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**CO-OCCURRING DISORDERS AND SELECTIVE SUBSTANCE
USE IN FEMALES AGES 10 TO 25 DIAGNOSED WITH
ATTENTION DEFICIT HYPERACTIVITY DISORDER**

by

Nancy A. Clinton

**A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Counselor Education
and Counseling Psychology**

**Western Michigan University
Kalamazoo, Michigan
December 2002**

**CO-OCCURRING DISORDERS AND SELECTIVE SUBSTANCE
USE IN FEMALES AGES 10 TO 25 DIAGNOSED WITH
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Nancy A. Clinton, Ph.D.

Western Michigan University, 2002

The paucity of research on females diagnosed with attention deficit hyperactivity disorder (ADHD) precipitated this exploratory investigation into co-occurring disorders and selective substance use in females ($n = 70$), ranging in age between 10 and 25, diagnosed with ADHD and substance use disorder (SUD). Data extracted from archived substance abuse treatment center records were tested via chi-square analyses to determine proportional differences between frequencies in predetermined co-occurring disorder groups (disruptive behavior disorders, mood-anxiety disorders, and learning disorders) and predetermined substance groups (stimulant, depressant, and cannabis) for the total ADHD cohort and for specific diagnoses (inattentive, hyperactive-impulsive, combined, and with presenting symptoms but failing to meet full criteria). Statistical significance was set at the .05 level, with all p values $> .05$ considered not significant.

The first analysis examined the frequency differences among the co-occurring disorder groups for the total ADHD cohort. Mood-anxiety disorders were found to be significantly more prevalent. Sample distribution precluded the second analysis comparing proportions of co-occurring disorders by specific diagnoses. A post hoc

exact test found no significant association for specific diagnoses and co-occurring disorder groups. The third and fourth analyses examined the differences in substance groups for the total ADHD cohort and by specific ADHD diagnoses. Statistically significant differences were not found in substance selection by the total cohort or by specific ADHD diagnosis. The final analyses examined substance selection by specific ADHD diagnosis for each co-occurring disorder. Due to the low number of participants diagnosed with co-occurring disruptive behavioral disorders and learning disorders, substance frequency comparisons by ADHD for these diagnosis stand untested. Consequently, the final analysis examined substance use for co-occurring mood-anxiety among the specific ADHD diagnoses. No statistically significant differences were found in substance selection for specific ADHD diagnoses for co-occurring mood-anxiety disorders.

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CHAPTER I

INTRODUCTION

Background of the Problem

The passage from childhood to adulthood is filled with innumerable changes and is fraught with countless challenges. Increased and rapid physical growth, hormonal change, movement from concrete to more abstract thinking, and development of self-identity constitute developmental milestones. Chronological age does not determine automatic attainment of developmental milestones nor do all change markers occur simultaneously. Changes in cognitive, emotional, social, and physical development are accomplished based on interplay of heredity and environment. The constant state of flux in physical appearance, emotional response and cognitive comprehension become a source of angst. Most of this transitional period occurs during adolescence, defined by the American Academy of Pediatrics as ages 12 to 21 (Greydanus, 1991). For many, the development of a sense of self-identity and sense of self-esteem that are formed at this age are heavily dependent upon a feeling of “belonging” and the opinions of peers. Goal attainment is made all the more difficult by the seemingly incessant intrapersonal changes in the transition period (Muro & Kottman, 1995; Shaffer, 1988; Stone & Bradley, 1994).

Attention Deficit Hyperactivity Disorder (ADHD) and Substance Use Disorder (SUD) are present in many children, adolescents, and adults today. One of

the most commonly diagnosed disorders among children, ADHD, is “a neurobiological disorder resulting from a malfunction in the transmitter systems of the brain” (Quinn, 1995, p. 2). Although opinions regarding exact numbers vary, ADHD is estimated to be present in 3% to 11% of elementary school-age children. Once thought to be outgrown as children mature, ADHD symptomatology continues to be present in more than half of the adolescents and adults diagnosed as children and is currently considered to have a lifetime duration (American Academy of Child and Adolescent Psychiatry (AACAP), 1997; American Psychiatric Association (APA), 2000; Jackson & Farugia, 1997). Maladaptive substance use and continued use despite substance related problems are markers of SUD, a disorder that is on the increase among adolescents. Recent research indicates that larger numbers of adolescents are using alcohol and drugs and that substance use is occurring at an earlier age than in was found in earlier studies. Drawing from the examination of research of others, Coker and Borders (2001) reported that 70% of the adolescents acknowledged alcohol use by the time they were 12 years old, 13.4% of the 8th graders admitted to binge drinking behaviors, and one third of high school seniors met the accepted criteria for problem or binge drinking.

The scope of ADHD covers a broad spectrum of behaviors with multifaceted implications. The *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)* (APA, 2000) identifies three subtypes of ADHD: predominantly inattentive (ADHD-I), predominantly hyperactive-impulsive (ADHD-HI) and combined (ADHD-CO). Also identified are those individuals displaying symptoms but failing to meet full criteria (ADHD-NOS). Boys tend to behave more impulsively and in a

more hyperactive manner and therefore are more readily identifiable. Due to visible hyperactive behaviors, boys have historically outnumbered girls in the diagnosis of ADHD by a ratio ranging from 2:1 to 9:1 (APA, 2000). Although inattentiveness may remain, the hyperactive behaviors tend to decrease with age. In girls, ADHD frequently manifests as inattentiveness. Since the characteristics of the inattentive subtype of ADHD are more subtle, it is often not diagnosed until later, during school years, when academic and cognitive problems become more complex. Due to the subtle symptoms of ADHD-I, many remain under diagnosed or undiagnosed (Cantwell, 1996; Klein & Mannuzza, 1991; Landau & Moore, 1991). Regardless of the ADHD subtype, research indicates that symptoms of ADHD remain present, continuing to create challenges in 40% to 80% of adolescents and 8% to 66% of adults initially diagnosed (Barkley & Biederman, 1997; Hechtman, 1991).

Many adolescents diagnosed with ADHD manifest behaviors that are off-putting to others. When these behaviors present in the form of impulsiveness, inattention, or hyperactivity, these individuals are viewed as “different,” setting them apart from their peers. Typical ADHD behaviors such as these not only have been found to impact academic functioning but also have been found to influence relationships, social development, self-esteem, and personal development. Despite obvious symptomatology, many adolescents strongly deny their ADHD diagnosis, refuse to participate in the treatment plans designed for them, choosing to self-medicate rather than admit to “being different” from peers. Consequently, ADHD has been identified as a risk factor in the development of co-occurring disorders,

especially substance related disorders (Biederman, Newcorn, & Sprich, 1991; Brown, 2000; Jaffe, 1996).

Generally related to peer acceptance, use of alcohol and drugs is frequently employed in an effort to be considered “cool” or as a means to gain inclusion in a chosen peer group. According to Jaffe (1996), experimentation and recreational use of alcohol and drugs among teens is the first of four stages in the progression leading to chemical dependence. Several risk factors have been found linked to substance related disorders in teens. They include poor self-esteem, school problems, impulsivity, peer problems, depression, and ADHD. According to Jaffe (1996), “Teenagers who are serious abusers of alcohol and drugs may have numerous coexisting disorders, especially ADHD” (p. 243). Other research studies have concluded that ADHD alone significantly increased risk for SUD, noting that 20% of adult alcoholics are additionally diagnosed with ADHD. Although there are additional risk factors, the presence of ADHD alone has been identified as significant in the development of SUD (Biederman, Wilens, Mick, Milberger, Spence, & Faraone, 1995; Horner & Scheibe, 1997; Schubiner, Tzelepis, Isaacson, Warbasse, Zacharek, & Musial, 1995).

Many individuals with ADHD are impulsive and have interpersonal and school difficulties, negative feelings, and poor self-esteem, in addition to problems with peer relationships. Given these factors, it would not be unusual for people with ADHD to turn to alcohol and drugs in an effort to form peer relationships or to mediate negative feelings. Wilens, Biederman, Mick, Faraone, and Spencer (1997) studied a cohort of predominantly male ADHD-diagnosed adults and their

association with early onset SUD. Research results indicated that SUD “commonly onsets in ADHD patients during critical years of transition from adolescence to young adulthood” (p. 479). They concluded, “ADHD children should be a focus for prevention and early intervention programs aimed at reducing the risk for PSUD before the illness begins and becomes chronic” (p. 480).

Other research studies have uncovered a selective pattern of alcohol and drug use in individuals with ADHD. Wood, Wender, and Reimherr (1983) observed a prevalence of attention deficit disorder, residual type (continuation of ADHD symptoms beyond childhood), in young adult males who were alcohol dependent. They suggested that

it is plausible that certain experiences of the child with attention deficit disorder (such as rejection by teachers, parents, and peers and social and athletic failure) produce psychological difficulties that are partially ameliorated (made solvable) with alcohol. It is also plausible that the symptoms experienced by individuals with attention deficit disorder, residual type . . . have a continuing biological basis and that these persistent, biologically mediated discomforts can be temporarily removed by alcohol. (p. 97)

Bukstein, Brent, and Kaminer (1989) came to a similar conclusion in an investigation of the relationship among substance use, ADHD, and various other psychiatric disorders. Proffering that substances may serve as self-medication for coexistent psychiatric symptoms, they suggested that “substance use as self-medication of coexistent psychiatric symptoms continues to be a hypothesis worth exploring” (p. 1138).

Increasing evidence indicates that multiple diagnoses in individuals with ADHD are not unusual. According to Bukstein et al. (1989), a number of

“psychiatric disorders also appear to have an important role in the etiology of and vulnerability to substance use problems in adolescents” (p. 1131). Following a review of the research literature regarding ADHD over the past 10 years, Cantwell (1996) observed that “comorbidity is a major problem in children, adolescents, and adults with the ADD syndrome. As many as two thirds of elementary school-age children with ADD who are referred for clinical evaluation have at least one other diagnosable psychiatric disorder” (p. 981). In addition to impacting vulnerability, constellations of co-occurring disorders also magnify the intensity of impact. Based on a study of male adolescents in a residential substance use treatment program, Riggs, Thompson, Mikulich, Whitmore, and Crowley (1996) found that

adolescents with a combination of conduct disorder (CD), substance use disorder (SUD), and attention deficit hyperactivity disorder (ADHD) may have a more virulent illness with a worse prognosis for persistence of antisocial traits and perhaps substance use than do youths with CD and SUD without comorbid ADHD. (p. 1018)

Current literature leaves unanswered many critical questions regarding ADHD, especially in females. Most of what has been learned regarding ADHD has been based on studies of hyperactive boys between the ages of 6 and 12. Longitudinal studies investigating educational achievement, occupational rank, and psychiatric status have also focused on males, limiting or excluding females. Very little research has addressed the developmental trajectory of ADHD in females, especially the relationship of co-occurring disorders that are present in females (AACAP, 1997; Kann & Hanna, 2000; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993; Riggs et al., 1996).

“Although ADHD is the most studied disorder in child psychiatry, there are many questions related to clinical practice for which there are few scientific data” (AACAP, 1997, p. 108S). While SUD and ADHD have been found to have a close relationship, there exists a paucity of information addressing the differences among specific ADHD diagnoses or the relationship of co-occurring disorders in females. The historical focus of research on ADHD in boys and men has left data on girls and women virtually nonexistent.

Purpose of and Need for the Study

Research is needed to enhance information and to extend knowledge about ADHD in females. Both clinical and nonclinical populations would benefit from enhanced understanding of the factors related to ADHD and the presence of co-occurring psychiatric disorders in females.

This research was designed to improve understanding of ADHD in females ages 10 to 25 who had already developed SUD. Research findings enhance existing information regarding the prevalence and variety of co-occurring disorders associated with ADHD and the specific diagnoses within this population. First, the research sought to determine whether a relationship existed between ADHD and a co-occurring disorder group among the total cohort of females ages 10 to 25. The presence of a relationship between a specific ADHD diagnosis and co-occurring disorder grouping was also explored. Additionally, the research attempted to determine whether a relationship existed for the total ADHD cohort with a selected

substance group as well as among the specific ADHD diagnoses and a particular group of drugs for females ages 10 to 25.

Although previous research has dealt with varying aspects of these issues, this research was unique from previous studies in several ways. First, it was focused on females exclusively. Previous research has underrepresented females by either selecting samples from males only, or including females at a substantially reduced rate, neglecting to address the impact of gender. Secondly, previous studies have not focused on the presence of co-occurring disorders in females ages 10 to 25 as they manifest within each ADHD diagnosis. Third, this research sought to identify a configuration of ADHD and the specific ADHD diagnoses and the selection of a specific category of substances, addressing the question of possible self-medication among females ages 10 to 25. While prior studies may have incorporated aspects of this investigation, no research has examined co-occurring disorders and selective substance use exclusively in ADHD and SUD diagnosed females ages 10 to 25 as a total ADHD cohort and within specific ADHD diagnoses.

Definition of Terms

In this section, the researcher defines the terms most often used throughout this study.

Attention deficit hyperactivity disorder (ADHD): For the purposes of this study, ADHD refers to the “persistent pattern of inattention and/or hyperactivity-impulsivity that is frequently displayed and more severe than is typically observed in individuals at a comparable level of development” (APA, 2000, p. 85). Included are

the subtypes identified and described in the *DSM-IV-TR* that characterize the predominant symptom pattern, the combined type (ADHD-CO), the predominantly inattentive type (ADHD-I), the predominantly hyperactive-impulsive type (ADHD-HI), as well as those displaying symptoms but not meeting the full criteria (ADHD-NOS). Nomenclature for this disorder has changed over time. Therefore, the presence of the terms *hyperactive*, *Attention Deficit Disorder (ADD)*, *ADD residual type*, and *Minimal Brain Dysfunction (MBD)* in studies conducted by previous researchers does not definitely connote a designation of subtype or specific diagnosis (Bukstein et al., 1989; Weiss, Minde, Werry, Douglas, & Nemeth, 1971).

Substance use disorder (SUD): For the purposes of this study, SUD refers to a general pattern of maladaptive substance use or continued use despite the creation of substance related problems. For the purposes of this study, no differentiation was made between the two categories subsumed within SUD, substance abuse and substance dependence. The degree of substance involvement, marked by the designation of abuse or dependence, provide additional variables not being addressed in this study. No differentiation or distinction was made for SUD precipitated by the reduction or cessation of prescribed medications, specifically amphetamine conjurers. The broad category SUD or psychoactive substance use disorder (PSUD) was, therefore, selected as the variable to be addressed in this study. The specific substance groupings included stimulants, depressants, and cannabis.

Co-occurring disorders: In general, this term refers to multiple diagnoses of one or more additional psychiatric disorders, as identified by the *DSM-IV-TR* (APA, 2000). The co-occurring disorders included in this study focus primarily on Axis I, or

clinical disorders. In addition to diagnosed ADHD and SUD, the groups of disorders included are behavioral disorders, mood-anxiety disorders, and learning disorders. Personality disorders and mental retardation (Axis II), general medical conditions (Axis III), those disorders addressing relational issues (V Code) and adjustment disorders were not addressed. Substance-induced disorders, factitious disorders, dissociative disorders, somatoform disorders, sexual and gender identity disorders, and sleep disorders have also been excluded from this study.

Research Questions

This study involved the collection and analysis of data designed to address the following research questions:

1. Among females ages 10 to 25 diagnosed with SUD and ADHD, is there a pattern of co-occurring disorders?
2. Is there a difference in the pattern of co-occurring disorders related to specific ADHD diagnosis for females ages 10 to 25 diagnosed with ADHD and SUD?
3. Among females ages 10 to 25 diagnosed with ADHD and SUD, is there a preference for a specific substance group?
4. Based on specific ADHD diagnosis, is there a preference for a specific substance group among females ages 10 to 25 diagnosed with ADHD and SUD?
5. Within specific co-occurring disorder groupings, is there a difference in the pattern of selective substance use that relates to a specific ADHD diagnosis for females ages 10 to 25 diagnosed with ADHD and SUD?

Hypotheses

With regard to the first research question, it is hypothesized that there will be no significant difference in the frequency of co-occurring disorders present among females ages 10 to 25 diagnosed with ADHD.

In respect to the second research question, it is expected that there will be no significant difference in the frequency of co-occurring disorders among females ages 10 to 25 diagnosed with ADHD and SUD by specific ADHD diagnosis.

Regarding the third research question, it is hypothesized that there will be no difference in the frequency of substance group selection among females ages 10 to 25 diagnosed with ADHD and SUD.

Regarding the fourth research question, it is hypothesized that there will be no difference in the frequency of substance group selection among females ages 10 to 25 diagnosed with ADHD and SUD by specific ADHD diagnosis.

Regarding the fifth question, it is hypothesized that for each co-occurring disorder there will be no difference in the frequency of substance group selection among females ages 10 to 25 diagnosed with ADHD and SUD by specific ADHD diagnosis.

