flexibility with this exclusionary criterion was needed. The degree of injury was therefore assessed based on length of unconsciousness, whether they were hospitalized, how the injury occurred and how old they were when the incident happened. Participants were also excluded from the study if they failed to score one or more standard deviations below the norm on one of the subscales on the Adult Attention Deficit Disorders Evaluation Scale – Self-Report Version (A-ADDES) (McCarney & Anderson, 1996).

### Socioeconomic Status

Participants were asked about their occupation as well as their spouse's occupation in order to determine the socioeconomic status (SES) of the family. The Blishen Index (Blishen, Carroll, & Moore, 1987) was used to calculate SES. Occupations listed in Blishen et al. (1987) were used to assign occupations with a socioeconomic score. For each participant, the highest score in their family was used to represent their socioeconomic score (i.e. if the participant's spouse had a higher score, this score was used to determine the SES of the individual). These scores were then converted to one of six socioeconomic levels. levels 1 and 2 indicated low SES, levels 3 and 4 indicated middle SES, and levels 5 and 6 indicated high SES (Crawford, 1990).

### Other Demographic Information

Participants were asked their date of birth, their marital status, whether they had any children, and the highest level of education that they had completed. Education levels were scored as follows: 1 point for no high school education, 2 points for complete of some high school but without diploma, 3 points for completion of high school, 4 points for some post-

secondary education but without obtaining a degree or diploma, 5 points for obtaining a post-secondary degree, and 6 points for obtaining a university degree. Participants were also asked whether they had ever been formally diagnosed with AD/HD, with a mood disorder or with an anxiety disorder. In addition, participants were asked whether they were currently taking medications for any attentional problems, mood disorder, or anxiety. The type of medications were then placed into one of the following categories: (1) Stimulants (e.g., Methylphenidate [Ritalin], Dextroamphetamine [Dexedrine]), (2) Mood Disorder medication, and (3) Anxiety Disorder medication.

### Actual Sample

Of the original 81 adults interviewed, the final sample consisted of a total of 65 adults, including 39 females and 26 men. Sixteen participants were excluded based on low scores on the A-ADDES (10 men and 6 women).

Due to the difficulty of past studies in obtaining enough AD/HD-HI subtype participants (e.g., Eiraldi et al., 1997; Prout, 1999), it was anticipated that this study would not obtain a sufficient number of AD/HD-HI participants; however, difficulty in obtaining both the AD/HD-HI and AD/HD-PI subtypes occurred. The final sample consisted of 44 adults in the AD/HD-C group, 12 adults in the AD/HD-PI group, and 9 adults in the AD/HD-HI group.

### Measures

#### Screening

If there was no prior formal diagnosis of AD/HD, the Attention Deficit Disorder Checklist was used as a telephone screening device to obtain an initial determination of

AD/HD symptomatology (Kaplan, Humphreys, Crawford, & Fisher, 1997). The checklist was formed based on the DSM-IV criteria and on questions from six other standardized instruments. For this particular study, the checklist was modified in that only the first 17 questions were asked. These 17 items obtained information related to hyperactivity, impulsivity, inattention, organization skills, and social issues (see Appendix D).

Participants were asked to rate themselves based on four possible responses: 0 = not at all; 1 = just a little; 2 = pretty much; 3 = very much. In a previous unpublished study of 178 adults who were identified as likely meeting DSM diagnostic criteria for AD/HD, the mean score on the checklist was 23.76 (SD = 8.03). In contrast, 87 adults who were part of a non-AD/HD comparison group had a mean score on the checklist of 6.67 (SD = 3.62). Therefore for the current study, adults had to score within at least one standard deviation (i.e., 15 or greater) on the checklist.

#### Confirmation of AD/HD Diagnosis

To date, there is no clear consensus on how to assess adults suspected of having AD/HD. An accurate assessment is complicated by the disparity among clinicians with regard to the “appropriate” assessment of AD/HD in adulthood (Murphy & Gordon, 1998). The particular assessment approach taken depends on the clinician’s time and resources available. This study used a recently developed rating scale called the Adult Attention Deficit Disorders Evaluation Scale (A-ADDES). Based on DSM-IV criteria, the specific strength of this scale is that it requires input not only from the patient but also from other sources. There are three versions: a self-reporting form for the patient consisting of 58 items, a home reporting form for a significant other consisting of 46 items and a work

reporting form for a supervisor or co-worker consisting of 54 items. Unfortunately, the work version could not be utilized in this study given that the first few participants in the study expressed disinterest in having someone in their work environment evaluate their behavior. Most participants did not feel comfortable with this version and thus it was not given out for the remainder of the study. For all three versions, the items are rated on a five point scale from (0) does not engage in the behavior to (4) one to several times per hour. Completion time for the A-ADDES was approximately 20 minutes. The scales were standardized on a total of 6,074 ratings for the three versions and separate norms were provided for male and female adults 18 through 65+ years of age. Internal consistency for each of the three versions of the A-ADDES using the Cronbach Coefficient Alpha ranged from .97 to .98 (McCarney & Anderson, 1996).

#### Interview for Internalizing Disorders

The Structured Clinical Interview for the DSM-IV Axis I Disorders – Research Version (SCID-I: First, Gibbon, Spitzer, & Williams, 1996) is a comprehensive, semi-structured instrument that adheres closely to the DSM-IV decision trees for psychiatric diagnosis. The SCID-I has been used by the majority of studies researching comorbidity in adults with AD/HD (Biederman, Faraone, Spencer, Wilens et al, 1993; Murphy & Barkley, 1996). An important aspect of the SCID-I is that it has modules which enable clinicians to administer the sections that concern them most. For this particular study, the mood and anxiety modules were used. Rates of disorders reported are lifetime prevalences (i.e., if the full criteria have ever been met during the participant's life). Completion time for the SCID-I was approximately one hour.

### Rating Scales for Internalizing Symptoms

The Beck Depression Inventory-II (BDI-II) has been widely used for the assessment of cognitions associated with depression for both psychiatric patients as well as the normal population. The BDI-II consists of 21 symptoms. The respondents rate the intensity of these symptoms on a scale from 0 to 3. The BDI-II is a self-administered questionnaire with an administration time of 5 – 10 minutes. This questionnaire is used with adults, and adolescents 13 years and older. The assessment of symptoms corresponds to criteria in the DSM-IV. The BDI-II was based on several outpatient samples and a college sample. Internal consistency (coefficient alpha) for the outpatient sample was .92 and for the college sample was .93. Test-retest reliability (1 week) for the outpatient sample was .93 (Beck, Steer & Brown, 1996). An analysis of gender differences on the BDI-II revealed no significant differences between the scores of women and men. High internal consistency was found for both women ( $\alpha=.91$ ) and men ( $\alpha=.92$ ) (Dozois, Dobson, & Ahnberg, 1998)

The Beck Anxiety Inventory (BAI) has also been widely used for the assessment of the severity of anxiety in adults and adolescents. The BAI is a 21 item self report scale. The respondents rate the intensity of the symptoms on a 4-point Likert scale. Administration time is approximately 5 to 10 minutes. The BAI has high internal consistency, with a coefficient alpha of .92. Test-retest reliability (1 week) was found to be .75 (Beck & Steer, 1993). Gender differences have been found for scores on the BAI, with women with anxiety disorders scoring an average of 4 points higher than men (as cited in Beck & Steer, 1993). This gender difference should be taken into consideration when comparing anxiety levels for men and women.