Although the review of previous research indicates a relationship between specific ADHD diagnoses and specific co-occurring disorders in males, there is inadequate prior research on females to do similarly. For that reason, hypotheses without direction were chosen.

Overview of the Research Design

The basic design of this study consisted of analyses of the differences in frequencies of co-occurring disorders and substance use groups among ADHD and SUD diagnosed females ages 10 to 25. The subjects for this research study were selected from a data bank of a nationally known substance abuse treatment center via archival retrieval. Criteria for selection included appropriate gender, age, and diagnoses. Data gathered were examined using chi-square analyses. First, the frequency of co-occurring disorders was tabulated for the total ADHD cohort and then for the specific diagnoses of ADHD. Frequencies were analyzed to determine whether a significant difference among the co-occurring disorder groups for the total ADHD sample was present and also to determine if a significant difference was present among those co-occurring disorder groups by ADHD diagnosis. The frequencies in selected substance groups were also analyzed for the total ADHD cohort, for the ADHD diagnoses, and for the specific co-occurring disorders to determine whether there was a significant difference in the substance group preference.

Outline of the Dissertation

Chapter II of this dissertation reviews the literature on previous research studies addressing individuals diagnosed with ADHD and SUD. The review also focuses on research regarding other co-occurring disorders as they present with ADHD. Self-medication, specific ADHD diagnoses and limitations of current

research were explored, particularly as they relate to females. Chapter III explains the methodology associated with this research. Included are the research design, description of participants, data analysis, and limitations of the study. Chapter IV presents the findings of the study. Chapter V summarizes the research, discusses the findings, and offers final recommendations.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

The purpose of this chapter is to examine both empirical and nonempirical literature concerning attention deficit hyperactivity disorder (ADHD) and substance use disorder (SUD). In reviewing the ADHD literature, specific attention will be paid to a depiction of the disorder and coexistence with other disorders, particularly the relationship with substance use disorder. In the review of the substance use disorder literature, consideration will be given to diagnostic features, coexisting diagnoses particularly in relationship to ADHD, specific ADHD diagnoses, and self-medication. Current research addressing ADHD contains limited information on female co-occurring disorders and specific ADHD diagnoses. These limitations will also be addressed.

Attention Deficit Hyperactivity Disorder

Depiction of the Disorder

A substantial number of research studies, dating back to the 1970s, have sought to come to a clearer understanding of ADHD. Much attention has been focused on determining the age of onset and identifying unique attributes of the disorder. Achieving a clear picture of ADHD has been confounded by the behavioral similarities to other disorders and to a high rate of co-occurring disorders. Initially

thought to be present only in children, much of the early research directed considerable attention to determine the chronicity of the disorder into adolescence and adulthood and to the changes that occur in the disorder in the transitions through developmental stages. This section reviews the literature on features of ADHD, concentrating on diagnostic features, specific ADHD diagnoses or subtype and chronicity.

Diagnostic Features of Attention Deficit Hyperactivity Disorder

Attention deficit hyperactivity disorder is subsumed in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (APA, 2000) among those disorders that are usually first diagnosed in infancy, childhood, or adolescence. Those disorders include attention deficit hyperactivity disorder and the subtypes of ADHD, predominantly inattentive type (ADHD-I), predominantly hyperactive-impulsive type (ADHD-HI), combined type (ADHD-CO), as well as ADHD-NOS and the disruptive behavior disorders including conduct disorder (CD) and oppositional defiant disorder (ODD). Although commonly diagnosed among children, these disorders may also be diagnosed for the first time in adolescence or adulthood (Jackson & Farrugia, 1997; Ward, Wender, & Reimherr, 1991).

Characteristics. The defining feature of ADHD includes “a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than typically observed in individuals at a comparable level of development” (APA, 2000, p. 85). These behaviors produce interference with

developmentally appropriate social, academic, or occupational functioning.

Carelessness, failure to complete tasks, inattention to detail, and inability to maintain sustained attention exemplify the behaviors that are characteristic of ADHD-I.

Excessive talking, fidgeting, squirming, general inability to remain seated, interrupting others, and blurting out answers describe ADHD-HI type behavior.

ADHD-CO behaviors encompass actions characterized by both inattentiveness and hyperactivity-impulsivity (APA, 2000). Recent neuroscientific data explain that the dysfunctional behaviors of ADHD occur as a result of neuroanatomical or neurochemical abnormalities (Erk, 2000).

Diagnostic Impediments. Originally thought to be minimal brain dysfunction (MBD) in children, the distinguishing characteristics of ADHD include distractibility, an inability to focus attention, and enhanced motor activity (Mann & Greenspan, 1976; Tarter, McBride, Buonpane, & Schneider, 1977; Weiss et al., 1971). Arriving at an accurate diagnosis is made more difficult as the disruptive behavior disorders (CD and ODD) share some similar characteristics (APA, 2000; Biederman et al., 1993). The annoying, impulsive hyperactive behaviors characteristic of ADHD resemble the purposeful aggravation of others indicative of ODD. Task avoidance, related to the inability to sustain attention characteristic of ADHD, may be difficult to separate from the serious violations of rules typical of CD (APA, 2000; Clark & Bukstein, 1998).

Research indicates that ADHD frequently occurs in tandem with other psychiatric disorders, increasing the difficulty in making an accurate diagnosis. An

analysis of earlier research studies suggests that a diagnosis of co-occurring disorders is present in many clinically referred children with ADHD, including up to 35% for ODD, 30% to 50% for conduct disorder (CD), 15% to 75% for mood disorders, 10% to 92% for learning disorders, and approximately 25% for anxiety disorders (Biederman, et al., 1991).

The behaviors used to diagnose ADHD are similar to the diagnostic criteria of disruptive behavior disorders. Disruptive behavior disorders often present in tandem with ADHD. This relationship makes clear and accurate diagnoses difficult.

Heritability. ADHD appears to contain a genetic component. Individuals diagnosed with ADHD frequently have siblings and parents similarly diagnosed. Biederman, Faraone, Keenan, Knee, and Tsuang (1990) conducted a family study on first-degree relatives of clinically referred Caucasian males between the ages of 6 and 17 who were diagnosed with ADD. Findings disclosed “that relatives of clinically referred ADD children and adolescents have a significantly increased risk for ADD” (p. 531). Rates were significantly higher than those observed among relatives for either psychiatric or normal control groups, indicating that parents and siblings of both genders are at risk for the disorder. More parents and significantly more fathers of ADD diagnosed subjects also had ADD. Researchers determined that male relatives had a “significantly higher risk for ADD (37.4%) than the rates observed among male relatives of both normal and psychiatric control probands (7.2% and 3.9%, respectively)” (p. 530).

Levy, Hay, McStephen, Wood, and Waldman (1997) conducted research on 1,938 families to investigate the heritability of ADHD. Research participants for this empirical study were twins and siblings of both genders between the ages of 4 and 12. The results indicated that “ADHD has an exceptionally high heritability compared with other behavior disorders” (p. 741). Research results revealed stronger similarities between twins than between twin/sibling combinations, genetic overlap for ADHD-I and ADHD-HI subtype, as well as genetic specificity for ADHD-HI typology.

Both of these family studies endorsed the high degree of heritability of ADHD. The first study identified a strong intergenerational connection between ADHD in parents and their children, emphasizing the significant number of boys whose male relatives also had ADHD. The second study revealed the similarities among children within a family and also pointed out a heritability patterns by ADHD subtype.

Subtype—Presentation of the Disorder

There is controversy among researchers regarding the manner in which ADHD presents. Some researchers have suggested that ADHD might be most accurately described as a series of developmental phases, while others see it as three discrete categories (APA, 2000; Erk, 2000; Faraone, Biederman, Weber, & Russell, 1998).

Faraone et al. (1998) conducted a study to determine whether discrete categories existed among ADHD subtypes. Using a clinically referred sample of 413

children and adolescents, they detected differences between identified subtypes. First, the age of the members of one subtype of their sample differed from the age of the members in the other two. The mean age of members of the ADHD-I cohort were older (12.5 years) than either those in the ADHD-CO (9.9 years) cohort or those in ADHD-HI (8.1 years). Secondly, the subtypes differed in the age of onset for ADHD symptoms. Those in the ADHD-I subtype were much older (9.2 years) at the time of their referral for diagnosis than those in the ADHD-CO subtype (2.9 years). In addition to the early age of onset, the combined subtype also showed more intense and diverse impairments. Faraone et al. (1998) observed that, “compared with the other subtypes, combined-type patients appear to have the more clinically severe syndrome” (p. 192). They concluded that “although our results are not definitive, they provide some evidence for the validity of the DSM-IV subtypes” (p. 192). They recommended longitudinal studies to further explore the concept of developmental phases.

Erk (2000) focused his research on the ADHD-I typology. A review of previous research confirmed that this subtype has historically been an “underidentified, underserved, and a seemingly less understood group” (p. 389). He reported that “the internalizing dimension [of the ADHD-I subtype] often makes problems invisible or subtle in their initial appearance . . . seemingly inert in their early stages of development” (p. 392). He suggested that the delayed diagnosis for the ADHD-I subtype may be due to the disorder being overlooked. The lack of overt symptomatology provides a cogent explanation for the apparent delay in age of onset.

Initially, the studies addressing the age of onset and characteristic behaviors might lead one to believe that ADHD is a disorder with developmental evolution. Both Erk and Faraone have identified the subtle manner in which ADHD-I has been found to manifest, thus offering evidence to the contrary. Erk (2000) noted the differences between internalizing and externalizing manifestations by subtype, while Faraone et al. (1998) reported “marked psychiatric differences” (p. 190) between subtypes and much earlier and more intense impairments in the combined subtype. Longitudinal research was recommended in both studies to clarify the changes that occur between developmental stages and confirm the stability of the subtypes as they were defined by the *DSM-IV*.

Chronicity

In addition to the research conducted to clarify the defining features of the disorder, other research has examined chronic ADHD. These studies address the extent and duration of the disorder as well as changes occurring throughout the lifespan.

Extent and Duration of the Disorder. Behaviors characteristic of ADHD usually begin early in childhood, with the age of onset typically occurring prior to age 7. Although the literature on ADHD is voluminous, the data vary from study to study regarding the precise number of children and adolescents diagnosed. Current estimates calculate that ADHD occurs in 6% to 9% of children (Barkley & Biederman, 1997; Biederman et al., 1990; Samuel et al., 1999; Wender, 1995).

Longitudinal or follow-up studies indicate that ADHD is not outgrown.

Various research investigations indicate that 30% to 80% of children diagnosed with ADHD continue to meet the *DSM-IV-TR* criteria as adolescents and adults (Barkley, Fischer, Edelbrock, & Smallish, 1990; Gittelman, Mannuzza, Shenker, & Bonagura, 1985; Mannuzza, Klein, Bessler, Malloy, & Hynes, 1997; Mannuzza, Klein, Bonagura, Malloy, Giampino, & Addalli, 1991; Weiss, Hechtman, Milroy, & Perlman, 1985).

During a review of follow-up studies, Hechtman (1991) found support for the enduring nature of the disorder. She concluded that “generally these studies have found that 70% to 80% of subjects who had attention deficit hyperactive disorder in childhood continue to have significant problems in adolescence” (p. 416). Results from that review of follow-up studies support the findings of others on the chronicity of the disorder (AACAP, 1997; Gittelman et al., 1985; Klein & Mannuzza, 1991; Mannuzza et al., 1997; Weiss et al., 1971).

This disorder has historically been diagnosed more frequently in males. Klein and Mannuzza (1991) conducted research in an attempt to quantify gender differences. They placed the male to female ratio at 9:1. Drawing on data from a study conducted in upstate New York on the impact of gender, the American Academy of Child and Adolescent Psychiatry (1997) compared the gender breakdown by age group. They found ADHD “in 8.5% of girls and 17.1% of boys aged 10 to 13 years . . . [and] . . . 6.5% of girls and 11.4% of boys aged 14 to 16 years” (p. 89S).

In a retrospective follow-up study on adjustment and outcome for a cohort comprised of 68 boys and 17 girls, Wilson and Marcotte (1996) found that 38% of the study participants, initially evaluated between the ages of 6 and 12, continued to meet the diagnostic criteria for ADHD in adolescence at the ages of 14 to 18. Their figure was lower than those reported by the other researchers studying the chronicity of the disorder. Barkley et al. (1990) indicated that 80% of the subjects in their study (9 male to every 1 female) continued to meet diagnostic measures in adolescence. Herrero, Hechtman, and Weiss (1994) summarized research conclusions stating, "There is consensus that attention-deficit hyperactivity disorder (ADHD) is one of the most stable syndromes in child psychiatry, continuing into late adolescence and adulthood in over half of patients" (p. 510).

Although it is not clear how pervasively both genders continued to display symptoms, the results of these studies designed to determine the scope of ADHD have established that the disorder continues into adolescence and adulthood. Studies also revealed that males were found to be diagnosed with ADHD much more frequently than females.

Lifespan Changes. Although initially conceptualized as a disorder of childhood, longitudinal and follow-up studies on children with ADHD have provided substantial support for the chronicity of the disorder (Biederman, Faraone, Taylor, Sienna, Williamson, & Fine, 1998; Hechtman, 1994; Hechtman & Weiss, 1986; Mann & Greenspan, 1976; Mannuzza et al., 1993; Weiss et al., 1985). Due to the enduring nature of the disorder, clinical manifestations have been found to change as

the individual progresses developmentally. The early childhood symptoms of ADHD that included restlessness, distractibility, and aggressiveness have been found to diminish over time. Wilson and Marcotte (1996) found that “specifically, it has been reported that while the hyperactivity and behavioral disinhibition may abate, continued difficulties with the more ‘cognitive’ features of this disorder may persist and may continue to interfere with effective functioning” (p. 579). The behaviors present earlier in life are frequently replaced by new symptoms and difficulties related to them. Where hyperactivity was the initial problem, it is frequently replaced with difficulties in the areas of attention and concentration and with the addition of co-occurring disorders.

Gittelman et al. (1985) observed that “the most common disorders at follow-up were ADHD, conduct disorder, and substance use disorders” (p. 941). Although they noticed “a marked reduction in functional problems for hyperactive children between the average ages 13 to 18 years” (p. 946), 68% of the males in their study continued to meet the diagnostic criteria for ADHD into adulthood. Researchers agree that those presenting with ADHD symptoms in childhood continued to be plagued by academic, social, and emotional problems into adolescence and adulthood related to their ADHD behaviors.

Despite early childhood detection and clarification of ongoing problem areas, individuals identified with ADHD have been found to continue to have protracted difficulties. Results of additional studies have corroborated the findings addressed here that one does not outgrow this disorder; rather, ADHD presents different problems at different stages of life (Barkley et al., 1990; Biederman et al., 1991;

Hechtman & Weiss, 1994; Mannuzza et al., 1991; Mannuzza et al., 1997; Weiss et al., 1985).

These studies addressing the chronicity of ADHD endorsed the enduring nature of the disorder. They noted, however, that the manner in which it presents is contingent upon and may change across developmental stages. Regardless the age group, studies found that ADHD is more prevalent in males than in females.

Summary of the Description of the Disorder

Research has identified ADHD as a neurobiological disorder that includes among primary behavioral characteristics inattentiveness, enhanced motor activity, and distractibility. These behavioral characteristics form in combinations that define the subtypes of the disorder ADHD-I, ADHD-HI, ADHD-CO. Convincing data have established ADHD as a lifelong disorder with genetic components that continues to present problems throughout life. The majority of the research on ADHD has been conducted on males who have been diagnosed more frequently than females (AACAP, 1997; Barkley et al., 1990; Klein & Mannuzza, 1991).

Co-occurring Diagnoses and the Disorder

Due to the manner of presentation and enduring nature of the disorder, ADHD is frequently found in conjunction with additional disorders. Studies have sought to identify the specific co-occurring disorders involved. To date, only limited research has been conducted addressing gender and the relationship of the ADHD subtype or specific diagnosis to co-occurring disorders. This section reviews the

literature on disorders co-occurring with ADHD, concentrating on risk factors that foster co-occurring disorders, the impact of specific ADHD diagnosis, and the most prevalent co-occurring disorders.

Influential Factors

Jackson and Farrugia (1997) reported that there is “ample evidence that ADHD may be a chronically disabling condition, and researchers have unanimously reported findings of continued and augmented impairment as children diagnosed with ADHD age into adulthood” (p. 312). Much of this impairment has been found to occur in connection with the presence of additional disorders. Adolescents and adults diagnosed with ADHD experience significant social, emotional, and psychological problems including higher rates of inattention, depression, anxiety, oppositional behavior, mania, conduct disorder, and substance use disorders (Biederman et al., 1991; Wilson & Marcotte, 1996). Reflecting on the problems accompanying ADHD, Barkley (1990) stated, “Children with ADHD exhibit a plethora of physical, cognitive, academic, behavioral, and social difficulties” (p. 574).