## Procedure

### Participant Recruitment

Several hundred adults and children who have reported having learning or attention problems, or even a formal diagnosis of AD/HD, are on the computerized mailing list of the Behavioural Research Unit (BRU) at the Alberta Children's Hospital. Approximately once a year, the BRU has been mailing these families updates of their research results, always indicating that they may be invited to participate in future studies. For the current research, a letter was mailed to about 140 individuals on this mailing list, selected because they resided in Calgary and there was some reason to believe (based on earlier questionnaires and assessments) that there may be AD/HD symptoms reported in one of the adults. The letter described the nature of the study and what their participation would involve, and informed them that the investigator (Ms. Galbraith) would follow up the letter with a phone call to invite their participation (see Appendix E). They were reminded that participation in research is always voluntary.

When the investigator telephoned them, she inquired whether they were interested in participating. If they were, she asked their permission to go through the screening instruments over the phone at a convenient time: these include the Attention Deficit Disorder Checklist mentioned above, the demographic information and the exclusion criteria (age, reported history of neurological problems, etc.). Appointments were then made with those individuals proceeding with the study, so that the investigator could meet with them either at the hospital, the university, or their home, to complete the rest of the measures.

A total of 33 adults were seen at Alberta Children's Hospital. 39 adults were seen in their homes, 3 adults were seen at the University and 6 adults were seen at their business offices.

### Testing Procedure

All testing was carried out by the investigator (Ms. Galbraith). After written consent was obtained, the Structured Clinical Interview for the DSM-IV was administered. Following the completion of the interview, the three questionnaires were administered. The Beck Anxiety Inventory was given first, followed by the Beck Depression Inventory-II, and then the Attention Deficit Disorders Evaluation Scale (ADDES). When answering questions on the ADDES, those participants currently taking psychostimulant medication were asked to rate themselves based on their behavior when not on stimulant medication. After completion of the three questionnaires, married participants were asked if they would be willing to give their spouse the home reporting form for their spouse to complete. A total of 32 ADDES home version forms were given out and 16 were returned (50% return rate).

### Ethical Considerations

Throughout this study, if participants requested more information on AD/HD, they were provided with a list of community resources such as CH.A.D.D. (Children and Adults with ADD). In addition, if clinical levels become apparent on the depression and/or anxiety measures or if the participant exhibited significant emotional distress, the investigator, who is being trained as a clinical psychologist, provided referral sources. For example, if a participant met the criteria for Major Depressive Disorder in the interview, the investigator would inform the participant that they appeared to meet criteria for a depressive disorder.

would inquire whether they had received help in the past, and would then provide information on community resources. Thus although it was important not to label individuals or let them feel they were being given a formal diagnosis, if a participant met criteria for an anxiety or mood disorder, they were made aware of the condition and information on resources was provided. In the event that a participant displayed a significant degree of mood/anxiety symptomatology and appeared to present as an emergency situation, there were several steps that were to be followed. First, they were to be advised that their mood/anxiety symptoms were of a significant concern. Second, they were to be advised that under the Mental Health Act, the investigator has a duty to take action if she believes that the person is suffering from a mental disorder, and is in a condition presenting or likely to present a danger to themselves or others. The investigator would then emphasize the need for the participant to go to the Emergency Department at their local hospital for an assessment. This would involve three options: have the participant take themselves to the hospital; have a family member drive them; or call 911. In the unlikely event that the participant refused to go to the hospital, the police could be contacted. It is important to emphasize that it was never necessary to initiate these steps. In most instances, the participant was already under the care of a mental health professional or was encouraged to see their family physician at their earliest convenience. No participant in this study presented as an emergency situation.

## RESULTS

Included here is a description of relevant demographic information followed by results for degree of internalizing symptoms via rating scales, internalizing disorders via structured interview, overview of Logistic Regression results, additional analyses and analysis by subtype. The chi-square test of independence was used to examine the relationship between two categorical variables, the independent t-test was used to examine the relationship between a continuous variable and a categorical variable (with two levels), and the analysis of variance examined the relationship between a continuous variable and a categorical variable (with more than two levels). The significance level for all analyses was set at .05. Statistical Package for the Social Sciences (SPSS 9.0) was used to conduct all analyses.

### Description of the Sample

Sixty-five adults participated in the study: 26 were male and 39 were female. The AD/HD-C group contained 18 males and 26 females, the AD/HD-PI group contained 4 males and 8 females, and the AD/HD-HI group contained 4 males and 5 females (see Table 1).

The descriptive statistics for the following information are presented in Table 2. The age of the participants ranged from 24 to 56 years of age, with a mean age of 41. The number of children each participant had ranged from 0 to 7. No gender differences for age were found ( $t(63) = .16, p > .05$ ) and no gender differences for number of children were found ( $t(63) = .92, p > .05$ ).

Table 1

Sample Size and Percentage Rates by Subtype and Gender


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Subtype	Gender		Total N (%)
	Male N (%)	Female N (%)	
AD/HD-C	18 (69.2)	26 (66.7)	44 (67.7)
AD/HD-PI	4 (15.4)	8 (20.5)	12 (18.5)
AD/HD-HI	4 (15.4)	5 (12.8)	9 (13.8)

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Table 2

Participants' Ages and Number of Children

Variable	Gender					
	Male		Female		Total	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Age	42.79	8.37	39.70	8.64	40.93	8.60
No. of Children	1.96	1.54	2.00	1.57	1.98	1.55

Most of the participants were married. Analysis of their educational level revealed a wide range of educational attainment with over one third of the sample having obtained a university degree. Examination of the relationship between gender and marital status indicated no differences between men and women for marital status,  $\chi^2(3, N = 65) = .65, p > .05$  (see Table 3). The relationship between gender and educational level was also investigated: educational level did not differ between the two genders,  $\chi^2(4, N = 65) = .92, p > .05$ . Analysis of the relationship between gender and socioeconomic status (SES) revealed no gender differences for SES,  $\chi^2(2, N = 65) = .82, p > .05$ .

Of the 65 adults who participated in the study, 44.6% had been previously diagnosed with AD/HD, 44.6% had been previously diagnosed with a mood disorder and 12.3% had been previously diagnosed with an anxiety disorder (see Table 4). There was no difference between males and females regarding previous diagnosis. As shown in Table 5, there was a gender difference on use of stimulant medication: 41% of the females were taking stimulant medication as compared to 15.4% of the men,  $\chi^2(1, N = 65) = 4.82, p < .05$ . No differences were found between males and females regarding medication for mood disorders,  $\chi^2(1, N = 65) = .21, p > .05$ , or anxiety disorders,  $\chi^2(1, N = 65) = .68, p > .05$ . A total of 10 participants were on mood or anxiety medication but were not taking stimulant medication.

For descriptive statistics on the ADDES, see Table 6 and Table 7. No gender differences were found in participant's self-report on the ADDES; that is, males and

Table 3

Marital Status, Education Level and SES of Participants

Variable	Gender		Total N (%)
	Male N (%)	Female N (%)	
<b>Marital Status</b>			
Single	3 (11.5)	7 (17.9)	10 (15.4)
Married	18 (69.2)	21 (53.8)	39 (60.0)
Separated	1 (3.8)	3 (7.7)	4 (6.2)
Divorced	4 (15.4)	8 (20.5)	12 (18.5)
<b>Education Level</b>			
Some high school	3 (11.5)	4 (10.3)	7 (10.8)
High school diploma	3 (11.5)	5 (12.8)	8 (12.3)
Some post-secondary	5 (19.2)	10 (25.6)	15 (23.1)
Post-secondary diploma	7 (26.9)	7 (17.9)	14 (21.5)
University degree	8 (30.8)	13 (33.3)	21 (32.3)
<b>SES Level</b>			
Low	8 (30.8)	14 (35.9)	22 (33.8)
Mid	11 (42.3)	17 (43.6)	28 (43.1)
High	7 (26.9)	8 (20.5)	15 (23.1)

Table 4

Frequency of Previous AD/HD, Mood Disorder and Anxiety Disorder Diagnoses

Variable	Gender		Total N (%)
	Males N (%)	Females N (%)	
Prior AD/HD diagnosis			
No	14 (53.8)	22 (56.4)	36 (55.4)
Yes	12 (46.2)	17 (43.6)	29 (44.6)
Prior Mood Disorder diagnosis			
No	15 (57.7)	21 (53.8)	36 (55.4)
Yes	11 (42.3)	18 (46.2)	29 (44.6)
Prior Anxiety Disorder diagnosis			
No	23 (88.5)	34 (87.2)	57 (87.7)
Yes	3 (11.5)	5 (12.8)	8 (12.3)
Prior AD/HD + one or more comorbid diagnoses <sup>a</sup>	7 (26.9)	12 (30.1)	19 (29.2)

<sup>a</sup> These diagnoses were not necessarily simultaneous in time but may reflect varying diagnoses for the same symptoms over the individuals lifetime.

Table 5

Frequency of Medications for AD/HD, Mood Disorders and Anxiety Disorders

Variable	Gender		Total N (%)
	Males N (%)	Females N (%)	
AD/HD			
No medication	22 (84.6)	23 (59.0)	45 (69.2)
Medication	4 (15.4)	16 (41.0)	20 (30.8)
Mood Disorder			
No medication	20 (76.9)	28 (71.8)	48 (73.8)
Medication	6 (23.1)	11 (28.2)	17 (26.2)
Anxiety Disorder			
No medication	26 (100.0)	28 (97.4)	64 (98.5)
Medication	0 (0.0)	1 (2.6)	1 (1.5)
AD/HD + Mood/ Anxiety Medication			
	1 (3.9)	7 (18.0)	8 (12.3)

Table 6

Frequency of Subtype as Reported on Adult Attention Deficit Disorders Evaluation Scale

Variable	Gender		Total N (%)
	Male N (%)	Female N (%)	
ADDES (self-report)			
Hyperactive-Impulsive	4 (15.4)	5 (12.8)	9 (13.8)
Inattentive	4 (15.4)	8 (20.5)	12 (18.5)
Combined	18 (69.2)	26 (66.7)	44 (67.7)
ADDES (home version)			
Hyperactive-Impulsive	1 (3.8)	0 (0.0)	1 (1.5)
Inattentive	0 (0.0)	2 (5.1)	2 (3.1)
Combined	6 (23.1)	3 (7.7)	9 (13.8)
Not Clinical	1 (3.8)	3 (7.7)	4 (6.2)

Table 7

Mean Scores on A-ADDES (self-report form), BDI-II and BAI

Variable	Gender					
	Male		Female		Total	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
ADDES <sup>a</sup>	6.23	4.63	6.56	4.71	6.43	4.65
BDI-II <sup>b</sup>	16.19	10.08	15.51	12.48	15.78	11.50
BAI <sup>b</sup>	12.00	6.20	11.90	11.07	11.94	9.37

<sup>a</sup> A lower score indicates greater severity

<sup>b</sup> A higher score indicates greater severity

females did not rate themselves different with regard to subtype (i.e., Hyperactive-Impulsive, Inattentive, Combined).  $\chi^2(2, N = 65) = .82, p > .05$ . There was no difference between the genders on spousal report of subtype (ADDES – home version),  $\chi^2(3, N = 16) = 5.00, p > .05$ . Comparison of participant responses on the ADDES (self-report version) to their spousal response (home version), revealed no differences,  $\chi^2(6, N = 16) = 10.42, p > .05$ . In total, 32 people were given spousal report forms and half of these forms were returned; thus information on spousal report is based on a response from 41% of the married participants. Overall, there was 63% agreement between participants and spouses with regard to symptom pattern (i.e., subtype). Of those participants and spouses who disagreed, 25% of the disagreement was related to the spouse rating their partner as having very few AD/HD symptoms.

The relationship between gender and the severity of symptoms on the self-report version of the ADDES was also investigated: the severity of symptoms as measured by the ADDES did not differ for the two genders,  $t(63) = -.28, p > .05$ .

#### Degree of Internalizing Symptoms via Rating Scales

Two independent t-tests were performed to test the hypothesis that females with AD/HD would be more likely to have more internalizing symptoms as compared to males (see Table 7). No differences between males and females were found for BDI-II scores,  $t(63) = .23, p > .05$ , and for BAI scores,  $t(63) = .04, p > .05$ . To further analyze the degree of mood and anxiety symptoms, the data was examined by ranges determined from categories from the BDI-II and BAI manuals: minimal, mild, moderate and severe. No differences were found between the genders for the BDI-II ranges,  $\chi^2(3, N = 65) = .94, p >$

Table 8

Frequency of Ranges on the BDI-II and BAI

Variable	Gender		Total N (%)
	Male N (%)	Female N (%)	
<b>BDI-II range</b>			
Minimal	13 (50.0)	20 (51.3)	33 (50.8)
Mild	4 (15.4)	4 (10.3)	8 (12.3)
Moderate	4 (15.4)	9 (23.1)	13 (20.0)
Severe	5 (19.2)	6 (15.4)	11 (16.9)
<b>BAI range</b>			
Minimal	6 (23.1)	18 (46.2)	24 (36.9)
Mild	12 (46.2)	11 (28.2)	23 (35.4)
Moderate	8 (30.8)	6 (15.4)	14 (21.5)
Severe	0 (0.0)	4 (10.3)	4 (6.2)

.05; however, a difference was found between the genders for the BAI ranges.  $\chi^2(3, N = 65) = 8.05, p < .05$ . As shown in Table 8, females were more likely to have lower ratings of anxiety: 46% of the females fell in the minimal level anxiety group as compared to 23% of males. However, 10% of the females did fall in the severe anxiety group with no males falling into this category. The anxiety scores for males were more likely to fall in the mild and moderate anxiety groups.

#### Internalizing Disorders via Structured Interview

Two chi-squares were performed to test the hypothesis that females with AD/HD would be more likely to meet diagnostic criteria for internalizing disorders as compared to males (see Table 9). First, participants who met criteria for any mood disorder were collapsed under one category (i.e., mood disorder) and participants who met criteria for any anxiety disorder were collapsed under one category (i.e., anxiety disorder). No difference was found between the genders for the presence or absence of a mood disorder,  $\chi^2(1, N = 65) = .86, p > .05$ , or an anxiety disorder,  $\chi^2(1, N = 65) = .27, p > .05$ .