Problems and Impairments Leading to Co-occurring Diagnoses. Hechtman and Weiss (1986) conducted a 15-year longitudinal study following a primarily male cohort with ADHD. They observed that the sample had continuing problems that included restlessness and impulsivity, as well as difficulty with concentration and immaturity into adolescence. They noticed that “these problems often result in social and conduct difficulties with peers, teachers and parents” (p. 557). Reporting from

her research on the long-term outcome of ADHD, Hechtman (1991) asserted that poor self-confidence, concerns about social functioning, feelings of loneliness and of being different, as well as feelings of self-doubt and distrust were pervasive in the ADHD-diagnosed sample. Pointing to the impact of these negative feelings and personality difficulties, she observed that “low self-esteem is common” (p. 416).

In research on college students with ADHD, Javorsky and Gussin (1994) conceptualized the impact and changes in manifestation of ADHD on postsecondary performance from a different perspective. They described ADHD as “a performance-based deficit” (p. 171) and typical ADHD behaviors were described more as developmental adaptations. From that perspective, they characterized substance abuse as an attempt to self-medicate, overextended credit as a developmental manifestation of lack of self-control, poor job performance as a response to inadequate stimulation, and multiple traffic tickets as an example of impulsivity. These researchers perceived the behaviors produced by ADHD as adaptive functions or as coping mechanisms. However, over time those functions evolved into additional problems or psychiatric diagnoses.

Other research studies provide evidence that the presence of ADHD poses risks for a lifetime of impairment and difficulty. Results from these studies indicate that the ADHD population completes fewer years of education, reports lower global assessment of functioning (GAF), continues to exhibit problematic symptoms of hyperactivity, has an increased tendency toward conduct disorder or antisocial personality disorder, experiences lower self-esteem, has more clinical psychopathology including a higher rate of suicide attempts, exhibits enhanced drug

use, secures lower ranking occupational positions, and demonstrates basic instability in marriage, job, and residence (Barkley et al., 1990; Mannuzza et al., 1997; Weiss et al., 1985). Loeber, Farrington, Stouthamer-Loeber, and Van Kammen (1998) conducted a longitudinal study on multiproblem boys in an attempt to identify the predictive factors. Their intent was to clarify the interrelationship among risk factors. They were able to successfully identify a changing pattern in severity, frequency, variety, and onset of problem behaviors, as well as some differences in co-occurring disorders as they presented between age groups. Researchers recommended additional research into the risk factors posed by the presence of ADHD.

Due to the lifespan duration of ADHD, those with the diagnosis frequently develop additional disorders. As a child with ADHD grows and develops, there are alterations in frequency, variety, and severity of ADHD symptoms that have been found to ultimately impact how impairments manifest and change. Research studies have found that detrimental, ongoing problems of underachievement in school, reduced motivation, emotional immaturity, poor self-concept, feelings of hopelessness, and social difficulties contribute to the development of additional psychiatric disorders (Jackson & Farrugia, 1997; Javorsky & Gussin, 1994; Loeber et al., 1998; Mann & Greenspan, 1976; Slomkowski, Klein, & Mannuzza, 1995; Wilson & Marcotte, 1996). In light of the chronic problems and negative feelings precipitated by behaviors directly attributable to ADHD, it is easy to see how “evidence is growing that childhood ADHD is more than a coincidental factor in adult psychiatric problems” (Jackson & Farrugia, 1997, p. 312).

Previous research studies cite both ongoing difficulties and negative impact as issues that plague adolescents and adults who continue to be symptomatic. Research results confirmed that some of the behaviors common to ADHD pose ongoing problems, while others have been linked to poor self-esteem and subsequent development of additional disorders. One study identified the need for increasing research to identify risk factors that contribute to the problems of ADHD-diagnosed boys (Loeber et al., 1998).

Longitudinal Studies. Most of the research on the long-term impact of ADHD has been conducted on boys and men. Much of the information has come from longitudinal studies exploring the relationship between ADHD and coexisting disorders, with a focus primarily on males. Citing little existing information regarding females, these studies included females in low numbers or entirely excluded them. The aforementioned longitudinal studies addressed chronicity, adjustment issues, and co-occurring disorders presenting with ADHD (Barkley et al., 1990; Faraone et al., 1998; Gittelman et al., 1985; Hechtman, 1991; Hechtman & Weiss, 1986; Klein & Mannuzza, 1991; Mannuzza et al., 1991; Mannuzza et al., 1993; Mannuzza et al., 1997; Weiss et al., 1985; Wilson & Marcotte, 1996). Research results consistently confirmed that the presence of ADHD impacted adjustment and patterns of co-occurring disorders.

One study revealed the increased number of co-occurring disorders in male adults who had been studied initially as children. Compared with a similar control group, who had never been identified with ADHD behaviors, this sample of adults

continued to have “significantly higher rates than comparisons of ADHD symptoms (11% vs. 1%), antisocial personality disorders (18% vs. 2%), and drug abuse disorders (16% vs. 4%)” (Mannuzza et al., 1993, p. 565). This group of adults also attained a lower socioeconomic status and were found to be 5 to 7 times more likely to have an ongoing substance abuse problem and 10 times more likely to have antisocial personality disorder as adults. Summarizing the impact of ADHD on their subjects, Mannuzza et al. (1993) stated that “childhood ADHD predicts specific adult psychiatric disorders . . . [and adolescent] . . . disturbances were dependent on the continuation of ADHD symptoms” (p. 565).

Another longitudinal study conducted by Herrero et al. (1994) sought predictive factors for the development of antisocial disorders within the hyperactive population. The study covered the span from childhood to adulthood. The initial study was comprised of a cohort of 101 subjects who ranged from 6 to 12. Based on a chart review of the 66 mostly male (7 female and 59 male) subjects who returned from the original group of hyperactive patients, researchers concluded that hyperactivity was a risk factor for an antisocial outcome in males but not in females. They recommended future studies with more females to clarify the gender differences. Researchers also determined that the absence of behavior related problems at initial intake was “a predictive factor for the absence of antisocial disorders in adulthood” (p. 520).

Other research links the relationship between hyperactivity and antisocial behaviors. Weiss et al. (1985) found that children who “rated high for aggression at initial evaluation had a greater risk of later developing antisocial behavior” (p. 414).

Klein and Mannuzza (1991) reported that compared to the control group “grown hyperactive children had more moves, car accidents, antisocial behaviors, impulsive and restless behavior and worse academic achievement” (p. 383).

Much of the research connecting ADHD and co-occurring disorders has been conducted with male children or retrospectively with adults. Biederman et al. (1998) focused on diagnostic continuity between child and adolescent ADHD in males. They found that “similar to the child cases, adolescents with ADHD had high rates of comorbidity with conduct disorder, oppositional defiant disorder, mood disorders, and anxiety disorders” (p. 309). They also noted that “comorbidity with conduct disorder is associated with a significant risk for adolescent-onset substance use disorders . . . [and that] . . . the comorbidity of ADHD with mood disorder in adolescent years can be associated not only with severe morbidity but also with mortality” (p. 312). Their results were consistent with other comparable longitudinal studies of boys.

Longitudinal studies have examined the likelihood of co-occurring disorders in adolescents and adults. In two of the studies identifying co-occurring disorders, the research participants were male. Female representation in longitudinal studies has been extremely low. The study that included females was comprised of 89% males to 11% females. Although continuing symptoms of ADHD were found in both males and females, only males with ADHD had diagnosed coexisting substance use disorders, conduct disorder, oppositional defiant disorder, mood disorders, anxiety disorders, and antisocial disorders. The study conducted by Herrero et al. (1994)

recommended future research with more females to clarify gender differences as they related to co-occurring disorders.

Impact of ADHD Subtype

Erk (2000) conducted one of the few studies addressing ADHD and subtype. In an effort to increase understanding and improve treatment in the ADHD-I subtype, he attempted to clarify and describe concomitant psychopathologies and the co-occurring disorders unique to each. Concentrating on the differences in personality and behavior between ADHD-I and ADHD-HI, Erk described ADHD-HI behaviors as having an externalizing dimension. He characterized ADHD-HI as “an attentional, behavioral, and impulsive disorder” (p. 392). He observed that those behaviors were in contrast with ADHD-I behaviors, which he described as having an internalizing dimension. He described ADHD-I as “being more of an attentional, cognitive, anxious type disorder” (p. 392). He concluded that children diagnosed with ADHD- I were more withdrawn, self-conscious and shy, and disposed to anxiety and affective diagnoses.

Exploring issues surrounding diagnosis and treatment in ADHD, Brown (2000) drew from research on subtypes by Barkley. In the area of co-occurring disorders, he noted that 50% of children with ADHD-I would eventually meet the criteria for mood disorder and anxiety, 60% of children with the ADHD-CO would meet criteria for ODD, and 50% would meet criteria for CD. No differentiation was made by gender.

Most of the earlier research on ADHD and co-occurring disorders has been conducted without breaking the disorder into subtype. Both of the studies using subtype concluded that those with an ADHD-I diagnosis were more prone to anxiety and affective disorders. One study determined that those with ADHD-CO diagnosis were more prone to co-occurring ODD and CD (Brown, 2000). Neither study addressed the impact of gender. Clearly, there is a paucity of research on ADHD subtypes and the impact of gender.

Prevalent Patterns

Identified Disorders. Research studies have disclosed that certain patterns of co-occurring disorders have emerged with ADHD. Biederman et al. (1993) found high rates of antisocial, major depressive, SUD, and anxiety disorder among adults with attention deficit hyperactivity disorder. They stated that these rates “were consistent with high levels of comorbidity seen in clinical and epidemiologic samples of children and adolescents with the disorder” (p. 1794). These researchers compared the differences between groups of referred adults with ADHD, two thirds of whom were male, to adults without the disorder for 17 psychiatric disorders. A higher percentage of adults diagnosed with ADHD were found with each of the 17 disorders. Psychiatric disorders for the referred adults with ADHD ranged from 10% to 40% higher than for the adults in the comparison groups. “The adults with the disorder [ADHD] had significantly higher rates of antisocial personality disorder, conduct disorder, oppositional defiant disorder, substance use, anxiety disorders, enuresis, stuttering, and speech and language disorders” (pp. 1793–1794).

Co-occurring SUD. There is a strong and enduring connection between alcoholism and hyperactivity (Alterman, Petrarulo, Tarter, & McGowan, 1982; Goodwin, Schulsinger, Hermansen, Guze, & Winokur, 1975). Early research on ADHD uncovered alcoholism in many of the parents of children identified as hyperactive. Citing the research of others, Goodwin et al. (1975) noted that “antisocial behavior of the child was strongly related to later alcoholism” (p. 351). Additionally, “20 per cent of the fathers and 5 per cent of the mothers of the hyperactive children were alcoholic, compared to 10 per cent of the fathers of the controls, with no alcoholism in the mothers of the controls” (p. 353). These early studies noted that hyperactivity may predispose adult alcoholism.

Subsequent research connected alcoholism directly to ADHD. Utilizing the Minnesota Multiphasic Personality Inventory (MMPI), Tarter et al. (1977) determined that primary alcoholics began drinking earlier in life, were more severe drinkers, and exhibited almost four times as many symptoms of MBD in childhood than did secondary alcoholics. He defined primary alcoholics as those who met diagnostic criteria primarily for alcoholism and secondary alcoholics as those for whom alcoholism was not the primary diagnosis. In an examination of 33 male VA alcoholic inpatients, Alterman et al. (1982) also observed the connection between alcoholism and ADHD. He noted that those alcoholics who reported high levels of childhood MBD behaviors tended to suffer more adversity related to alcoholism and that familial alcoholics also reported significantly more childhood MBD/hyperactivity.

Numerous additional research studies strengthened the link between ADHD and substance related problems. These studies suggest that ADHD is a childhood antecedent to substance related disorders (Adams & Wallace, 1994; Alterman et al., 1982; Eyre, Rounsaville, & Kleber, 1982; Schubiner et al., 1995; Wood et al., 1983). In their 10-year follow-up study of hyperactive boys, Mannuzza, Gittelman-Klein, Bonagura, Konig, and Shenker (1988) observed that boys diagnosed with ADHD who used drugs in adolescence placed themselves at a heightened risk for developing more severe substance related difficulties. Results disclosed that these individuals had behavior problems resulting from drug use in early adolescence with graver consequences than controls and that they continued "to use drugs despite drug-related problems, eventually leading to the full SUD syndrome" (p. 18). Ninety-six percent of the boys diagnosed with ADHD were found to progress to full SUD syndrome versus 55% of the controls.

Other research (Jackson & Farrugia, 1997; Wood et al., 1983) also established higher rates of substance related problems in adults with ADHD. Wood et al. (1983) studied 33 males in residential alcohol treatment and determined that 33% had been hyperactive in childhood. Eyre et al. (1982) found that 22% of the 157, mostly male adult, opiate addicts reported a childhood history of hyperactivity. Data from these studies intensify the connection between substance use disorders and ADHD.

Wilens et al. (1997) conducted an investigation dealing with the early onset of substance use disorders in which they addressed the impact of ADHD on the initial age of substance use and related problems. They found that adults who had a

childhood ADHD diagnosis exhibited “a significantly younger age at onset of PSUD compared with non-ADHD controls” (p. 480). Their research also disclosed conduct disorder, anxiety disorder, and bipolar disorder were found to co-occur with adolescent SUD. They emphasized the “importance of targeting ADHD children for preventive and early intervention programs aimed at reducing the risk for PSUD” (p. 481).

Coexisting ADHD and SUD has created both diagnostic and treatment difficulties. Cantwell (1996) determined that “comorbidity complicates the diagnostic process and can have an impact on natural history and prognosis and the management of children, adolescents, and adults with ADD” (p. 198). In a study designed to determine the efficacy of treatment paradigms for chemical dependence among adolescents and young adults, Stratton and Gailfus (1996) found that those diagnosed with ADHD displayed marked difficulties in treatment. They noted that defiant behaviors and poor anger control present among adolescents diagnosed with ADHD caused them to “struggle with treatment and sobriety” (p. 90). Already at risk for impairments in social, emotional, academic, and vocational areas, individuals diagnosed with ADHD are at enhanced vulnerability when this disorder presents in combination with substance use (Abramowitz & O’Leary, 1991; Adams & Wallace, 1994; Biederman et al., 1991; Diamond & Mattsson, 1996; Landau & Moore, 1991; Thompson, Riggs, Mikulich, & Crowley, 1996).

Alcoholism and substance use disorders have been found to have a protracted relationship with ADHD. Two of the early research studies connected the individual with ADHD, parents, and family members to alcoholism. Later research found

connections with opium and other drugs. Studies showed that a diagnosis of ADHD leads to earlier drug use, more severe problems, more alcoholism, and problems with diagnosis and treatment. Three of the studies identified subjects as being male with the only mention of females referencing alcoholic mothers. Biederman et al. (1995) concluded, "Although psychiatric comorbidity increased the risk for psychoactive substance use disorders in adults with ADHD, by itself ADHD was a significant risk factor for substance use disorders" (p. 1652). Many studies identify ADHD as a childhood antecedent to substance related disorders; however, they lack specific details regarding the impact of gender, subtype, or specific diagnosis.

ADHD, CD, and SUD. The presence of ADHD with conduct disorders has been shown to increase risks for subsequent problems and further complicate ongoing difficulties for individuals diagnosed with ADHD (Barkley et al., 1990; Faraone et al., 1998; Gaub & Carlson, 1997; Landau & Moore, 1991; Mannuzza et al., 1993; Thompson et al., 1996; Wilson & Marcotte, 1996). Hechtman (1991) observed that "it . . . appears that the likelihood of developing conduct disorder is greater if ADHD persists and that substance abuse is often linked to or follows the conduct disorder" (p. 416). Gittelman et al. (1985) concluded that the greatest risk factor for the development of antisocial behavior and drug abuse for the 101 males in their prospective, controlled study was the maintenance of ADHD symptoms. They observed, "If the original symptoms of hyperactivity had not remitted, the chances of developing a conduct disorder were almost fourfold greater than if the childhood condition was no longer present" (p. 944). In the search for stable predictors of

outcome, they observed that “a relatively large proportion of hyperactive children develop and maintain conduct disorders” (p. 946).

Other research also found elevated rates of co-occurring disorders when ADHD behaviors continued into adolescence (Diamond & Mattsson, 1996; Eyre et al., 1982; Mannuzza et al., 1991; Thompson et al., 1996). Mannuzza et al. (1991) replicated an earlier study involving hyperactive children, with 94 hyperactive boys. Based on this all male study, they determined that childhood ADHD was a predictor for adult psychiatric disorders. “At follow-up, 27% of former patients vs. 8% of controls had an ongoing diagnosis of either conduct disorder or antisocial personality disorder . . . [and] . . . 16% of probands vs. 3% of controls had an ongoing nonalcohol substance use disorder” (p. 77).