Overall, 69% of the sample had a least one comorbid disorder while 31% of the sample had “pure” AD/HD. When examining the data by gender, 67% of females and 73% of males had at least one comorbid disorder. As shown in Table 9, according to information from the structured interview, 59% of the participants met the criteria for a mood disorder and 39% of the participants met the criteria for an anxiety disorder. Specifically, 54% of females and 65% of males met the criteria for a mood disorder, and 41% of females and 35% of males met the criteria for an anxiety disorder. A total of 28% of the sample met

Table 9

## Frequency of Comorbid Disorders as Determined by the SCID-I

Variable	Gender		Total N (%)
	Male N (%)	Female N (%)	
Mood Disorder	17 (65.4)	21 (53.8)	38 (58.5)
MDD	13 (50.0)	17 (43.6)	30 (46.2)
Dysthymic Disorder	2 (7.7)	1 (2.4)	3 (4.6)
Bipolar I	2 (7.7)	3 (7.7)	5 (7.7)
Bipolar II	0 (0.0)	1 (2.4)	1 (1.5)
Anxiety Disorder	9 (34.6)	16 (41.0)	25 (38.5)
Panic Disorder (PD)	6 (23.1)	3 (7.7)	9 (13.8)
Panic Disorder with Agoraphobia	0 (0.0)	3 (7.7)	3 (4.6)
Agoraphobia without History of PD	0 (0.0)	0 (0.0)	0 (0.0)
Social Phobia	3 (11.5)	5 (12.8)	8 (12.3)
Specific Phobia	3 (11.5)	5 (12.8)	8 (12.3)
Obsessive Compulsive Disorder	0 (0.0)	1 (2.6)	1 (1.5)
Posttraumatic Stress Disorder	0 (0.0)	2 (5.1)	2 (3.1)
Generalized Anxiety Disorder	1 (3.9)	2 (5.1)	3 (4.6)

Note. Some participants had multiple diagnoses: AD/HD alone, 31%; AD/HD + 1 other diagnosis, 37%; AD/HD + 2 other diagnosis, 23%; AD/HD + 3 other diagnosis, 8%; AD/HD + 4 other diagnosis, 1%.

criteria for both a mood disorder and an anxiety disorder. The presence or absence of specific mood/anxiety disorders was examined by gender but no differences emerged between males and females. Although it was noted that more males were diagnosed with Panic Disorder, this finding only represented a trend as this analysis failed to reach statistical significance.

### Overview of Logistic Regression Results

Two direct logistic regression analyses were performed to assess prediction of membership in one of two categories of outcome (presence or absence of mood/anxiety disorder) on the basis of gender. Both analyses had sufficient sample sizes as per the rule of thumb that no more than 20% of cells should have fewer than 5 participants (Tabachnick & Fidell, 1996). The first logistic regression looked at whether being male or female would predict the presence or absence of a mood disorder. Gender did not significantly improve the fit of the model and thus was not a significant predictor,  $\chi^2(1, N = 65) = 0.86, p > .05$  (see Table 10). The second logistic regression looked at whether being male or female would predict the presence or absence of an anxiety disorder. Gender did not significantly improve the fit of the model and thus was not a significant predictor,  $\chi^2(1, N = 65) = 0.86, p > .05$  (see Table 11).

### Additional Analyses

#### Mood/Anxiety Disorders

Additional statistical analyses were performed to examine differences between participants who met criteria for a mood disorder or an anxiety disorder versus those who

Table 10

Logistic Regression Analysis of Presence/Absence of Mood Disorder as a Function ofGender

Variables	<u>B</u> <sup>a</sup>	Wald test <sup>b</sup> (z-ratio)	Odds Ratio <sup>c</sup>
Gender	-.482	.922	.618

<sup>a</sup> B is the logistic regression coefficient

<sup>b</sup> Wald test is a test of the significance of the coefficient (Wald = B/standard error of B<sup>2</sup>).

<sup>c</sup> Odds ratio is the odds of an outcome (e.g., presence of mood disorder) for a category of a predictor (e.g., female) divided by the odds of that outcome for the other category of the predictor (e.g., male).

Table 11

Logistic Regression Analysis of Presence/Absence of Anxiety Disorder as a Function of Gender

Variables	<u>B</u>	Wald test (z-ratio)	Odds Ratio
Gender	.273	.520	1.31

did not meet criteria. No differences were found for participants' ages, number of children, marital status, socioeconomic status, prior AD/HD diagnosis, medications, and self-report on the ADDES. However, those that did not meet criteria for an anxiety disorder were more likely to have had a higher education,  $\chi^2(2, N = 65) = 6.66, p < .05$ , and there was a trend for them to have a higher SES level,  $\chi^2(2, N = 65) = 5.63, p = .06$ . Participants who met criteria for a mood disorder were more likely to not be taking stimulant medication,  $\chi^2(1, N = 65) = 4.06, p < .05$ . However, a trend was also observed for those not taking stimulant medication in that they were less likely to have an anxiety disorder,  $\chi^2(1, N = 65) = 3.34, p = .07$ .

Analysis by gender revealed a difference between females with an anxiety disorder and females without an anxiety disorder: females with an anxiety disorder were more likely to be single,  $\chi^2(2, N = 39) = 7.22, p < .05$ . Females with a mood disorder were also more likely to fall in the predominantly inattentive subtype as determined from self-report on the ADDES,  $\chi^2(2, N = 39) = 6.12, p < .05$ .

#### Symptom Severity on BDI-II and BAI

Additional statistical analyses were also performed to examine whether there were differences between participants falling in higher ranges (more severe symptomatology) on the BDI-II and BAI as compared to those participants falling in the lower ranges (less severe symptomatology). No differences were found between participants in the four ranges on the BDI-II with respect to marital status, education, socioeconomic status, prior AD/HD diagnosis, and self-report on the ADDES. Participants scoring in the more severe

range on the BDI-II were found to have a greater number of comorbid disorders,  $\chi^2(12, N = 65) = 23.80, p < .05$ , as were participants scoring in the more severe range on the BAI.  $\chi^2(12, N = 65) = 24.06, p < .05$ . Analysis by gender revealed a difference for participants scoring in the more severe ranges on the BAI on their use of stimulant medication: males scoring in the more severe ranges on the BAI were less likely to be using stimulant medication,  $\chi^2(2, N = 26) = 7.76, p < .05$ . Analysis by gender revealed a difference between participants scoring in the more severe ranges on the BAI and their socioeconomic status: females scoring in the more severe ranges on the BAI were more likely to have lower SES,  $\chi^2(6, N = 39) = 15.17, p < .05$ .

#### Congruence between Symptoms and Disorders

The congruence between the interview and the rating scales was established by comparing those with or without a disorder to their score on the respective rating scale. Participants meeting criteria for a mood disorder on the SCID had higher scores on the BDI-II,  $t(63) = -3.08, p < .05$ , and an examination by gender revealed that this finding was statistically significant for both men,  $t(24) = -2.34, p < .05$ , and women,  $t(37) = -2.10, p < .05$ . Those who met criteria for a mood disorder also had higher BAI scores as compared to those who did not meet criteria,  $t(63) = -2.84, p < .05$ , and an examination by gender revealed that this finding was statistically significant for women,  $t(37) = -2.27, p < .05$ , but not for men,  $t(24) = -1.80, p > .05$ . Participants meeting criteria for an anxiety disorder on the SCID had higher BAI scores,  $t(63) = -2.14, p < .05$ , and an examination by gender revealed this finding was not significant for either women or men alone. In addition, those who had an anxiety disorder also had higher BDI-II scores as compared to those who did

not have an anxiety disorder.  $t(63) = -2.22, p < .05$ , and an examination by gender revealed this finding was not significant for women nor significant for men.

### Stimulant Medication

An examination of the relationship between self-reported scores on the ADDES and stimulant medication revealed that those taking stimulant medication had more severe scores on the ADDES as compared to those not taking stimulant medication,  $t(63) = 2.12, p < .05$ . Specifically, females were more likely to be taking stimulant medication and to have more severe scores on the ADDES,  $t(24) = 2.34, p < .05$  but males were not more likely to be taking stimulant medication and to have more severe ADDES scores,  $t(24) = .57, p > .05$ .