According to Wilson and Marcotte (1996), ADHD-diagnosed adolescents reported a “greater use of alcohol and drugs in those cases with conduct disorder” (p. 586). Results revealing elevated levels of co-occurring disorders were consistent with an earlier study, in which they had determined that children who had been diagnosed with ADHD were at a high risk for psychosocial, educational, and adaptive problems in adolescence.

In a study conducted by Thompson et al. (1996) on 171 adolescent boys with some form of substance involvement who were also diagnosed with CD, researchers found that those with “ADHD had more CD symptoms, earlier age of CD onset, more substance dependence diagnoses, and more comorbid depression and anxiety” (p. 325). Based on a study of 13 male adolescents diagnosed with ADHD, CD, and SUD, Riggs et al. (1996) concluded:

Adolescents with the combination of conduct disorder (CD), substance use disorder (SUD), and attention-deficit hyperactivity disorder (ADHD) may have a more virulent illness with a worse prognosis for persistence of antisocial traits and perhaps substance use than do youths with CD and SUD without comorbid ADHD. (p. 1018)

A strong relationship clearly exists between ADHD, CD, and substance use disorders in adolescents and adults. The combination of the three disorders has been determined to present more complex problems. Four of the six studies addressing co-occurring ADHD, SUD, and CD presented data only on males and none addressed the impact of subtype on the presence of the co-occurring disorder. Questions again remain regarding the impact of gender, subtype, and specific ADHD diagnosis.

Summary of the Presence of Co-occurring Disorders and ADHD

Research has identified ADHD as an enduring disorder that continues to present ongoing problems into adolescence and adulthood. In addition to the difficulties and problems that occur due to ADHD, adults and adolescents are frequently diagnosed with co-occurring disorders. The presence of co-occurring disorders presents enhanced problems in diagnosis and treatment, as well as multiplying the impact of the disorders on the individual. According to Mannuzza et al. (1993), "Childhood ADHD predicts specific adult psychiatric disorders" (p. 565).

Initially found to be present in the parents of ADHD-diagnosed children, substance use disorders have an extensive and intimate history of involvement with ADHD. Additional disorders identified by various research studies as occurring in conjunction with ADHD are antisocial and disruptive behavior disorders and mood disorders. Very little previous research has been based on the specific ADHD

subtype or diagnosis and co-occurring disorders. Most research on coexisting disorders has been conducted on males, so little attention has been directed to differences in co-occurring disorders as they present in girls and women.

Research Limitations and the Need for Additional Focused Research

Research studies have confirmed the existence of limitations in current information on adolescent ADHD and established the need for additional and focused research. ADHD has been identified as risk factor for substance use disorders. The presence of co-occurring disorders has been found to present added complications for ADHD-diagnosed adolescents. Loeber et al. (1998) indicated a need for additional research addressing the interrelationship of risk factors during the different stages of adolescence. Angold et al. (1999) concurred. They espoused the need for additional research on co-occurring disorders because “relationships among disorders may change over time as patterns of reciprocal influence between the causes and effects of different forms of psychopathology become established” (p. 77). Wilens et al. (1997) advocated early prevention and intervention programs for children with ADHD and endorsed additional investigations on this population. They determined that “ADHD children should be a focus for preventive and early intervention programs aimed at reducing the risk for PSUD before the illness begins and becomes chronic” (p. 480). Each of these studies points to the need for additional research in the area of ADHD.

According to Biederman et al. (1998), “The dearth of information on adolescent ADHD fuels lingering uncertainties regarding the diagnosis and treatment

of ADHD in adolescence” (p. 305). Much of that information has been developed on males, ignoring the impact of gender. Additionally, earlier research does not address the ADHD subtype as it occurred prior to the change in nomenclature that divided ADHD into subtypes. Lack of knowledge about the disorder as it manifests in combination with other disorders, in females ages 10 to 25, and by specific ADHD diagnosis presents problems for evaluation and treatment in the increasing number of individuals who are referred, for their families and for their therapists. Additional focused research is warranted for this ADHD-diagnosed population.

Research Limitations Based on Gender. The lack of information regarding the presentation and course of ADHD in girls leaves many critical questions unanswered. Girls with ADHD have often been unidentified or underidentified. Cantwell (1996) believed

... there may be people (particularly females) who had unrecognized ADD in childhood, who were not evaluated in childhood ... [because] ... in most samples of those who present as adults with no childhood evaluation or treatment, a substantially greater number of females has been present. (p. 983)

The paucity of research on ADHD in females was also addressed by Wilson and Marcotte (1996), who noted that the “limitation of many longitudinal studies of ADD has been the exclusion of female subjects. In fact there are a limited number of studies that have examined ADD in girls at any period of development” (p. 580). Frequently, ADHD has been found to go undiagnosed in females until late childhood, adolescence, or adulthood.

Kann and Hanna (2000) noted the “relative absence of research on female children and adolescents” (p. 267). Although numerous research studies have identified the need for additional research on adolescent substance abuse and ADHD, little of the existing information has come from studies identifying the impact of gender (Biederman et al., 1998; Hechtman & Weiss, 1986; Horner & Scheibe, 1997; Mannuzza et al., 1991; Mannuzza et al., 1993; Wilens et al., 1997). The gender information imbalance in the existing research hinders diagnosis and treatment for females.

The impact of undiagnosed ADHD in females is particularly meaningful in relationship to co-occurring disorders. Kann and Hanna (2000) conducted a study that focused on gender and disruptive behavior disorders. They observed that in conjunction with disruptive behavior disorders “girls are more likely to be diagnosed as having one or more comorbid disorders, including attention deficit-hyperactivity disorder, anxiety, depressive disorders, somatization disorder, substance use disorders, antisocial personality disorder and academic underachievement” (p. 268). Gaub and Carlson (1997) conducted a meta-analysis and critical review of literature with a specific look at the impact of gender on ADHD. Their research identified the presence of some of the same co-occurring disorders but determined that when compared with ADHD-diagnosed males, these females had “lower levels of hyperactivity, fewer conduct disorder diagnoses, lower rates of other externalizing behavior, but greater intellectual impairment” (p. 1041).

Despite the multitude of research on ADHD, the studies addressing ADHD in girls is “scant and inconsistent” (Sharp, Walter, Marsh, Ritchie, Hamburger, &

Castellanos, 1999, p. 40). Both diagnosis and research on the impact of ADHD have historically been disproportionately in favor of males over females. Klein and Mannuzza (1991) placed the male–female ratio in referred samples as high as 9:1. Sharp et al. (1999) synthesized, “Girls with ADHD have been neglected by clinicians and researchers” (p. 40).

Six research studies identified the scant research on ADHD in girls and women, endorsing the need for additional research on ADHD in females. One study revealed the delay in diagnosis in girls (Cantwell, 1996). Two other studies identified co-occurring disorders (Gaub & Carlson, 1996; Kann & Hanna, 2000). In addition to the continuation of ADHD behaviors, other co-occurring disorders including CD, anxiety, SUD, somatic disorder, depression, antisocial personality disorder, and academic underachievement were identified. No studies connected gender to ADHD subtype. Other research studies noted the meager amount of research on the manner in which the disorder manifests in girls and support the need for more research (Biederman et al., 1998; Cantwell, 1996; Kann & Hanna, 2000; Klein & Mannuzza, 1991; Mannuzza et al., 1993; Sharp et al., 1999; Wilson & Marcotte, 1996).

Research Limitations Based on Subtype. Previous research results concur that ADHD is frequently found in combination with substance use disorders, anxiety disorders, mood disorders, and disruptive behavior disorders, especially CD (Biederman et al., 1993; Biederman et al., 1991; Gaub & Carlson, 1997; Gittelman et al., 1985; Kann & Hanna, 2000; Mannuzza et al., 1988; Wilson & Marcotte, 1996). Furthermore, researchers noted that in many cases ADHD serves as a precursor to

subsequent disorders (Loeber et al., 1998; Wilens et al., 1997). Only limited research has investigated the question of the relationship of these co-occurring disorders to the ADHD subtypes (Brown, 2000; Erk, 2000; Faraone et al., 1998).

Although limited, the research that has explored the relationship between co-occurring disorders and ADHD subtype has detected some patterns. Erk (2000) found elevated rates of anxiety and mood disorders in the ADHD-I subtype. Faraone et al. (1998) observed that “compared with the other two types, the combined type had significantly higher rates of conduct, oppositional, bipolar, language and tic disorders” (p. 188). In an effort to identify risk factors and to identify the clinical course of the disorders, additional focused research has been recommended. This alignment of co-occurring disorders with ADHD subtype or diagnosis would be effective in the effort to formulate prevention and treatment strategies.

The two studies addressing ADHD subtype provided preliminary information regarding subtype and co-occurring disorders (Brown, 2000; Erk, 2000). Neither of these studies addressed co-occurring disorders in females by ADHD subtype. Research connecting gender with ADHD subtype and co-occurring disorders is needed to provide a clearer picture of the disorder as it presents in females.

ADHD Conclusion

Most of the research studies on ADHD have been conducted on boys and men. Many studies have addressed the presence of ADHD preceding and possibly predicting certain co-occurring adolescent and adult psychiatric disorders. The connection between ADHD and SUD has been found to be particularly close.

Research investigations have shown that in many instances the development of substance related disorders and disruptive behavior disorders in adolescence is contingent upon the continuation of ADHD behaviors. Only a limited number of research studies have either examined whether a relationship exists between co-occurring disorders and ADHD subtype or focused on examining the disorder in girls and women. Research studies concerning ADHD-diagnosed females exploring the relationship of co-occurring disorders to ADHD subtype or diagnosis are virtually nonexistent.

Additional research in the area of ADHD is necessary to formulate a clearer understanding of the disorder itself, as well as the impact on and interaction with co-occurring disorders. Due to the ongoing problem of differentiation and overlapping diagnoses, Cotugno (1993) recommended additional research indicating that “there appears to be a continuing need to understand better to what extent symptoms of ADHD coexist with other disorders in ways that are not random or artifactual” (p. 338). Biederman et al. (1991) searched psychiatric and psychological literature for empirical research into the “considerable and varied comorbidity” (p. 574) that exists with ADHD, disruptive behavior disorders, mood and anxiety disorders, and learning disabilities. They noted that “specific patterns of symptoms and syndromes tend to occur together in individuals and families” (p. 574). They suggested that subgroups might be more effectively delineated on the basis of co-occurring disorders. They recommended ongoing research to enhance knowledge determining the nature of the relationship and useful in the areas of prevention and treatment.

In general, previous research points to the need for additional research in the area of adolescent ADHD and co-occurring disorders (Biederman et al, 1998; Bukstein et al., 1989; Gaub & Carlson, 1997; Gittelman et al., 1985; Horner & Scheibe, 1997; Samuel et al., 1999; Stratton & Gailfus, 1996; Wilson & Marcotte, 1996). Substance use disorders, disruptive behavior disorders, mood disorders, and learning disorders have been identified by various studies as co-occurring with ADHD. Current research results are based on studies conducted with a predominantly male population, marginalizing females and clouding the issue of gender. Current research is limited in the area of ADHD subtype. Additional research to investigate relationships between ADHD diagnoses and co-occurring disorders and additional research to explore co-occurring disorders related to gender would benefit both prevention and treatment programs.

Understanding the effects of co-occurring disorders on the development and course of ADHD would enhance preventive and treatment interventions for children, adolescents, and adults. Additional research is warranted to obtain a more complete understanding of the ADHD subtypes, the presence of co-occurring disorders, and their impact on the young female. Previous research has provided a basis of information from which to begin further investigation. Future research would enhance understanding of the relationship with co-occurring disorders by specific ADHD diagnosis and would assist in identification of risk and protective factors, as well as contribute to providing stable predictors of outcome for an increased number of those diagnosed.

Substance Use Disorder

Depiction of the Disorder

Considerable research has explored the maladaptive patterns of behavior involving alcohol and drugs that comprise substance use disorders (SUD). Much attention has focused on attempts to determine the factors that contribute to substance use and support continued substance use, despite numerous difficulties. This section reviews the literature on SUD, concentrating on diagnostic features, function of substance use, co-occurring disorders, and self-medication.

Diagnostic Features of Substance Use Disorder

Substance-related disorders, as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (APA, 2000), are “disorders related to the taking of a drug of abuse (including alcohol), to the side effects of a medication, and to toxin exposure . . . [noting that] . . . the term substance can refer to a drug of abuse, a medication or a toxin” (p. 191). Substance use disorders and substance-inducing disorders form the two groups subsumed in this category. Substance use disorders are further divided into substance dependency and substance abuse.

Characteristics. Substance use disorders are maladaptive patterns of behaviors that form the defining diagnostic criteria for dependency or abuse. Criteria include elevated tolerance to substance use, failure to complete major role

obligations, legal problems, social or interpersonal problems exacerbated by substance use, withdrawal, substances taken in greater amounts or over longer period than intended, persistent desire to control use, and excessive time spent in activities surrounding use and for recovery. These criteria describe the variations in life behavior patterns of persons who are diagnosed with SUD. According to the *DSM-IV-TR* (APA, 2000), there are 11 classes of substances included in substance-related disorders.

SUD Descriptors. Substance dependence is marked by “a pattern of repeated self-administration that usually results in tolerance, withdrawal and compulsive drug-taking behavior” (APA, 2000, p. 192). Dependence involves continued substance use despite serious, substance-related problems and contains physiological, behavioral, and cognitive features. This diagnosis frequently features feelings of craving and can be applied to all classes of substances except caffeine.

Substance abuse indicates a more complex substance involvement. It differs from dependence in that it does not include tolerance, withdrawal, or a pattern of compulsive use. Rather, it is defined by “recurrent and significant adverse consequences related to the repeated use of substances . . . [such as] . . . repeated failure to fulfill major role obligations, repeated use in situations in which it is physically hazardous, multiple legal problems and recurrent social and interpersonal problems” (APA, 2000, p. 198). Frequently, a diagnosis of substance dependence precedes one of abuse.

Although each of these disorders poses unique issues, both present serious problems for individuals diagnosed with SUD. When SUD is present in adolescents, the issues are complicated by the lack of maturity.

Risk Factors in Adolescents. Adolescent SUD is marked by “impairment in psychosocial and academic functioning” (AACAP, 1997, p. 141S). While published literature on adolescent substance abusers is limited, the existing research has identified some factors that increase the chance of developing substance use disorders. According to the AACAP (1997), the “factors that contribute to early use or to continuing use include common adolescent feelings of omnipotence, peer influences or ‘peer pressure,’ and cultural factors such as availability of substances and mixed messages about use provided by mass media” (p. 141S). The AACAP (1997) has established four broad classes of risk factors leading to SUD that included parent and family risks, peer-related risks, individual risks, and community characteristics. These risk factors have been found to be enhanced by the immaturity of the adolescent.

Jaffe (1996) identified the most influential factor leading to SUD as a relative who has a history with substance-related problems. Additional factors identified in his research that were found to increase the risk for alcohol and substance abuse included poor self-esteem, underachievement in school, aggressive or impulsive behaviors, family instability, co-occurring depression, substance-using friends, and ADHD related school problems. In addition to being directly implicated, many of those risk factors are typical behaviors and feelings of adolescents with ADHD.

In another study, Rounds-Bryant, Kristiansen, Fairbank, and Hubbard (1998) investigated the impact of gender on alcohol and drug use, mental health problems, abuse, and crime in over 3,382 adolescents involved in drug treatment. Identified SUD risk factors included co-occurring ADHD and CD and both physical and sexual abuse. Adolescent males and females were similar in the rate at which they reported this abuse, although females reported both physical and sexual abuse while males reported physical abuse only. Females also reported more psychiatric disorders, were found to be less likely to act out, and consequently were found to be more prone to “internalizing disorders, such as depression” (p. 31). These researchers noted that “the female adolescents were just as or more impaired behaviorally and psychologically as the males” (p. 31).

These three studies identified risk factors for adolescents. Overlap in risk identification occurred in the areas of family risks, individual risks, and peer risks. Many of the feelings and behaviors identified as SUD risk factors were identical to feelings and behaviors typical of adolescents diagnosed with ADHD. Only one study pointed out the similarities and differences presented by gender (Rounds-Bryant et al., 1998).

Functions of Substance Use

Expectations. In an effort to develop a better understanding the of the function of alcohol and drugs, a substantial amount of research has addressed substance abuse, addictions, and the interaction of drugs and society on human behaviors. The behaviors that precede drug use, the pharmacological effect of drugs,

and the impact of friends, community, and family have been explored to explain development of substance-related disorders (AACAP, 1997; Lewis, Dana, & Blevins, 1994; Peele, 1985; Ray & Ksir, 1993).