### Analysis by Subtype

Given the insufficient number of participants in the AD/HD-HI and AD/HD-PI subtypes, comparisons among the subtypes were limited. No differences were found for subtype on the variables of gender, age, number of children, marital status, education level, SES level, previous AD/HD diagnosis, presence/absence of mood or anxiety disorders, or scores on the BDI-II and BAI (see Table 12, 13 and 14 for descriptive statistics). However, a difference was found between subtype and stimulant medication: AD/HD-C adults were more likely to be taking stimulant medication as compared to the AD/HD-PI and AD/HD-HI adults,  $\chi^2(2, N = 65) = 6.59, p < .05$ . Although no differences were found between subtype and mood/anxiety disorders, analyses by specific disorders revealed an interesting trend for adults of the AD/HD-PI subtype: they were more likely to have had a diagnosis of Major Depressive Disorder as compared to the other two subtypes,  $\chi^2(2, N = 65) = 5.10,$

Table 12

Mean Scores on ADDES (self-report), BAI and BDI-II for the AD/HD Subtypes

Variable	Combined	Inattentive	Hyperactive-Impulsive
ADDES <sup>a</sup>	4.16	10.50	12.11
BAI <sup>b</sup>	13.39	9.58	8.00
BDI-II <sup>b</sup>	15.91	17.92	12.33

<sup>a</sup> A lower score indicates greater severity

<sup>b</sup> A higher score indicates greater severity

Table 13

Frequency of AD/HD Diagnosis and Medication by Subtype

Variable	Combined N (%)	Inattentive N (%)	Hyperactive- Impulsive N (%)
Prior AD/HD Diagnosis			
No	21 (47.7)	8 (66.7)	7 (77.8)
Yes	23 (52.3)	4 (33.3)	2 (22.2)
AD/HD			
No medication	26 (59.1)	11 (91.7)	8 (88.9)
Medication	18 (40.9)	1 (8.3)	1 (11.1)

Table 14

Frequency of Ranges on the BDI-II and BAI by Subtype

Variable	Combined N (%)	Inattentive N (%)	Hyperactive- Impulsive N (%)
<b>BDI-II range</b>			
Minimal	21 (47.7)	6 (50.0)	6 (66.7)
Mild	4 (9.1)	3 (25.0)	1 (11.1)
Moderate	12 (27.3)	0 (0.0)	1 (11.1)
Severe	7 (15.9)	3 (25.0)	1 (11.1)
<b>BAI range</b>			
Minimal	15 (34.1)	4 (33.3)	5 (55.6)
Mild	13 (29.5)	7 (58.3)	3 (33.3)
Moderate	13 (29.5)	0 (0.0)	1 (11.1)
Severe	3 (6.8)	1 (8.3)	0 (0.0)

$p = .078$ . A trend was also observed for the AD/HD-C adults with regard to anxiety levels as measured by the BAI: the AD/HD-C adults had higher levels of anxiety (moderate to severe) as compared to the other two subtypes,  $\chi^2(4, N = 65) = 7.81, p = .099$ . Using a one-way ANOVA, a difference was found between the subtypes and severity of scores on the ADDES ( $F(2,62) = 33.35, p < .05$ ). Results of a Scheffe post-hoc group comparison showed that adults of the combined group had more severe scores on the ADDES as compared to the inattentive and hyperactive-impulsive groups.

As shown in Table 15, 75% of adults in the inattentive group had a mood disorder compared with 59.1% of the adults in the combined group and 33.3% of the adults in the hyperactive-impulsive group. Of interest to the writer, all of the participants who met the criteria for Bipolar Disorder were of the combined subtype ( $N = 6$ ). Also, 40.9% of the combined group had an anxiety disorder compared with 33.3% of the inattentive and 33.3% of the hyperactive-impulsive group. As shown in Figure 1, 91.7% of participants in the inattentive subtype, 68.2% of the participants in the combined subtype, and 44.4% of the participants in the hyperactive-impulsive subtype had a least one comorbid disorder. In terms of the relationship between gender, subtype and internalizing disorders, as previously mentioned, females were more likely to be diagnosed with a mood disorder if they were of the inattentive subtype,  $\chi^2(2, N = 39) = 6.12, p < .05$ . Males appeared to be more likely to be diagnosed with a mood disorder if they were of the combined subtype; however, this failed to reach statistical significance.

Table 15

Frequency of Mood/Anxiety Disorders in each Subtype

Subtype	Mood Disorder N (%)	Anxiety Disorder N (%)	Mood + Anxiety Disorder N (%)
Combined	26 (59.1)	18 (40.9)	14 (31.8)
Inattentive	9 (75.0)	4 (33.3)	2 (16.6)
Hyperactive-Impulsive	3 (33.3)	3 (33.3)	2 (22.2)

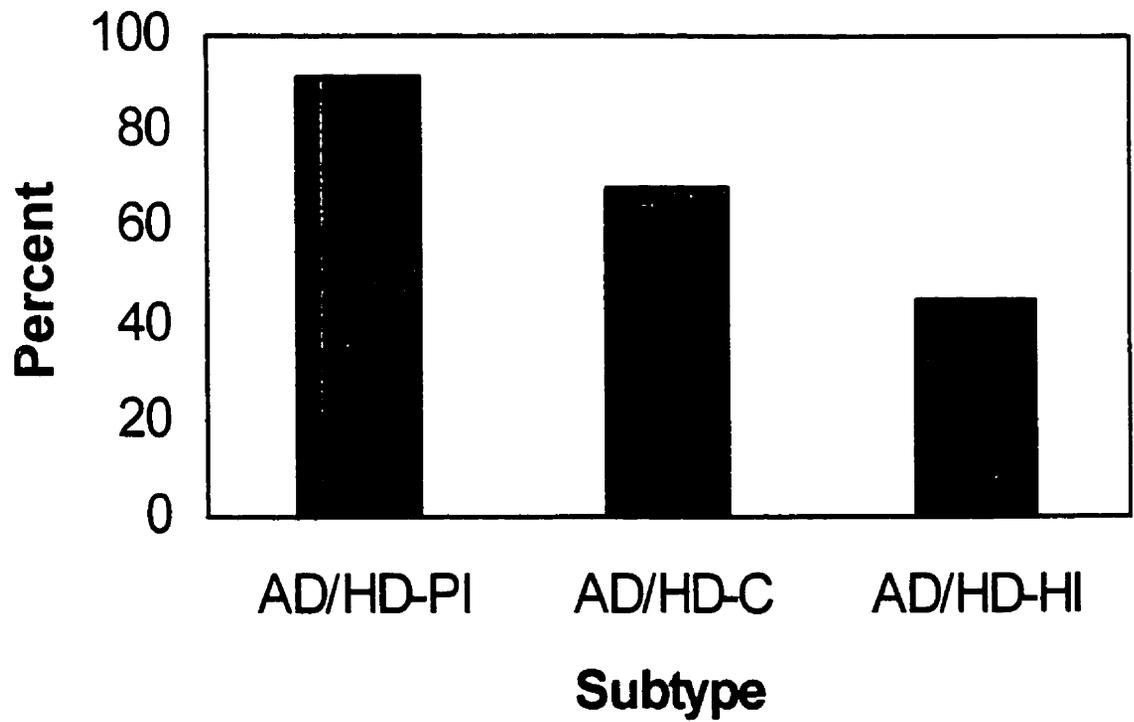


Figure 1. Percent of AD/HD adults who have a least one comorbid disorder

## DISCUSSION

### Implications of Findings Regarding Hypotheses

The present study provided information regarding comorbidity patterns, gender differences and subtyping in AD/HD. The present findings did not support hypothesis 1 that females with AD/HD would be more likely to have more internalizing symptoms as compared to males. The present findings did not support hypothesis 2 that females with AD/HD would be more likely to meet diagnostic criteria for internalizing disorders as compared to males. More specifically, this study found that neither gender predicted the presence or absence of an anxiety or mood disorder. The study did not support hypothesis 3 that adults of the AD/HD-PI subtype would be more likely to have more internalizing symptoms as compared to adults of the AD/HD-C subtype. The study did not support hypothesis 4 that adults of the AD/HD-PI subtype would be more likely to meet diagnostic criteria for internalizing disorders as compared to adults of the AD/HD-C subtype. However, when examined by gender it was found that females of the predominantly inattentive subtype were more likely to have a mood disorder. Finally, the study did not support hypothesis 5 that adults of the AD/HD-PI subtype would be more likely to be female in the sample.