Research findings indicate that some individuals employ substances to obtain a specific, desired effect. This effect is generated through a combination of factors that include unique individual physiological and psychological features, attributes of the particular substance and the cultural environment. Substance use has been found to serve as a contrivance to “fit in” with peers and as experimental behavior typical of adolescents. For others, drug use has been found to serve as a means of escape from the responsibilities of life or as a means of self-medication. Self-medication occurs when substance use is employed as a means to cope or to escape physical or psychological pain (Khantzian, 1985; Lewis et al., 1994; Milkman & Frosch, 1973; Peele, 1985; Ray & Ksir, 1993).

Self-Medication. Research has disclosed that drugs and alcohol play a role in modifying painful, negative feelings. In a study designed to explore the relationship of drug effect to the habitual user, Milkman and Frosch (1973) detected a link between personality style and drug preference. They found that difference in personality style of heroin and amphetamine abusers explained the choice of one substance over another; the heroin addict appeared to view himself with contempt, while the amphetamine abusers displayed an inflated sense of self-worth. They observed that heroin addicts, overwhelmed by low self-esteem, reduced anxiety through repression and withdrawal. Conversely, amphetamine abusers expend

substantial psychic and physical energy in an attempt to maintain a sense of self as productive and powerful. They noticed that “the specific drug effects of ‘satiation’ (heroin) and ‘activation’ (amphetamine) temporarily aid in the reduction of anxiety” (p. 242). They concluded the “drug of choice appears to be syntonic with the abuser’s characteristic modes of adaptation . . . bolstering characteristic modes of defensive functioning” (p. 242). Their research illustrated the influence of personality style on the preferential selection of a drug for self-medication. The pharmacological effect sought was designed to mediate an underlying sense of anxiety, worthlessness or low self-esteem.

Results from other research with substance dependent adults confirmed the findings that drug choice is not made randomly (Fisher & Beckley, 1999; Khantzian, 1985). Specific substance selection was determined to have been made as a form of self-medication. Khantzian (1985) stated that the “self-medication motive is one of the more compelling reasons for overuse of and dependence on drugs” (p. 1263). He concluded that the drugs were selected to facilitate coping and to defend against negative feelings. He found that specific drugs were used to self-medicate specific psychiatric disorders. He reported, “Narcotic addicts prefer opiates because of their powerful muting action on the disorganizing and threatening affects of rage and aggression. Cocaine has its appeal because of its ability to relieve distress associated with depression, hypomania and hyperactivity” (p. 1259).

Both of the studies identified a purposeful selection of alcohol or drugs to accomplish self-medication. One study indicated that selection of a specific drug was based on the personality type of the user and was made to reduce anxiety (Milkman

& Frosh, 1973). The other study emphasized the importance of specific drugs to facilitate coping and mediate feelings (Khantzian, 1985).

Summary of the Depiction of the Disorder. Substance use disorders are characterized by a maladaptive pattern of behavior that manifests in the form of impairment in the areas of psychosocial and interpersonal functioning. Various risk factors have been identified including parent and family risks, peer-related risks, individual risks, and community characteristics. Substance use has been found to have been employed as an aspect of adolescent experimentation, as a means to fit in with peers, and for desired pharmacological effects. Convincing data have established selective substance use as a method of self-medication based on personality type and for mediating specific feelings and behaviors. Only limited research exists on SUD in adolescents and less research addresses SUD in females.

Co-occurring Diagnoses

Substance use disorders are often found in tandem with other psychiatric disorders. Patterns of specific relationships have developed as more research is gathered. This section will address literature that identifies SUD with various psychiatric disorders, especially ADHD. Attention will also focus on literature that addresses self-medication.

SUD With ADHD

The connection between substance use and ADHD has been addressed in numerous research studies; however, the specific details regarding the nature of that relationship differ (Adams & Wallace, 1994; Alterman et al., 1982; Angold et al., 1999; Biederman et al., 1991; Tarter et al., 1977; Wood et al., 1983). Some studies provide a direct link between ADHD and SUD, while others connect ADHD and SUD only in conjunction with additional disorders such as CD (Biederman et al., 1998). Research studies have confirmed that ADHD increases the risk for development of alcoholism and other psychoactive substance-use disorders (Alterman et al., 1982; Goodwin et al., 1973; Wilens et al., 1997).

In a study involving 14- to 19-year-old males and females, Horner and Scheibe (1997) learned that “ADHD subjects began drug use at an earlier age, had more severe substance abuse, and had a more negative self-image prior to drug use and improved self-image with drug use” (p. 30). Retrospective studies have also documented the increased risk for substance abuse in individuals diagnosed with ADHD (Biederman et al., 1993, Biederman et al., 1995; Hechtman & Weiss, 1986; Mannuzza et al., 1991, Mannuzza et al., 1993). Based on a study of 120 ADHD-diagnosed adults, Wilens et al. (1997) concluded that “overall, ADHD subjects had significantly young age of onset of PSUD compared with controls” (p. 477). They also determined that “childhood-onset and persistent ADHD is associated with adolescent onset PSUD” (p. 481). On average, adolescents diagnosed with ADHD were found to become substance abusive three years earlier than controls.

Drawing on Klein's analysis of adult outcomes of children with ADHD, Javorsky and Gussin (1994) concluded that "young adults with ADHD had a six-fold risk for substance abuse disorder as compared with matched peers" (p. 170). Hechtman and Weiss (1986) also noted a higher incidence of substance abuse problems among individuals with a primarily hyperactive subtype of ADHD who also exhibited poor self-confidence and low self-esteem. Follow-up studies of hyperactive children, conducted by Mannuzza et al. (1993), indicated that substance use disorder was present in 16% of the adults who had been diagnosed with ADHD versus 4% of the controls. Herrero et al. (1994) reviewed the charts of 66 hyperactive patients who were followed for 15 years at prospective 5-year intervals. Her findings indicated that by adolescence a high percentage of children who had been diagnosed with ADHD (60%) were currently experiencing, or had experienced, alcohol abuse or dependence.

All seven of these research studies supported the direct link between ADHD and SUD. Two of the studies indicated that the existence of ADHD led to earlier substance use (Horner & Scheibe, 1997; Wilens et al., 1997). Two studies identified the impact of low self-esteem and poor self-confidence on development of SUD (Hechtman & Weiss, 1986; Horner & Scheibe, 1997).

SUD and Other Disorders

A relationship has emerged connecting substance related disorders, co-occurring ADHD, and other behavioral disorders (Biederman et al., 1991; Biederman et al., 1995; DeMilio, 1989; Goodwin et al., 1975; Hechtman & Weiss, 1986;

Schubiner et al., 1995; Tarter et al., 1977). As a means of illustrating the interconnection of SUD, ADHD, and other psychological disorders, Mannuzza et al. (1991) conducted research replicating an earlier study conducted with hyperactive children. Results revealed higher rates of substance use disorder (14% vs. 8%) and conduct disorders (32% vs. 8%) in adults who had been diagnosed with ADHD as children than controls. When antisocial personality characteristics were added to a diagnosis of ADHD, Mannuzza et al. (1993) discovered that the rate of individuals found to have ongoing substance abuse jumped to seven times more than the control group. In follow-up studies, Gittelman et al. (1985) discovered that 59% of the children presenting with ADHD and conduct disorders had developed drug or alcohol abuse behavior. Among those diagnosed with ADHD, almost all cases (84%) of substance use disorders occurred following the antisocial disorder. These studies indicated drug abuse rarely occurred among those with ADHD unless CD was present as well.

Additional studies focusing on the adolescent found that SUD has been shown to follow or coincide with the emergence of conduct disorders. Results from one study emphatically connected SUD, ADHD, and CD. Barkley et al. (1990) found that the diagnosis of CD with ADHD increased cigarette, alcohol, and drug use by two to three times the rate of those without a CD diagnosis. The researchers stated, "Most outcome findings were at least partially mediated by whether CD was also present in the hyperactives, or as in the case of substance abuse or school expulsion, were entirely accounted for by its presence" (p. 556). The progression of disorders in these cases suggests that the onset of childhood ADHD may be, in many cases, a

precursor to subsequent disorders. The manner in which this progression has been illustrated raises the question of subsequent disorders serving the function of adaptation, coping, and self-medication (Jensen et al., 1997). The presence of ADHD may serve a predictive value that would be useful in preventative work for specific subsequent behavioral and substance use disorders.

Clark and Bukstein (1998) found that the presence of co-occurring psychopathologies increases an adolescent's risk of developing alcohol use disorder (AUD). They focused particularly on antisocial disorders and negative-affect disorders in their research. Drawing from their previous research, they noted that "major depression and PTSD are especially prevalent among female adolescents with AUDs" (p. 119). They determined that co-existing "mental disorders may both precipitate and result from AUDs" (p. 121).

Four of the studies determined that the number of individuals diagnosed with SUD increases as the number of co-occurring disorders increases (Barkley et al., 1990; Gittelman et al., 1985; Mannuzza et al., 1991; Mannuzza et al., 1993). Antisocial personality disorder and CD were the two disorders identified as precipitating the most change when found in combination with ADHD. One study questioned the function of SUD as possible self-medication to mediate the impact of the other multiple disorders (Jensen et al., 1997). Another study found researchers uncertain about the precise order of onset, SUD (in this case alcohol), or the co-occurring psychopathology (Clark & Bukstein, 1998).

SUD as Self-medication

ADHD and SUD as Self-medication. In a study conducted by Tarter et al. (1977), adult alcoholic participants reported having recalled more symptoms of childhood minimal brain dysfunction (MBD) than those with other diagnoses or control group members. Research subjects completed a questionnaire on MBD that specifically identified feelings of exclusion and a low threshold for frustration. Results disclosed that MBD, alcoholic participants began drinking at an earlier age and exhibited more severe symptoms of alcoholism. Researchers tentatively suggested that the early onset of substance use was an attempt by subjects to use alcohol to mediate negative affect connected with MBD. They stated, "It is quite plausible that it is the lack of personal and social competence consequential to MBD that leads to alcoholic intake in an effort to obtain a transient euphoric psychic effect and relief from social stress" (p. 767).

The use of alcohol to obtain relief from the distress associated with ADHD was also addressed by Wood et al. (1983). Based upon a study conducted with inpatient alcoholics, the authors concluded, "It is plausible that certain experiences of the child with attention deficit disorder (such as rejection by teachers, parents, and peers and social and athletic failure) produce psychological difficulties that are partially ameliorated (made solvable) with alcohol" (p. 97).

Self-medication was also addressed in a study of inhabitants of a residential substance abuse treatment center who had been diagnosed with ADHD either in childhood or retrospectively as an adult. Participants in this study disclosed that

alcohol and drugs had been employed in their struggle with ADHD symptoms to “self-medicate . . . [and to] reduce feelings of restlessness . . . [and for] calming effects” (Schubiner et al., 1995, p.147).

The use of psychoactive substances to self-medicate is addressed in various other research studies. Studies involving substance abuse by adults with ADHD indicated that substances were used to cope with ADHD symptoms, to mediate mood disorders, and to defend against low self esteem (Hechtman & Weiss, 1986; Herrero et al., 1994; Horner & Scheibe, 1997; Milberger, Biederman, Faraone, Chen, & Jones, 1997; Rounsaville, Anton, Carroll, Budde, & Prusoff, 1991). This abuse was also found to include substances other than alcohol (DiMilio, 1989; Jaffe, 1991; Wilson & Marcotte, 1996). In many cases, addiction occurred as the by-product of this self-medicating behavior.

Milberger et al. (1997) also observed an elevated use of cigarette smoking by individuals diagnosed with ADHD and suggested that this might lead to subsequent use of illicit drugs. In the study conducted with boys ages 6 to 17, followed prospectively for 4 years, results indicated that ADHD was a significant predictor of early initiation of cigarette smoking with continuation into mid-adolescence. Those ADHD-diagnosed children who smoked also were diagnosed with other psychological disorders. Researchers reported finding “relatively less treatment of ADHD at follow-up in those ADHD probands who smoked compared with those who did not smoke” (p. 42). From this they implied that “it is possible that some of the ADHD children who smoke may do so in an effort to self-medicate their ADHD

symptoms, since nicotine has been shown to modulate dopaminergic pathways and may exert stimulant-like effects” (p. 43).

Other studies have established that addiction occurs as a by-product of self-medication (Fisher & Beckley, 1999; Stratton & Gailfus, 1998). Findings reveal that individuals diagnosed with ADHD employed alcohol and drugs to mediate hyperarousal to various environmental stimuli. The researchers proposed that some human beings, due to individual neurological composition, “experience the external world around them and the internal world within them as threatening . . . because of their sensitive and disorganized nervous systems” (Fisher & Beckley, 1999, p. 90). These hypersensitive individuals self-medicate to ameliorate the hyperarousal and subsequently become addicted.

Eyre et al. (1982) studied the use of drugs to self-medicate for those with ADHD utilizing 157 adult opiate addicts. They found that 22% of that population had childhood histories of hyperactivity and many continued to manifest adult symptoms of the disorder. The substance of choice for these addicts was opium. Researchers determined the opium was employed as a “response to social stigmatization or as an attempt to cope with primary attention deficit problem” (p. 527).

All six studies connected substance use disorders to self-medication directly related to ADHD. Three of the studies addressed the need to mediate negative affect precipitated by feelings of exclusion, frustration, psychological difficulties, or low self-esteem (Eyre et al., 1982; Tarter et al., 1977; Wood et al., 1983). Two other

studies identified the need to self-medicate for restlessness and hyperarousal (Fisher & Beckley, 1999; Schubiner et al., 1995).

Self-Medication in Adolescents. According to Fisher and Beckley (1999), the nature or subtype of ADHD is an important aspect in determining the degree and variety of substance abuse. They reported that adolescents diagnosed with ADD without hyperactivity tend to begin drug use during their teens continuing to engage in the use of alcohol use as a means of self-medication. They observed that marijuana is also used by this group as a means to be included socially during adolescence. Subjects reported “daily use of marijuana as a means for calming themselves down and attempting to fit into the group” (p. 217). They determined that adolescents diagnosed with ADHD have been involved with alcohol and drugs as young as age 9 and tend to employ substances such as heroin and cocaine for their properties. Loeber et al. (1998), in their study assessing risk factors for multiproblem boys, discovered that some boys with behavioral problems began substance use as early as first grade.

According to Fisher and Beckley (1999), whether SUD develops is determined by the degree and duration of involvement with drugs. They reported that

generally, the ADHD individual will have been abusing some substance for years prior even to reaching adolescence. ADHD individuals, at very early ages, tend to become involved on more hard-core drug use, such as cocaine and heroin, for their stimulant properties. They drink to live and live to drink. These patterns may begin as young as 9 years of age. (p. 217)

Self-medication by individuals diagnosed with ADHD impacts the treatment and services for that disorder. Treatment for each of the individual's disorders is

impacted and complicated by the other, multiplying and obfuscating treatment needs. In the adolescent population that is already less motivated in general than its adult counterparts regarding treatment, any complications create the need for an intensified treatment program (Melnick, DeLeon, Hawke, Jainchill, & Kressel, 1997).

Two of the studies identified the extremely early age for substance involvement intimating self-medication (Fisher & Beckley, 1999; Loeber et al., 1998). Identifying the calming effects of marijuana, Fisher and Beckley (1999) directly identified substance use as a form of self-medication among adolescents. One of the three studies addressed the need for an intensified treatment program when self-medication has been employed to mediate difficulties (Melnick et al., 1997).

Summary of Co-occurring Disorders

Multiple and co-occurring disorders with SUD present enhanced problems in diagnosis and treatment, as well as amplifying the impact on the individual. Poor self-image, poor self-confidence, and low self-esteem have been directly linked to the use of alcohol and drugs at an earlier age. Some research studies have identified ADHD as a precursor of SUD. In addition to ADHD, disruptive behavior disorders and mood disorders have been identified by various research studies as occurring in conjunction with SUD. A positive correlation between the number of co-occurring disorders and the likelihood of developing SUD has also been determined.

SUD Conclusion

The etiology of substance use disorders has led to identification of a variety of influential relationships. Although there is disagreement regarding the nature of the relationship, research studies have identified a close connection between ADHD and SUD. Some research studies have portrayed this relationship as a co-occurring disorder (Adams & Wallace, 1994; Biederman et al., 1995; Bukstein et al., 1989; DeMilio, 1989; Faraone et al., 1998); other studies described it as the result of a developmental progression (Bukstein et al., 1989; Lynskey & Fergusson, 1995); and still others as a gender specific issue (Biederman et al., 1995; Gaub & Carlson, 1997). Research conducted by Barkley et al. (1990) determined that SUD and ADHD would co-occur only if CD were also present. The selection of specific substances has been identified as a means to accomplish a specific goal such as adaptation, coping, or self-medication to mediate painful feelings, particularly in the area of low self-esteem (Eyre et al., 1982; Hechtman, 1991; Hechtman & Weiss, 1986; Horner & Scheibe, 1997; Javorsky & Gussin, 1994; Khantzian, 1985; Milkman & Frosh, 1973; Stratton & Gailfus, 1998; Rounsaville et al., 1991).

Independently or in combination with other disorders, research has identified a relationship between SUD and ADHD. The presence of ADHD has resulted in deficits in interpersonal relationships, an inability to perform successfully in school, work, and in recreational environments. These deficits have been found to contribute to the rise of a negative sense of self, thereby leading to substance use (Mannuzza et al., 1991; Mannuzza et al., 1993; Mannuzza et al., 1997, Rounds-Bryant et al., 1998;

Schubiner et al., 1995; Sheridan, Dee, Morgan, McCormick, & Walker, 1996; Thompson et al., 1996). Barkley (1990) viewed the onset of childhood ADHD as a possible precursor to subsequent disorders including substance use.

Albeit research has been conducted regarding children, adolescents, and young adults diagnosed with substance use and SUD, questions remain. Even though ADHD has been found in some studies as a precursor of SUD, further research is necessary to clarify the relationship of SUD to ADHD and other co-occurring disorders in females. Uncovering a pattern of selective substance use based on the presence of co-occurring disorders would be most helpful in prevention and treatment programs for females.

CHAPTER III

METHODOLOGY

In this chapter, the methodology employed in this study, including the research design and analysis, are described. Additionally, participant data and several limitations associated with this study are detailed.

Research Design

In this observational study of ADHD-diagnosed females ages 10 to 25, the differences in the frequency of specific groupings of co-occurring psychiatric disorders and specific groupings of psychoactive substances were examined. The composition of specific groupings of co-occurring disorders and substances employed in this study was based on prior research in males. The frequency of diagnosed co-occurring disorder groups was assessed for females within the total cohort diagnosed with attention deficit hyperactivity disorders as well as by those with specific ADHD diagnoses. The frequency of selective substance use in ADHD-diagnosed females ages 10 to 25 was also assessed for each co-occurring disorder among the total ADHD cohort and for specific ADHD diagnoses. Independent variables included ADHD and the ADHD diagnoses. Psychiatric disorder groups and selected substance groups formed the dependent variables.

Independent Variables

In addition to investigating the total ADHD cohort, the specific diagnoses of ADHD made up the independent variables for this research. The *DSM-IV-TR* (APA, 2000) has defined three subtypes as the primarily inattentive type (ADHD-I), the primarily hyperactive-impulsive type (ADHD-HI) and the combined type (ADHD-CO). Subtype diagnosis is contingent upon the presence of specific behaviors and symptoms for at least 6 months at a level that is maladaptive and inconsistent with the developmental level. Also included was the diagnosis of ADHD-NOS, delineating those individuals displaying symptoms of ADHD but who lack full diagnostic criteria.

Dependent Variables

The dependent variables included three co-occurring psychiatric disorder groupings and three selected substance groupings. The psychiatric disorder groups that were included for investigation in this study were disruptive behavior disorders, mood-anxiety disorders, and learning disorders. Disorder selection was based upon studies of co-occurring disorders in males diagnosed with ADHD and SUD. Selected substance groups included stimulants, depressants, and cannabis and were established based on effect of intoxication. The dependent variables are listed and described below.

Co-occurring Disorders

Disruptive Behavioral Disorders. For the purposes of this study, the category of disruptive behavioral disorders included antisocial disorders and antisocial personality disorder. Antisocial disorders included both oppositional defiant disorder (ODD) and conduct disorder (CD).

Behaviors indicative of oppositional defiant disorder include arguing, inappropriate anger or vindictiveness, rule defiance, blaming others, and deliberate annoyance of others. These behaviors are less severe than the pattern of behaviors that violates the basic rights of others present in conduct disorder (Clark & Bukstein, 1998; Maxmen & Ward, 1995). There are four categories of behavior indicative of conduct disorder: (1) aggression toward animals and people, (2) destruction of property, (3) theft and deceitfulness, and (4) serious rule violations (Clark & Bukstein, 1998).

Antisocial personality disorder requires that an individual be at least 18 years old, with symptoms presenting prior to the age of 15. In addition to being consistently irresponsible, characteristic CD behaviors include aggressiveness, destructiveness, deceitfulness, or severe rule violation (APA, 2000).

Mood-anxiety Disorders. For the purpose of this study, the category of mood-anxiety disorders included mood disorders, anxiety and phobic disorders, and posttraumatic stress disorder. Mood disorders encompass dispositions that reflect a disturbance in disposition. Those changes could be euphoric, dysphoric, or both.

Euphoric episodes would include those periods in which the mood is abnormally elevated, expansive, or irritable. Elevated episodes combined with depressive episodes form bipolar disorder. Depressive episodes include major depressive disorder and dysthymic disorder. These episodes are distinguished by variations in degree and duration of depressed mood or loss of interest (APA, 2000).

Anxiety disorders are characterized by excessive worry, uneasiness, and apprehension lasting for six months, accompanied by difficulties with concentration, restlessness, fatigue, sleep disturbance, and muscle tension. Phobias involve marked and persistent fears related to various factors including a situation, location, or environment (APA, 2000).

Posttraumatic stress disorder is characterized by feelings of intense fear, helplessness, or horror following having witnessed or experienced an event or events that involved or threatened death or injury. Additional symptoms include recurrent dreams, recollections of the event, difficulties sleeping and difficulty with anger, and avoidance of stimuli involved with the event (APA, 2000).

Learning Disorders. Learning disorders are characterized by individual achievement substantially below that expected for age, schooling, and level of intelligence on individually administered, standardized tests in several academic areas. *Substantially below* is defined as a discrepancy of two or more standard deviations between achievement and IQ (APA, 2000). Learning disorders also subsume developmental delays in the areas of motor skills, communication skills, and other developmental disorders.

Groups of Substances

The selected substance variables have been combined into groupings based on the effect produced by intoxication. More than one substance is included within each grouping. The three variables are (1) stimulants including but not limited to cocaine and amphetamines; (2) depressants including but not limited to alcohol, sedatives, anxiolytics, and opioids; and (3) cannabis including marijuana and hashish.

Stimulants. Stimulants, such as amphetamines and cocaine, are potent central nervous system chemical synergists that produce psychoactive and sympathomimetic effects. Effects of intoxication begin with a “high” feeling, followed by the development of symptoms such as euphoria with enhanced vigor, gregariousness, hyperactivity, restlessness, hypervigilance, interpersonal sensitivity, and talkativeness. In addition to the psychological and behavioral changes, there are physiological changes that range from pupillary dilation to coma (APA, 2000).

Depressants. Depressants, such as alcohol, sedatives, and opioids, produce clinically significant maladaptive behavioral and psychological changes. Effects of intoxication include inappropriate sexual or aggressive behavior and mood lability. In addition to the psychological and behavioral changes, there are physiological changes that range from slurred speech, impaired memory, and drowsiness to nystagmus and coma (APA, 2000).

Cannabis. The cannabinoids have diverse effects in the brain producing clinically significant maladaptive behavioral and psychological changes. Effects of

intoxication begin with a “high” feeling, followed by symptoms such as euphoria with inappropriate laughter and grandiosity, sedation, lethargy, and distorted sensory perceptions such as the sensation that time is passing slowly. In addition to the psychological and behavioral changes, there are physiological changes that range from increased appetite to tachycardia (APA, 2000).

Null Hypotheses

The null hypotheses were generated from the original five research questions. Due to the exploratory nature of this study and the paucity of research on ADHD-diagnosed females, nondirectional hypotheses were chosen. The hypotheses that were tested follow.

Null Hypothesis 1: There is no difference in the frequency of co-occurring disorders present among females ages 10 to 25 diagnosed with the ADHD and SUD. The co-occurring disorders include (a) behavioral disorders, (b) mood-anxiety disorders, and (c) learning disorders.

Null Hypothesis 2: There is no difference in the frequency of co-occurring disorders among females ages 10 to 25 diagnosed with SUD and ADHD by specific ADHD diagnosis (ADHD-I subtype, ADHD-HI subtype, ADHD-CO subtype, or ADHD-NOS). The co-occurring disorders include (a) disruptive behavioral disorders, (b) mood-anxiety disorders, and (c) learning disorders.

Null Hypothesis 3: There is no difference in the frequency of substance group selection among females ages 10 to 25 diagnosed with ADHD and SUD. The substance groups include (a) stimulants, (b) depressants, and (c) cannabis.

Null Hypothesis 4: There is no difference in the frequency of selected substance groups among females ages 10 to 25 diagnosed with SUD and ADHD by specific ADHD diagnosis (ADHD-I subtype, ADHD-HI subtype, ADHD-CO subtype or ADHD-NOS). The substance groups include (a) stimulants, (b) depressants, and (c) cannabis.

Null Hypothesis 5: For each co-occurring disorder group (disruptive behavioral, mood-anxiety, learning), there is no difference in the frequency of selected substance groups among females ages 10 to 25 by specific ADHD diagnosis (ADHD-I subtype, ADHD-HI subtype, the ADHD-CO subtype or ADHD-NOS). The substance groups include (a) stimulants, (b) depressants, and (c) cannabis.

Data Analysis

The data collected for this research were investigated via descriptive and inferential analysis. Since the purpose of this investigation was to examine the differences in patterns of co-occurring disorders and selective substance use within the total cohort of ADHD-diagnosed females ages 10 to 25 and by specific ADHD diagnosis, each diagnostic group was treated separately in both descriptive and inferential analyses. All statistical analyses were performed using SAS (SAS Institute, 2001), a computerized statistical software program. Demographic data were descriptively analyzed. Descriptive analyses included age, ethnicity, participant history of mental illness, substance abuse treatment, and suicide attempts.

The inferential analyses examined patterns of co-occurring disorders and patterns of selected substance use for the total ADHD-diagnosed sample as well as

patterns among the specific ADHD diagnoses. Chi-square analyses were used to compare the differences among the frequencies of co-occurring disorder variables and the differences among the frequencies of selected substance variables. To that end, both the co-occurring psychiatric disorders and substance selections were grouped into three categories. For each analysis, the researcher controlled for an overall experiment error rate of 5% to reduce the likelihood of chance occurrences of significance when they did not occur.

Participants

Participants for this research were selected from a population of females receiving inpatient substance abuse treatment at a nationally known treatment center located outside a large, metropolitan, Midwestern community. Individuals receiving treatment may come from outside the region, although most patients receiving treatment were from the area. This treatment center was chosen as the site for data collection based on its reputation working with substance abusing adolescents and adults. Restricting data collection for this study to participants in a single treatment center assured uniformity in diagnostic criteria. Participants for this study included all females ages 10 to 25 involved in treatment from 1999 through the summer of 2002, whose diagnoses included ADHD, SUD, and at least one additional disorder.

In order to protect the rights and confidentiality of all participants, a proposal for this study was submitted to the Research Action Team of the institution providing subject data and the Human Subjects Institutional Review Board (HSIRB) of Western Michigan University. Letters of approval are found in Appendices A and B.

Subject Selection Procedure

Upon receipt of approval from the doctoral committee, Research Action Team at the cooperating treatment center, and the Human Subjects Institutional Review Board at Western Michigan University, the researcher contacted the collaborating investigator requesting extraction of participant data. Subject selection involved a computerized search of archived intake data for all females, between the ages of 10 and 25, who had received treatment at the center and who met the criteria for the study (age, gender, ADHD, SUD, and additional diagnoses). Treatment center diagnoses were *DSM-IV* criteria based and were determined by clinicians at the treatment center. Diagnoses were determined following an intake assessment process comprised of a *DSM-IV* based questionnaire followed by a semistructured interview. The interview and questionnaire constituted the two-pronged process that formed the basis of all treatment center patient diagnoses. Only females who met study qualifications and had received treatment were included.

Data Transfer

Based on the criteria for the study, the collaborating scientist supervised subject selection and data extraction from archived intake records at the substance abuse treatment center. Only information necessary to provide a detailed description of participants and for analyses was extracted. Following removal of all identifying information, thereby rendering study participants anonymous to the researcher, the

participant data were transferred. Data were transferred via electronic mail to the researcher.

Subject Description

Following data transfer from the treatment center, the next task was to review and categorize the data. From the information provided, data for participant descriptors, diagnoses, and substance selection were categorized and coded for analysis. Of the 89 subjects initially identified, 3 had been entered into the database twice, and an additional 15 had incomplete data. This reduced the sample size to 71.

Category Delineation by Co-occurring Disorders

Only 45 of the 71 participants were diagnosed with one of the co-occurring disorder groups designated as a dependent variable for this study (disruptive behavior disorders, mood-anxiety disorders, and learning disorders). The remaining 26 were diagnosed with additional disorders not being investigated in this study or were diagnosed with more than one of the co-occurring disorders selected for this study.

Of those 26 females diagnosed with a disorder not being investigated as a dependent variable in this study, 15 were diagnosed with additional substance disorders and 9 had received diagnoses for co-occurring disorders in more than one dependent variable category. Only 2 females were diagnosed with co-occurring disorders other than those being investigated in this study. The additional disorder for one of the remaining 2 individuals was borderline personality disorder and the disorder for the other was eating disorders. Due to noncompliance with designated

co-occurring disorders, those 26 participants became ineligible for inclusion in that portion of the study.

Category Delineation by Substance Selection

Participant data were also categorized and classified for a substance group. Review of participant data revealed that of the 71 participants, one lacked delineation of a preferred substance group. Elimination of that participant modified the numbers for both co-occurring disorder analyses and selected substance group analyses. Final sample size was, therefore, reduced to 44 for analyses of co-occurring disorders and 70 for analyses involving selected substance groups.

ADHD Diagnoses

Of those 70 females who comprised the study participants, 23 (approximately 33%) of the subjects were diagnosed ADHD-CO, 22 (31%) of the subjects were diagnosed ADHD-HI, 7 (10%) of the subjects were diagnosed ADHD-I, and 18 (approximately 26%) of the subjects were diagnosed ADHD-NOS.

Ages for the 70 ADHD-diagnosed participants ranged from 15 to 25, with the mean age of 18.45 for the total sample population. Table 1 details the ages of the 70 sample participants, and Table 2 describes and details their ethnicity. In the sample of 70 participants, 67 (approximately 96%) were Caucasian, 2 participants (3%) were Asian/Pacific Islander, 1 participant (approximately 1%) did not have information regarding ethnicity. There were no participants identified as African-American, Hispanic, or "Other."

Table 1
Ages of the Sample by ADHD Diagnosis

Age	Total (<i>n</i> = 70)	CO^a (<i>n</i> = 23)	HI^a (<i>n</i> = 22)	I^a (<i>n</i> = 7)	NOS^a (<i>n</i> = 18)
Age Range	15–25	15–23	15–20	16–25	15–20
Mean Ages	18.45	19.69	17.64	18.86	17.72

^aCO, HI, I and NOS refer to the ADHD diagnoses ADHD-CO, ADHD-HI, ADHD-I, and ADHD-NOS.

Table 2
Ethnicity of the Sample by ADHD Diagnosis

Ethnicity	Total (<i>n</i> = 70)	CO^a (<i>n</i> = 23)	HI^a (<i>n</i> = 22)	I^a (<i>n</i> = 7)	NOS^a (<i>n</i> = 18)
African-American	0	0	0	0	0
Asian-Pacific Islander	2	0	1	0	1
Caucasian	66	22	20	7	17
Hispanic	0	0	0	0	0
Other	0	0	0	0	0
Blank	2	1	1	0	0

^aCO, HI, I and NOS refer to the ADHD diagnoses ADHD-CO, ADHD-HI, ADHD-I and ADHD-NOS.

To obtain a richer picture of this ADHD-diagnosed sample population, the researcher examined the data addressing history of previous mental health treatment, substance abuse treatment, and suicide attempts. In the sample of 70 participants, 65

(approximately 93%) of the sample had a history of treatment for mental illness, 37 (approximately 52%) of the sample had a history of previous substance abuse treatment, and 18 (approximately 25%) of the sample had attempted suicide. Of those 65 participants who had received previous treatment for mental illness, approximately 34% were diagnosed ADHD-CO, 27% were diagnosed ADHD-HI, 11% were diagnosed ADHD-I, and 27% were diagnosed ADH-NOS.

Of those 65 participants (approximately 93% of the total sample) having received prior treatment for mental illness, 54 (83%) of the participants had received prior treatment for mental illness in an outpatient setting, and 11 (17%) had received treatment for mental illness in both inpatient and outpatient facilities. None of the 65 participants had received prior treatment for mental illness exclusively in an inpatient setting. All previous treatment for mental illness had occurred in either an outpatient only setting or in both settings. Tables 3 through 5 detail participant history of treatment for mental illness, substance abuse treatment, and suicide attempts.