### Additional Findings

The study did reveal some additional findings. Females were more likely to be taking stimulant medication as compared to males, and females who were taking stimulant medication had more severe AD/HD symptoms. Thus, females who had more severe AD/HD symptomatology were more likely to take stimulant medication to help them cope

with their symptoms. Participants who were not taking stimulant medication, were more likely to meet criteria for a mood disorder. It may be that treatment of the AD/HD symptoms indirectly improves symptoms associated with a mood disorder or it may be that those participants who are willing to take stimulant medication were more likely to get help for mood symptoms before it became more serious (e.g., a mood disorder). With respect to those participants meeting criteria for an anxiety disorder versus those not meeting criteria, those with an anxiety disorder were more likely to be single, have a lower education and lower SES.

The finding of a 63% agreement between self-report and spousal report on the ADDES demonstrated that the majority of married couples agreed with one another with regard to symptom pattern (i.e., subtype). However, 25% of the couples disagreed on symptom patterns. Are these participants more focused on their mental health or are they simply exaggerating their symptomatology? Perhaps their spouse is not aware of the degree of difficulties that they experience with having AD/HD. It may be beneficial for future studies to focus on the experiences of the family (e.g., the spouse) living with an adult with AD/HD and their perceptions of the difficulties that their family member experiences.

This study also found that as the number of comorbid disorders increased, mood and anxiety symptoms increased. The increased comorbidity among participants with more severe internalizing symptomatology provides additional support for the importance of assessing for comorbid disorders in clinical practice.

The results from this study indicate very high comorbid rates for adults with AD/HD. Consistent with other studies which have found a relationship between AD/HD

and anxiety disorders (e.g., Biederman, Faraone, Spencer, Wilens, Norman et al., 1993; Murphy & Barkley, 1996; Shekim et al., 1990), this study found that 39% of the participants met the criteria for an anxiety disorder. Also consistent with other research (e.g., Biederman, Faraone, Spencer, Wilens, Norman et al., 1993; Murphy & Barkley, 1996; Shekim et al. 1990), this study found a relationship between AD/HD and mood disorders: 59% of the participants met the criteria for a mood disorder. However, the number of participants meeting criteria for a mood disorder was higher than other studies. For example, a review of studies by Barkley (1998) found that 16% to 37% of adults with AD/HD met the criteria for Major Depressive Disorder while the current study found that 46% of the participants met the criteria.

This study found no gender differences with regard to the presence of anxiety and mood symptoms and/or disorders, which is consistent with other studies which have found no gender differences in internalizing comorbidity patterns in children (e.g., Brown, Madan-Swain, & Baldwin, 1991; Horn, Wagner, & Ialongo, 1989) and in adults (e.g., Biederman, Faraone, Spencer, Wilens, Mick et al., 1994). However, one gender difference was found for females: females had either minimal anxiety ratings or severe anxiety ratings whereas males rated their anxiety as falling more in the mild to moderate range. Since research has suggested the women score an average of 4 points higher on the BAI than men, this was taken into consideration and the four high scores were examined (as cited in Beck & Steer, 1993). Even if four points were taken off these high scores, the scores of three of the participants would still remain in the severe category. Thus, this study found that women tended to rate their anxiety as either really low or really high as compared to

men. However, no other gender differences were found for anxiety levels when examined by actual scores on the BAI (i.e., as a continuous measure) or by presence/absence of an anxiety disorder. Further studies are needed to confirm these findings but it appears that gender may not be a significant predictor of internalizing comorbid patterns in individuals with AD/HD.

Within the context of gender, an interesting theory has been developed that suggests that females with a disruptive behavioral disorder (e.g., AD/HD) will be more likely to have a comorbid condition than males (Loeber & Keenan, 1994; Zahn-Waxler et al., 1995). This study did not support previous suggestions of a gender paradox of comorbidities. The study found that 73% of males and 67% of females had a least one comorbid disorder. Thus, females with a disruptive behavioural disorder such as AD/HD were not more likely to have a comorbid disorder as compared to males. Also, consistent with other studies (e.g., see review by Gaub & Carlson, 1997), females were not found to have a more severe disorder than males based on scores on the ADDES. This finding contrasts with the theory suggested by Eme (1992), who predicted that disorders such as AD/HD are more prevalent in males but are more severe in females. However, the present study did not investigate other areas of functioning (e.g., cognitive or psychosocial); thus the conclusion of whether females had a more severe disorder is limited to information from the AD/HD rating scale.

The finding of no differences between the subtypes with regard to anxiety and mood symptoms and/or disorders is consistent with recent studies (e.g., Eiraldi et al., 1997; Faraone, Biederman, Weber, & Russell, 1998; Paternite et al., 1996; Wolraich et al., 1996). However, when examined by gender, females of the inattentive subtype were more likely to

meet criteria for a mood disorder. To the author's knowledge, no studies have examined subtype and comorbidity patterns by gender. Although there was a suggestion by Gaub and Carlson (1994, as cited in Arnold, 1994) that females with internalizing comorbidity would be more likely to be in the inattentive subtype, no studies could be found within the literature. Perhaps women of the inattentive subtype may be at an increased risk for developing a mood disorder. Further studies are needed to replicate this finding as this could have important clinical implications in terms of assessment and treatment.

With regard to subtype, this study also found that participants in the combined subtype were more likely to be taking stimulant medication and were more likely to have more severe AD/HD symptomatology. As would be expected, it appears that the more severe the AD/HD symptoms the more likely individuals are to be taking stimulant medication. It is of interest that those participants with more severe AD/HD symptoms were more likely to be in the combined subtype. A closer look at the relationship between the number of comorbid conditions and subtype also reveals that only participants in the combined subtype had multiple comorbid diagnoses (i.e., three or more comorbid diagnoses); however, the small number of subjects in the other two subtypes limits the interpretation of this finding. The findings of more severe AD/HD symptoms and possibly more comorbid diagnoses in the combined subtype coincides with other research which has suggested that the combined subtype is a more severe disorder than the other subtypes (e.g., more impairment in multiple domains) (Faraone, Biederman, Weber, & Russell, 1998). Also consistent with other studies such as Willcutt et al. (1999) is the finding that participants in the combined and inattentive subtype had more severe scores on all

measures (e.g., AD/HD symptomatology, and depression and anxiety symptoms) as compared to participants in the hyperactive-impulsive subtype (although measures of depression/anxiety symptoms did not reach statistical significance with regard to significant differences in severity level).