Among the 37 participants (approximately 52% of the total sample) who had a history of previous substance abuse treatment, 43% were diagnosed ADHD-CO, 30% were diagnosed ADHD-HI, 8% were diagnosed ADHD-I, and 19% were diagnosed ADHD-NOS. Twenty (54%) of the participants had received prior substance abuse treatment in an outpatient setting, 9 (24%) had received substance abuse treatment in both inpatient and outpatient facilities, and 8 (22%) had received prior substance abuse treatment exclusively in an inpatient setting. Each ADHD diagnosis grouping was represented in all categories reflecting prior substance abuse

treatment with the exception of ADHD-I. None of the participants diagnosed ADHD-I had received prior inpatient only substance abuse treatment.

Of the 18 females in the study (approximately 25% of the total sample) who had attempted suicide, approximately 28% were diagnosed ADHD-CO, approximately 28% were diagnosed ADHD-HI, 11% were diagnosed ADHD-I, and

Table 3

History of Previous Mental Health Treatment by ADHD Diagnosis

Type of Treatment	Total (n = 65)	CO ^a (n = 22)	HI ^a (n = 18)	I ^a (n = 7)	NOS ^a (n = 18)
Inpatient	0	0	0	0	0
Outpatient	54	18	15	6	15
Both	11	4	3	1	3

^aCO, HI, I and NOS refer to the ADHD diagnoses ADHD-CO, ADHD-HI, ADHD-I and ADHD-NOS.

Table 4

History of Previous Substance Abuse Treatment by ADHD Diagnosis

Type of Treatment	Total (n = 37)	CO ^a (n = 16)	HI ^a (n = 11)	I ^a (n = 3)	NOS ^a (n = 7)
Inpatient	8	3	3	0	2
Outpatient	20	10	6	1	3
Both	9	3	2	2	2

^aCO, HI, I and NOS refer to the ADHD diagnoses ADHD-CO, ADHD-HI, ADHD-I and ADHD-NOS.

Table 5
Condition During Suicide Attempts by ADHD Diagnosis

Intoxication Condition	Total (<i>n</i> = 18)	CO^a (<i>n</i> = 5)	HI^a (<i>n</i> = 5)	I^a (<i>n</i> = 2)	NOS^a (<i>n</i> = 6)
Sober	9	2	3	1	3
Intoxicated	5	1	1	1	2
Both	4	2	1	0	1

^aCO, HI, I and NOS refer to the ADHD diagnoses ADHD-CO, ADHD-HI, ADHD-I and ADHD-NOS.

33% were diagnosed ADHD-NOS. Nine (50%) of the participants had attempted suicide only when sober, 5 (approximately 28%) had attempted suicide only when intoxicated, and the remaining 4 (22%) had attempted suicide under both conditions. Each grouping of specific ADHD diagnosis was represented among those who had attempted suicide only when sober, as well as for those who had attempted suicide only when intoxicated, but only the ADHD-I subtype had no study participants who had attempted suicide under both circumstances.

Substance Use

The 70 participants for the study were also categorized into one of three selected substance groups based upon substance preference identified during intake. The substance groups were configured based upon similar effects being produced by the substances subsumed within each. Substances selected had been identified in research based on males and included (1) stimulants, (2) depressants, and (3)

cannabis. Of the 70 participants, 17 (approximately 24%) identified stimulants as their selected substance group, 28 (approximately 40%) identified depressants as their selected substance group, and 25 (approximately 36%) identified cannabis as their selected substance group. The ages of the participants within each substance grouping are detailed in Table 6 and ethnicity is described in Table 7.

Table 6
Ages of the Sample by Substance Use

Age	Total (<i>n</i> = 70)	Stimulant (<i>n</i> = 17)	Depressant (<i>n</i> = 28)	Cannabis (<i>n</i> = 25)
Age Range	15–25	15–22	15–25	15–23
Mean Ages	18.54	18.65	19.00	17.72

Table 7
Ethnicity of the Sample by Substance Use

Ethnicity	Total (<i>n</i> = 70)	Stimulant (<i>n</i> = 17)	Depressant (<i>n</i> = 28)	Cannabis (<i>n</i> = 25)
African-American	0	0	0	0
Asian-Pacific Islander	2	0	0	2
Caucasian	67	16	28	23
Hispanic	0	0	0	0
Other	1	1	0	0

Of the 17 subjects who selected stimulants as the substance of choice, 16 participants (approximately 94%) were identified as Caucasian, and the remaining 1

(approximately 6%) lacked ethnic designation. Among the 28 subjects who selected depressants as the substance of choice, all 28 participants (100%) were Caucasian. Of the 25 subjects whose substance of choice was cannabis, 23 participants (approximately 92%) were Caucasian, and the remaining 2 (8%) were identified as Asian-Pacific Islander. To obtain a richer picture of this selective substance sample population, the researcher reviewed the data addressing history of previous mental health treatment, substance abuse treatment, and suicide attempts. Tables 8 through 10 detail participant history of treatment for mental illness, substance abuse treatment, and suicide attempts by substance selection.

Table 8

History of Previous Mental Health Treatment by Substance Use

Type of Treatment	Total (<i>n</i> = 65)	Stimulant (<i>n</i> = 16)	Depressant (<i>n</i> = 25)	Cannabis (<i>n</i> = 24)
Inpatient	0	0	0	0
Outpatient	54	15	19	20
Both	11	1	6	4

Of the 70 participants, 65 (approximately 93%) of the sample had a history of mental health treatment, 37 (approximately 53%) of the sample had a history of previous substance abuse treatment, and 18 (approximately 25%) of the sample had attempted suicide. Among the 65 participants having received prior treatment for mental health, 26% of the subjects selected stimulants, 38% of the subjects selected depressants, and 37% of the subjects selected cannabis as their preferred substance.

Table 9
History of Previous Substance Abuse Treatment by Substance Use

Type of Treatment	Total (n = 37)	Stimulant (n = 12)	Depressant (n = 12)	Cannabis (n = 13)
Inpatient	8	2	4	2
Outpatient	20	7	6	7
Both	9	3	2	4

Table 10
Condition During Suicide Attempts by Substance Use

Intoxication Condition	Total (n = 18)	Stimulant (n = 3)	Depressant (n = 7)	Cannabis (n = 8)
Sober	9	3	3	3
Intoxicated	5	0	2	3
Both	4	0	2	2

Within the cohort of 37 who had received prior substance abuse treatment, 32% of the subjects selected stimulants, 32% of the subjects selected depressants, and 35% of the subjects selected cannabis as their preferred substance. Among the 18 who had attempted suicide, 17% of the subjects selected stimulants, 39% of the subjects selected depressants, and 44% of the subjects selected cannabis as their preferred substance.

Limitations

This research study was meant to be an initial investigation into the relationship of gender and ADHD to co-occurring disorders and selective substance use. Due to the exploratory nature of this investigation, this study was limited in several ways.

1. There are limits to generalizing findings from this study, as participants for this research were extracted from only one substance treatment center.

2. Designation of ADHD subtype did not exist prior to the *DSM-IV* (APA, 1994); therefore, the number of subjects for this research was small. The small size of the sample population may limit generalizing results.

3. Medication use, as it is etiologically related to SUD, was not differentiated in this study. Selective substance use described in this study did not distinguish those individuals whose SUD was precipitated by the reduction or cessation of prescribed stimulant medication. Results regarding selective substance use may be limited.

CHAPTER IV

FINDINGS

This chapter contains two main sections. The first section is a presentation of the statistical analysis of the data. The second section offers an evaluation of the hypotheses as they pertain to the results of this study.

Analysis of the Data

The purpose of this study was to observe, compare, and analyze the differences among substance abusing ADHD-diagnosed females ages 10 to 25 for the presence of diagnosed co-occurring disorders and for a preference in substance selection. The three variables comprising co-occurring disorders included disruptive behavioral disorders, mood-anxiety disorders, and learning disorders. The three selected substance variables included stimulants, depressants, and cannabis.

Frequencies were compared for the total ADHD-diagnosed sample as well as for the specific ADHD diagnoses (ADHD-I, ADHD-HI, ADHD-CO, and ADHD-NOS). The frequencies were recorded and compared for the three co-occurring disorders variables and for the three substance use variables. Additionally, the frequencies for substance use selection by specific ADHD diagnoses were compared within the three co-occurring disorders. The frequency differences among co-occurring disorders and differences among substance group selection were examined using chi-square analyses, with test selection contingent upon sample size.

Chi-square test of proportions (goodness-of-fit test) was employed in initial analyses and exact chi-square test of association was employed where appropriate. Within each area, the researcher controlled for an overall experimental error rate of 5% to reduce the likelihood of chance occurrences of significance when they did not occur. All statistical analyses were performed using SAS (SAS Institute, 2001).

Results

In this section, the results of the analyses on the three groups of co-occurring disorders and three groups of selected substances are presented. Results are reported for the total ADHD sample as well as for the specific ADHD diagnoses. Also presented are results describing the difference in substance group selection for the specific ADHD diagnoses within the three co-occurring disorders. Data were analyzed utilizing chi-square tests to determine frequency differences among the co-occurring disorders and differences among the substance groups.

Co-occurring Disorders

This section describes the frequency differences and analytical results for the total ADHD-diagnosed sample. The co-occurring disorders include disruptive behavioral disorders, mood-anxiety disorders, and learning disorders.

Table 11 presents the frequency distribution for each of the co-occurring disorders, and Table 12 describes the analysis of differences among the three variables.

Table 11
Distribution of Co-occurring Disorders

Diagnosis	Total	Behavioral	Mood-anxiety	Learning
ADHD	44	1	42	1

Table 12
Differences in Co-occurring Disorders

Statistic	<i>N</i>	Value	<i>df</i>	<i>p</i>
Chi-square	44	76.4091	2	< 0.0001*

*** $p < .05$.**

Using a chi-square goodness-of-fit test, a statistically significant difference was found present among the three co-occurring disorders (disruptive behavior disorders, mood-anxiety disorders, and learning disorders). All but two of the 44 ADHD-diagnosed females were diagnosed with co-occurring mood-anxiety disorders.

Co-occurring Disorders by ADHD Diagnosis

This section describes the frequency differences for the specific ADHD diagnoses (ADHD-I, ADHD-HI, ADHD-CO, and ADHD-NOS) found in co-occurring disorders. The co-occurring disorders comprising independent variables in this analysis included disruptive behavioral disorders, mood-anxiety disorders, and learning disorders. Table 13 presents the frequencies of co-occurring disorders by

ADHD diagnoses. Due to the distribution in which 6 of the 16 cells contained a sum of zero, it was not possible to conduct a chi-square test of proportions (goodness-of-fit test) on co-occurring disorders by ADHD diagnosis. An exact chi-square test of association was conducted post hoc. That analysis found no significant difference among the four ADHD diagnoses in the area of co-occurring disorders. Table 14 presents the results of that analysis.

Table 13

Distribution of Co-occurring Disorders by ADHD Diagnosis

ADHD Diagnosis	Total (<i>n</i> = 44)	Behavioral (<i>n</i> = 1)	Mood-anxiety (<i>n</i> = 42)	Learning (<i>n</i> = 1)
ADHD-CO	14	0	14	0
ADHD-HI	14	0	13	1
ADHD-I	4	0	4	0
ADHD-NOS	12	1	11	0

Table 14

Differences in Co-occurring Disorders by ADHD Diagnosis

Statistic	<i>N</i>	Value	<i>df</i>	<i>p</i>
Exact chi-square	44	4.9555	6	0.6004*

**p* > .05.

Substance Use

This section describes the frequency differences and analytical results for the total ADHD-diagnosed sample. Selected substance groups comprising the dependent variables included stimulants, depressants, and cannabis. Table 15 presents the frequencies for each of the substance groups, and Table 16 describes the analyses of differences among the three substance variables. The chi-square goodness-of-fit test for equal proportions determined that no statistically significant difference was found in the selection of stimulants, depressants, or cannabis by the ADHD-diagnosed sample. Results of the exact chi-square test of association, conducted post hoc, were in agreement.

Table 15

Distribution of Substance Use

Diagnosis	Total	Stimulant	Depressant	Cannabis
ADHD	70	17	28	25

Table 16

Differences in Substance Use Groups

Statistic	<i>N</i>	Value	<i>df</i>	<i>p</i>
Chi-square	70	2.7714	2	0.2501*

*** $p > .05$.**

Substance Use by ADHD Diagnosis

This section describes the frequency differences and analytical results for the specific ADHD diagnoses. Table 17 presents the frequencies for the substance groups by ADHD diagnosis (ADHD-I, ADHD-HI, ADHD-CO, and ADHD-NOS). Table 18 presents analytical results. The three substance groups forming the dependent variables for this test included stimulants, depressants, and cannabis.

Table 17

Distribution of Substance Use by ADHD Diagnosis

ADHD Diagnosis	Total (<i>n</i> = 70)	Stimulant (<i>n</i> = 17)	Depressant (<i>n</i> = 28)	Cannabis (<i>n</i> = 25)
ADHD-CO	23	5	10	8
ADHD-HI	22	5	7	10
ADHD-I	7	0	4	3
ADHD-NOS	18	7	7	4

Table 18

Differences in Substance Use by ADHD Diagnosis

Statistic	<i>N</i>	Value	<i>df</i>	<i>p</i>
Chi-square	70	5.9291	6	0.4312*

**p* > .05.

No statistically significant difference was found among the specific ADHD diagnoses in substance selection at the .05 probability level. Results of a post hoc

exact chi-square test for association supported the initial findings. The exact chi-square test of association found no significant difference by specific ADHD diagnoses in substance group selection.

Substance Use by Co-occurring Disorders

Disruptive Behavior Disorders. There were inadequate data for analysis of the three substance variables for disruptive behavioral disorders. Due to the small number of participants diagnosed with co-occurring disruptive behavior disorders, it was not possible to analyze the differences in the frequency for stimulants, depressants, and cannabis for each of the ADHD diagnoses (ADHD-I, ADHD-HI, ADHD-CO, or ADHD-NOS).

Mood-Anxiety Disorders. This section describes the frequency differences and analytical results for the specific ADHD diagnoses. In Table 19 the frequency differences among the groups of substances comprising the dependent variable (stimulants, depressants, and cannabis) for each of the ADHD diagnoses (ADHD-I, ADHD-HI, ADHD-CO, and ADHD-NOS) are described. Table 20 presents the results of the analysis. No statistically significant difference was found among the specific ADHD diagnoses in substance group selection at the .05 probability level. Results of a post hoc exact chi-square test for association supported the initial finding. No significant association between specific ADHD diagnoses and substance selection was found.

Table 19

Distribution of Substance Use in Co-occurring Mood-Anxiety Disorders

ADHD Diagnosis	Total (<i>n</i> = 42)	Stimulant (<i>n</i> = 11)	Depressant (<i>n</i> = 19)	Cannabis (<i>n</i> = 12)
ADHD-CO	14	3	6	5
ADHD-HI	13	5	4	4
ADHD-I	4	0	3	1
ADHD-NOS	11	3	6	2

Table 20

Differences in Substance Use in Co-occurring Mood-Anxiety Disorders

Statistic	<i>N</i>	Value	<i>df</i>	<i>p</i>
Chi-square	42	4.2396	6	0.6443*

**p* > .05.

Learning Disorders. There were inadequate data to conduct a statistical analysis of substance selection for learning disorders. Due to the small number of participants diagnosed with co-occurring learning disorders, it was not possible to conduct a statistical analysis of the three substance variables, stimulants, depressants, and cannabis.

Evaluation of the Hypotheses

This research examined the difference in the frequency distribution of diagnosed co-occurring disorders and selected substance use among substance

abusing ADHD-diagnosed females ages 10 to 25. Two null hypotheses predicted that there would be no difference in the frequency distribution of co-occurring disorders for the total ADHD-diagnosed sample or by specific ADHD diagnoses (ADHD-I, ADHD-HI, ADHD-CO, and ADHD-NOS). Two null hypotheses predicted that there would be no difference in the frequency distribution in substance selection for the total ADHD-diagnosed sample or by specific ADHD diagnoses (ADHD-I, ADHD-HI, ADHD-CO, and ADHD-NOS). The fifth null hypothesis predicted that there would be no difference in the frequency distribution among substance selection selected based on the specific ADHD diagnoses within each co-occurring disorder group. The three groupings of co-occurring disorders included disruptive behavioral disorders, mood-anxiety disorders, and learning disorders.