### Strengths and Limitations of the Findings

This study has a number of strengths that make it unique within the published literature on AD/HD. To the author's knowledge, this study is one of the first to examine gender differences, comorbidity patterns and subtyping in adults with AD/HD. Given the predominance of research on males within the AD/HD literature, the inclusion of males and females was important so that gender differences could be analyzed. This study also looked at internalizing symptomatology, an area that has traditionally not been studied as intensively as compared to other areas such as externalizing disorders. The identification of AD/HD subtypes was important since there has been some suggestion within the literature of differences within the subtypes with respect to comorbidity patterns. Another strength of this study was the use of a self-referred sample which offers a contrast to previous research that have often used clinical samples. The finding of high comorbidity rates among this sample suggests that comorbidity is not isolated to clinical samples and may be a widespread phenomenon.

The findings reported in this study must be interpreted in light of inherent methodological limitations. With regard to sample size, there was sufficient power to detect a large effect size for the majority of the analyses; however, there was insufficient power to detect a medium effect size. Post-hoc power analyses revealed that a sample size ranging

from approximately 110 to 160 would be needed to detect subtype differences. Also, the significance level for all analyses was set at .05. Given that many comparisons were performed it is important to mention that some findings may have been significant due to chance. The sample characteristics in this study were unique in that the sample tended to have a high education level (32% had a University degree) and the majority of the participants were married (60%). Thus, although this sample may not be representative of all adults with AD/HD, the differences that were found may be even greater in a more "typical" AD/HD cohort.

One limitation that was noted throughout the study was the diagnostic categorization of AD/HD. This was one of the first studies to use the Adult Attention Deficit Disorder Evaluation Scale (A-ADDES) as a measure of AD/HD symptoms and as a method of subtyping participants. Unfortunately, time constraints prevented a more thorough assessment of AD/HD symptomatology so the ADDES was the measure used to ascertain this diagnosis. Although the ADDES does allow input from the participant's spouse (home version) and does ask questions that are relevant to an adult with AD/HD, a number of participants complained about the design of the quantifiers. Many participants felt that although the quantifiers were structured to obtain information about the frequency with which an individual demonstrates a behavior, they did not take into account the severity of the behavior. For example, participants were unsure how to rate something that occurred infrequently but was very severe and distressing for them. Although the manual discusses this issue and emphasizes that "frequency is an essential feature of AD/HD....central to the measurement of AD/HD" (McCarney & Anderson, 1996, p.90),

many of the participants felt that the inclusion of a severity index would have been important for rating their behavior. The idea of severity is important when dealing with an adult population who often report not engaging in AD/HD behaviors as frequently as when they were younger but report still having problems with certain behaviors at various times.

Of interest to the writer was the finding that many adults reported that they would have had much higher ratings on the ADDES if they were filling it out as a young adult (i.e., in their 20s). This age decline in AD/HD symptoms has also been reported in a longitudinal study of boys with AD/HD (Mannuzza et al., 1993). Perhaps this is an indication that the construct of AD/HD needs to be evaluated differently in adulthood. Specific criteria for adult AD/HD need to be developed which take into account the fact that many adults have learned to cope with their symptoms and would still have the symptoms if they did not engage in specific strategies (e.g., routines). Another possible modification of the DSM-IV criteria could involve changing the requirement of impairment in two or more settings to one or more settings. Another possible consideration would be to reduce the number of symptoms required to meet diagnostic criteria (e.g., five instead of six). The diagnostic classification of adults with AD/HD is an area that needs to be made a research priority.

#### Directions for Future Research

In general, this study reiterates the importance of recognizing the continuation of AD/HD into adulthood. The identification of adulthood AD/HD is important since "its underrecognition in adults may cause unnecessary distress and disability" (Biederman, Faraone, Spencer, Wilens et al., 1993, p.1797). As discussed above, the need to clearly

define the construct of AD/HD in adulthood is urgently needed to help clinicians with their assessment of adults presenting with AD/HD characteristics. It will be important for future studies to look at specific age groups in adults to determine if there is a decrease in symptoms in early adulthood.

An important finding from this study is the indication of high comorbidity rates among a self-referred sample. Are adults with AD/HD more susceptible to mood and anxiety disorders because of their difficulties with such areas as school and peer relationships? More research is needed to determine what factors cause an adult with AD/HD to be at risk for developing a mood/anxiety disorder. It will be of interest to see if future generations will display different comorbid patterns given that they may be more likely to have had an early diagnosis. The majority of the participants in this study were not diagnosed in childhood and only 46% had a previous diagnosis. Many of the participants recounted difficult childhoods with regard to school and peer difficulties, and subsequent self-esteem issues. It will be interesting to see if future research determines whether an early diagnosis will reduce the risk for internalizing disorders.

The present study did not find gender differences with regard to internalizing symptoms/disorders; however, more studies are needed to examine gender differences given the paucity of studies to-date. Although recent evidence based on DSM-IV criteria has suggested no gender differences with regard to internalizing comorbidity patterns, additional studies are needed with larger sample sizes and with non-referred participants. It will also be important for future studies to identify AD/HD subtypes and to assess for comorbid conditions. Replication of this study with a much larger sample size may provide

important information regarding gender and comorbid patterns within the subtypes. For example, it would be interesting to see if other studies replicate the difference between men and women with respect to stimulant medication. Do more women take stimulant medication because they have more severe symptomatology? Is it because they are more likely to access health care services?

Gaining a better understanding of subtype differences will have important implications for the treatment of adults with AD/HD. The finding that the combined subtype may be a more severe form of AD/HD has possible important clinical implications and needs to be examined in multiple domains (e.g., cognitive, psychiatric, psychosocial). Also, it will be useful for future studies to determine if females of the inattentive subtype are at an increased risk for developing a mood disorder. In general, participants in this study of the inattentive subtype were more likely to have a mood disorder. Future exploration of subtype differences will be important if research continues to demonstrate clear patterns within the subtypes, since this could lead to the development of guidelines for assessment procedures for the subtypes (Morgan et al., 1996).

### Conclusions

The present findings did not support the hypotheses of gender differences with regard to the presence of anxiety and mood symptoms and/or disorders. These findings are consistent with other studies which have found no gender differences in internalizing comorbidity patterns in children and adults.

The results from this study did indicate very high comorbidity rates for adults with AD/HD. Consistent with other studies which have found a relationship between AD/HD

and internalizing disorders (anxiety and mood), this study found that 39% of the participants met the criteria for an anxiety disorder and 59% of the participants met the criteria for a mood disorder. Participants meeting criteria for an anxiety disorder versus those not meeting criteria, were more likely to be single, have a lower education and lower SES.

An additional finding in the present study was that females were more likely to be taking stimulant medication as compared to males (41% to 15.4%). Also, females who were taking stimulant medication had more severe AD/HD symptoms as compared to females not taking medication.

The finding of no differences between the subtypes with regard to anxiety and mood symptoms and/or disorders is consistent with recent studies using diagnostic criteria from the DSM-IV. However, when examined by gender, females of the inattentive subtype were more likely to meet criteria for a mood disorder. This study also found that participants in the combined subtype were more likely to be taking stimulant medication and were more likely to have more severe AD/HD symptomatology. In addition, only participants in the combined subtype had multiple comorbid diagnoses (i.e., three or more comorbid diagnoses).

In sum, the present study provided evidence to support previous findings of high levels of comorbid internalizing conditions in adults with AD/HD. Despite sample size limitations, the present study did provide some new speculations about the role of gender and subtypes in the development of internalizing disorders and provided further support for the need to continue to research AD/HD in adulthood.

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**APPENDIX A**

**Diagnostic Criteria for AD/HD**

DSM-IV Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder

A. Either (1) or (2):

- (1) six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Inattention*

- (a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- (b) often has difficulty sustaining attention in tasks or play activities
- (c) often does not seem to listen when spoken to directly
- (d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- (e) often has difficulty organizing tasks and activities
- (f) often avoid, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- (g) often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
- (h) is often easily distracted by extraneous stimuli
- (i) is often forgetful in daily activities

- (2) six (or more) of the following symptoms of **hyperactivity-impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Hyperactivity*

- (a) often fidgets with hands or feet or squirms in seat
- (b) often leaves seat in classroom or in other situations in which remaining seated is expected
- (c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
- (d) often has difficulty playing or engaging in leisure activities quietly
- (e) is often “on the go” or often acts as if “driven by a motor”
- (f) often talks excessively

*Impulsivity*

- (g) often blurts out answers before questions have been completed
- (h) often has difficulty awaiting turn
- (i) often interrupts or intrudes on others (e.g., butts into conversations or games)

- B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- C. Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).

- D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
- E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Note. From "Diagnostic and statistical manual of mental disorders" (4<sup>th</sup> ed.). (p. 83).

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**APPENDIX B**

**Recruitment Poster**

## Research on Adult ADHD

A clinical psychology graduate student (Kim Galbraith) currently doing research at the Behavioural Research Unit at Alberta Children's Hospital is looking for ADULTS who have been DIAGNOSED with AD/HD, or WHO BELIEVE they have the characteristics of AD/HD.

This research is interested in studying gender differences, particularly the emotional and behavioural characteristics of men and women with AD/HD.

- It would take about 2 hours of your time. Consists of a personal interview scheduled at your convenience. The questions ask about your feelings in various situations. When we have scored the questionnaire, we will tell you how many answers compare to others with various emotional concerns.
- Your participation is completely voluntary. After you call to inquire about the study, you are free not to participate: it is your choice.

If you want further information about this study, please call  
Kim Galbraith or Dr. Bonnie Kaplan at 229-7365.

**We need your help!**

**APPENDIX C**

**Consent Form**



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FACULTY OF MEDICINE

Department of Paediatrics  
Alberta Children's Hospital  
Telephone: (403) 229-7365  
Fax: (403) 543-9100  
Email: kaplan@ucalgary.ca

CONSENT FORM FOR STUDY OF AD/HD

**Title:** Comorbidity of Attention-Deficit/Hyperactivity Disorder and Internalizing Symptoms  
**Investigators:** Kim Galbraith, M.Sc. Clinical Psychology Student, Bonnie Kaplan, Ph.D.

This consent form, a copy of which has been given to you, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Attention-Deficit/Hyperactivity Disorder (AD/HD) is a common childhood behavioural disorder. Recent evidence suggests that in some cases AD/HD continues into adulthood. Our study will investigate adults with characteristics of AD/HD, to determine if they have other emotional concerns. Our study will also examine whether there are differences between men and women with these AD/HD characteristics. In addition, due to the changes in the diagnostic criteria for AD/HD, emotional characteristics and gender differences need to be examined within the subtypes of AD/HD.

Participation in this study requires approximately two hours of your time. You will be asked to answer some interview questions and to complete three questionnaires. The questionnaires ask about your feelings in various situations. When we have scored the questionnaires, we will tell you how your answers compare to others with various emotional concerns.

You will be assigned a code number, and all of the data we collect will be identified only with that code and not your name. Only the investigators will have access to the data. If the results of this study are published, participant data will be anonymous.

We do not believe that participation in this study will be harmful to you, nor do we believe participation will be beneficial to you. Your participation in this study is a selfless contribution to scientific research. Gaining a better understanding about the characteristics of AD/HD could have important implications for mental health service planning and delivery.

Your participation in this study is completely voluntary. If you do not want to participate in this study, or if you decide part-way through that you want to stop, you are certainly free to do so.

In the event that you suffer injury as a result of participating in this research, no compensation or treatment will be provided for you by the University, the Calgary Regional Health Authority, or the Researchers. You still have all your legal rights. Nothing said here about treatment or compensation in any way alters your right to recover damages.

As a subject, your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time without jeopardizing your health care. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. If you have further questions concerning matters related to this research, please contact Kim Galbraith at 220-2215 or Dr. Bonnie Kaplan at 229-7365. If you have any questions concerning your rights as a possible participant in this research, please contact the Office of Medical Bioethics, University of Calgary, at 220-7990.

_____	_____
Participant	Date
_____	_____
Investigator	Date
_____	_____
Witness	Date

A copy of this consent form has been given to you to keep for your records and reference.

**APPENDIX D**

**Attention Deficit Disorder Checklist**

**ATTENTION DEFICIT DISORDER CHECKLIST**

Consider these characteristics as having persisted over time:	Not at all 0	Just a little 1	Pretty much 2	Very much 3
1. Difficulty sitting still for long periods of time; "on the go"				
2. Feelings of restlessness; fidgety				
3. Feels unsatisfied; complains of boredom; seeks stimulation or novelty				
4. Difficulty sustaining attention; shifts activities or topics in conversation; does multiple activities at same time; mind wanders				
5. Difficulty following verbal directions; does not seem to be listening when spoken to; needs reminders				
6. Easily distracted by sounds or sights				
7. Making too quick judgements or decisions; (safety concerns as child)				
8. Poor self-monitoring; fails to give attention to important details; careless mistakes				
9. Difficulty waiting turn; impatient; easily frustrated				
10. Blurts out; makes irrelevant comments or talks off topic; difficulty playing quietly; interrupts				
11. Difficulty sustaining relationships/keeping friends				
12. Problems making friends				
13. Sits quietly and daydreams				
14. Hard to get started on tasks or avoids tasks requiring sustained mental effort (e.g., chores, homework); procrastinates				
15. Difficulty completing tasks				
16. Loses or misplaces things; does not return things to usual place				
17. Problems organizing or planning				

**APPENDIX E**

**Recruitment Letter**



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CALGARY

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Faculty of Medicine

Department of Paediatrics  
Alberta Children's Hospital  
Telephone: (403) 229-7365  
Fax: (403) 543-9100  
Email: kaplan@ucalgary.ca

Behavioural Research Unit  
Alberta Children's Hospital  
1820 Richmond Road SW  
Calgary, AB T2T 5C7

17 September 1999

«Mom» «and» «Dad» «FamilyName»  
«Address»  
«City», «Province»  
«PostalCode»

Dear «Mom» «and» «Dad»:

This letter is being sent to you because you and/or your family participated in one of the studies of learning and attention problems carried out over the last few years by members of the Behavioural Research Unit (BRU) at the Alberta Children's Hospital.

In our recent update that we mailed to you in May or June, we mentioned that we might occasionally invite you to participate in future projects. The purpose of this letter is to tell you a bit about one of our new projects, and to ask whether you would be interested in learning more about it.

One of the clinical psychology graduate students currently doing research in the BRU has a particular interest in ADHD and is looking for adults who have been diagnosed with ADHD, or who believe they have attentional problems or other characteristics of ADHD. The graduate student (Kim Galbraith) is interested in studying gender differences and, in particular, the emotional and behavioral characteristics of men and women with AD/HD.

Kim may call you sometime in the next couple of weeks to see if you are interested; please feel free to call us (especially since we're not sure we have everyone's accurate phone number) at 229-7365. She will be able to answer any questions you have about her study. Please keep in mind that participation in research is *always voluntary*, and of course you are free to say no.

Thanks so much for your support of our work.

Sincerely,

Bonnie J. Kaplan, Ph.D.  
Professor of Paediatrics, and  
Director, Behavioural Research Unit