Null Hypothesis of Co-occurring Disorders

Utilizing a chi-square goodness-of-fit test to assess the frequency of co-occurring disorders (disruptive behavioral disorders, mood-anxiety disorders, learning disorders) this research found significant differences at the 95% level. Significantly more participants were found to have co-occurring mood-anxiety disorders. Significantly fewer participants were found to have co-occurring disruptive behavior disorders and learning disorders. Therefore, the following null hypothesis was rejected: There is no difference in the frequency of co-occurring disorders present in females ages 10 to 25 diagnosed with the ADHD and SUD. The co-occurring disorders include (a) behavioral disorders, (b) mood-anxiety disorders,

and (c) learning disorders. This research demonstrated differences in the frequency with which these co-occurring disorders were present among the study participants.

Null Hypothesis of Co-occurring Disorders by ADHD Diagnosis

The low number of participants diagnosed with co-occurring disruptive behavioral disorders (1 participant) and learning disorders (1 participant) precluded a goodness-of-fit analysis designed to compare the frequency difference in co-occurring disorders by specific ADHD diagnosis. However, a post hoc exact chi-square test of association found no statistically significant association between co-occurring disorder and specific ADHD diagnosis. Therefore, the null hypothesis stating that there is no difference in the frequency of co-occurring disorders among females ages 10 to 25 diagnosed with the ADHD and SUD by specific ADHD diagnosis was retained.

Null Hypothesis of Selective Substance Use

Utilizing a chi-square goodness-of-fit test to assess the frequency of selected substances (stimulants, depressants, cannabis) for the total ADHD cohort, no statistically significant differences were found. Therefore, the following null hypothesis was retained: There is no difference in the frequency of substance group selection among females ages 10 to 25 diagnosed with ADHD and SUD.

Null Hypothesis of Substance Use by ADHD Diagnosis

Utilizing a chi-square test of proportions to assess the frequency distribution of selected substance use within the three co-occurring disorders (disruptive behavioral disorders, mood-anxiety disorders, learning disorders) by ADHD diagnosis, this research found no statistically significant difference. Therefore, the following null hypothesis was retained: There is no difference in the frequency of substance group selection among females ages 10 to 25 by specific ADHD diagnosis (ADHD-I subtype, ADHD-HI subtype, ADHD-CO subtype, or ADHD-NOS).

Null Hypotheses of Substance Use by Co-occurring Disorders

Each of the co-occurring disorder groups (disruptive behavioral, mood-anxiety, learning) was analyzed independently to determine differences in frequencies of substance selection among females ages 10 to 25 diagnosed with the ADHD-I subtype, ADHD-HI subtype, the ADHD-CO subtype, or an ADHD-NOS diagnosis.

Disruptive Behavioral Disorders

The low number of participants diagnosed with co-occurring disruptive behavioral disorders prevented the analysis designed to compare the frequency distribution in co-occurring disruptive behavior disorders by ADHD diagnosis. Therefore, the null hypothesis that there is no difference in the frequency of selected substance groups among females ages 10 to 25 by specific ADHD diagnosis

(ADHD-I subtype, ADHD-HI subtype, the ADHD-CO subtype, or ADHD-NOS) for co-occurring disruptive behavior disorders stands untested.

Mood-Anxiety Disorders

Utilizing a chi-square test of proportions to assess the frequency distribution of selected substances within co-occurring mood-anxiety disorders by ADHD diagnosis, this research found no significant difference. Results of a post hoc exact chi-square test of association concurred. Therefore, the following null hypothesis was retained: For the co-occurring mood-anxiety disorders group, there is no difference in the frequency of selected substance groups by specific ADHD diagnosis (ADHD-I subtype, ADHD-HI subtype, ADHD-CO subtype, or ADHD-NOS) for co-occurring mood-anxiety disorders.

Learning Disorders

The low number of participants diagnosed with co-occurring learning disorders prevented the analysis that was designed to compare the frequency distribution in co-occurring disruptive behavior disorders by ADHD diagnosis. Therefore, the null hypothesis that there is no difference in frequency of selected substance groups among females ages 10 to 25 by specific ADHD diagnosis (ADHD-I subtype, ADHD-HI subtype, ADHD-CO subtype, or ADHD-NOS) for co-occurring learning disorders stands untested.

CHAPTER V

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

In this final dissertation chapter, the researcher summarizes the research project and discusses its findings. She also makes recommendations for future research and offers suggestions for work with ADHD-diagnosed females in clinical settings.

Summary

The focus of early research on ADHD was to formulate a definition of the disorder and to obtain a clearer understanding of the criteria that depict various manifestations. Refinement of terminology and descriptors of ADHD has been an ongoing process for over 30 years. The most recent change of that nature was the delineation of the ADHD subtypes noted in the *DSM-IV* (APA, 1994). Achieving a distinct picture of the disorder has been confounded by several factors, including an initial belief that ADHD was present only in children, confusion regarding heritability, the variations in the manner in which the disorder manifests during different developmental stages, behavioral similarities to other disorders, and a high rate of co-occurring disorders. Currently, ADHD has been established as a heritable, lifelong disorder that consists of subtypes (ADHD-I, ADHD-HI, ADHD-CO). The American Psychiatric Association integrated ADHD into one overarching category, establishing the three subtypes on the basis of predominant symptom patterns noted

in the *DSM-IV* (APA, 1994). Early research on ADHD was conducted primarily on males retrospectively or in longitudinal studies of boys, following them from childhood into adulthood. Historically, research has been conducted on boys due to the substantial overrepresentation of the disorder in males. Klein and Mannuzza (1991) placed the male to female ratio at 9:1.

This study was designed to augment the paucity of research on females. The focus of the study specifically addressed the scant body of research pertaining to the ADHD diagnoses or subtypes and co-occurring SUD and ADHD in females. This research also seemed clinically relevant, since research on males has determined links to substance abuse and specific co-occurring disorders in boys. An understanding of associations or relationships of this nature for females could be beneficial for both prevention and treatment programs.

Participants in this study were females ranging in age from 15 to 25 who received treatment at a nationally known inpatient substance abuse treatment center outside a large, Midwestern, metropolitan city. Data were extracted from archived intake records and, following removal of all identifying participant information, were numerically coded and transferred electronically. The researcher recorded and compared frequency differences in co-occurring disorders for the total ADHD cohort as well as for the specific ADHD diagnoses. The researcher also recorded and compared frequency differences in selected substance groups for the total ADHD sample and for the specific ADHD diagnoses. Additionally, the frequency differences in selected substance groups were recorded and compared in the co-occurring mood-anxiety disorder group for each ADHD diagnosis. The sample distribution precluded

examination of the differences in selected substance group frequencies in co-occurring disruptive behavior disorders and in co-occurring learning disorders for specific ADHD diagnoses.

The researcher used chi-square tests to analyze the data for the ADHD-diagnosed total sample as well as data for the distinct ADHD diagnoses, comparing expected frequencies to observed frequencies in the areas of co-occurring disorders and selected substances. Exact chi-square tests of association were also conducted post hoc where applicable. Within each analysis, the researcher controlled for an overall experimental error rate of 5%. Statistically significant differences were found for only one test. Results of the analyses indicated that significantly more of the total ADHD sample were found to have been diagnosed with co-occurring mood-anxiety disorders.

Discussion of the Findings

In this section, the researcher discusses the findings from this study. The discussion will first address data obtained from quantification of the demographic and descriptive questions extracted from the intake records. These data were used to gain a richer picture of study participants. The researcher also discusses the analyses related to the research questions.

Findings Based on Descriptive Analyses

Interesting data were acquired from categorizing demographic and descriptive information. In addition to addressing age and ethnicity, this information

covered previous treatment for mental illness, prior substance abuse treatment, and suicide attempts.

The first noteworthy finding involved ethnicity. Based on this study, significantly more Caucasian females were found to be diagnosed with co-occurring disorders. The overwhelming majority (approximately 96% of the 70 participants with identified co-occurring disorders) described themselves as Caucasian. Although 3% of the participants described their ethnicity as Asian-Pacific Islander, there were no study participants who described their ethnicity as African-American or Hispanic. The collaborating scientist indicated that this ethnic distribution was reflective of the demographic breakdown of those receiving treatment at the center.

Noteworthy findings were also observed for prior treatment history for mental illness and/or substance abuse. Treatment history included both inpatient and outpatient treatment. Of the 70 participants, only 5 had received no prior treatment for mental health or substance abuse. Thus, approximately 93% of the entire sample had received prior treatment for mental illness, and 52% had received treatment for substance abuse. Some participants had received treatment for both. Current inpatient substance abuse treatment combined with a history of prior treatment for these female participants is indicative of a history of ongoing problems, which supports early longitudinal research on males. Those studies found that by adolescence, boys with an ADHD diagnosis continued to have significant emotional difficulties and greater alcohol and drug use (Hechtman & Weiss, 1986; Herrero et al., 1994). Similarly, this group of ADHD and SUD diagnosed females continues to have significant difficulties with both substances and emotional issues as illustrated

by current placement and multiple diagnoses. This finding is disturbing as prior research has determined that ongoing difficulties for adolescents diagnosed with ADHD have been found to lead to continued impaired functioning in adulthood (Mannuzza et al., 1991; Weiss et al., 1985; Wilson & Marcotte, 1996).

All of the study participants who had attempted suicide had a history of previous treatment. The suicide attempts and ongoing need for treatment as illustrated by the treatment history of these participants supports findings in prior research conducted predominantly on males. Those studies indicated that boys who continued to experience ADHD symptoms had more severe problems, including additional disorders and suicide attempts (Barkley et al., 1990; Mannuzza et al., 1997; Weiss et al., 1985). Review of prior treatment by subtype disclosed that all ADHD diagnoses were represented among those having received previous treatment for mental illness. It is not possible to compare these findings to earlier research studies due to the lack of research focused on specific ADHD diagnoses or females. It may be that the participants who attempted suicide have ongoing difficulties severe enough to warrant some type of treatment, regardless of subtype or specific diagnosis. The combination of ADHD, SUD, and co-occurring mood-anxiety disorders may serve as a predictive index regarding suicide. Biederman et al. (1998) found that for males "the comorbidity of ADHD with mood disorder in adolescent years can be associated not only with severe morbidity but also with mortality" (p. 312).

Examination of substance selection as it related to prior treatment history revealed that there were no noticeable frequency differences in substance selection

contingent upon having received prior substance abuse treatment. Of the 37 participants with a substance treatment history, 12 expressed a preference for stimulants, 12 expressed a preference for depressants, and 13 selected cannabis. These relatively equal results are difficult to compare with earlier research on ADHD subjects. Although earlier studies referenced co-occurring disorders and substances, few specifically defined selected substances or prior treatment history. One study of adolescents in treatment for substance abuse and other concurrent disorders delineated specific drugs. Results indicated that the majority of ADHD and SUD diagnosed adolescents ($n = 12$) preferred alcohol or cannabis over cocaine (DeMilo, 1989). Although the participants from this study with a treatment history for substance abuse differed from that finding, study participants having a history of prior treatment for mental illness selected only substances that aligned with that research. Those females having received prior treatment for mental illness only more frequently chose depressants and cannabis. Of the 30 participants in this cohort, only 4 selected stimulants, 15 selected depressants, and the remaining 11 chose cannabis. Perhaps, for some participants, depressants and cannabis were more readily available than stimulants, while for others the selection of a specific substance was less important than achieving a state of intoxication.

Findings Related to Research Questions

Due to the manner of presentation and enduring nature of the disorder, ADHD is frequently found in conjunction with additional disorders. As research established the chronicity of ADHD, a “considerable and varied comorbidity”

(Biederman et al., 1991, p. 574) was found to exist. Angold et al. (1999) noted, “patterns of reciprocal influence between the causes and effects of different forms of psychopathology” (p. 77) and recommended further research to clarify. Most prior research in the area of co-occurring disorders has been conducted on males.

A close relationship between ADHD and SUD has been firmly established (Adams & Wallace, 1994; Alterman et al., 1982; Angold et al., 1999; Biederman et al., 1991; Tarter et al., 1977; Wood et al., 1983). Early research on ADHD uncovered alcoholism in many of the parents of children identified as “hyperactive,” while subsequent studies determined that “hyperactivity” may predispose adult alcoholism (Alterman et al., 1982; Goodwin et al., 1975). More recently, Biederman et al. (1995) determined, “Although psychiatric comorbidity increased the risk for psychoactive substance use disorders in adults with ADHD, by itself ADHD was a significant risk factor for substance use disorders” (p. 1652). Jensen et al. (1997) raised the question of the possible function of coping and self-medication served by this progression of disorders.

This study sheds some light on the female relationship between ADHD and co-occurring disorders and selective substance use. The relationship to co-occurring disorders and substance selection were investigated for the total ADHD sample and for specific ADHD diagnoses. The researcher used chi-square tests measuring goodness-of-fit and exact tests of association to analyze data. The researcher controlled for an overall experimental error rate of 5%. This section discusses both the statistically significant and the nonsignificant results of the data analyses. It also offers some concluding remarks about the findings of this investigation.

Results of the analyses indicated there were statistically significant differences between expected and observed frequencies of co-occurring disorders for the total cohort of ADHD participants. Mood-anxiety disorders were found to be present in 42 of the 44 sample participants. The mood-anxiety disorders specifically diagnosed for this cohort included depression disorders, bipolar disorders, posttraumatic stress disorder, and various anxiety and phobic disorders. Only 1 participant was found to have been diagnosed with co-occurring disruptive behavior disorders, and only 1 participant was found to have been diagnosed with co-occurring learning disorders. No statistically significant differences were found, however, between the ADHD diagnoses (ADHD-CO, ADHD-HI, ADHD-I, and ADHD-NOS) and co-occurring disorders.

The disproportionately large number of mood-anxiety disorders and corresponding low number of behavior disorders and learning disorders among participants become more meaningful when viewed in terms of previous research, although direct comparison is difficult, since most previous research has been conducted on males.

Results of this study support some prior research findings yet differ from others. The large number of co-occurring mood-anxiety disorders found in this study differs from earlier studies that identified co-occurring antisocial disorders, specifically conduct and oppositional defiant disorders, as the most prevalent additional disorders in males. Gittelman et al. (1985) observed among the male subjects that “the most common disorders at follow-up were ADHD, conduct disorder, and substance use disorders” (p. 941). Referencing the findings of

Gittelman, Hechtman (1991) observed that “it . . . appears that the likelihood of developing conduct disorder is greater if ADHD persists and that substance abuse is often linked to or follows the conduct disorder” (p. 416).

The results of this research differ from earlier studies in the area of learning disorders (Erk, 2000; Gaub & Carlson, 1996). Earlier studies of ADHD-diagnosed females indicated that learning problems, developmental learning disabilities, or intellectual impairment were significantly present in females. Erk (2000) found a higher incidence of developmental learning disabilities in children diagnosed ADHD-I compared with ADHD-HI. Results from this study found the opposite. Only 1 participant had been diagnosed with co-occurring learning disorders, and the subtype for that participant was ADHD-HI. It is possible that an early diagnosis of ADHD in the female participants in this study or involvement in substance use may have provided an explanation for any poor academic performance or masked learning disorders.

Findings from this study also differ from prior research in the attribution of disorders and allocation of proportions by subtype. Brown (2000), drawing on Barkley’s findings on subtypes, reported that 50% of children with ADHD-I would meet criteria for anxiety and mood disorder, 60% of children with the ADHD-CO would meet criteria for ODD, and 50% would meet criteria for CD. This study determined that no statistically significant association exists between co-occurring disorders and a specific ADHD diagnosis. It may be that the co-occurring SUD present in the females participating in this study has influenced the predominance of

co-occurring mood-anxiety disorders. The presence of co-occurring disorders could change if substance use is terminated.

Findings from this study regarding the relationship between substance and ADHD diagnoses are in contrast to those identified by Fisher and Beckley (1999). They concluded that the nature or subtype of ADHD is an important aspect in determining the degree and variety of substance abuse. Specifically, they found that adolescents diagnosed with ADD, without hyperactivity, used alcohol and marijuana as a means of self-medication. Eyre et al. (1982) identified one substance (opium) as the preferential substance for 22% of those reporting childhood hyperactivity. These earlier studies were conducted with primarily male participants and in some cases ADHD was diagnosed retrospectively, as the research was conducted on adults. Findings from this study regarding specific substance selection indicated no statistically significant preference for a substance (grouped by effect of intoxication) contingent upon specific ADHD diagnosis. No statistically significant differences were found in substance selection for the specific ADHD diagnoses in co-occurring disorders. Sample size and distribution precluded testing of either co-occurring disruptive behavior disorders or learning disorders; therefore, research questions for those disorders remain untested. It might be that gender is the factor influencing the lack of defined substance preference for participants, or possibly as these females age, a preference for a specific substance will emerge. This researcher wonders if the driving force behind substance use for the participants in this study was to obtain the desired effect of intoxication from available substances rather than to seek the particular intoxicating effect of that substance. Substance use may be employed as a

means of self-medication to mediate the negative affect precipitated by feelings directly related to ADHD (Eyre et al., 1982; Fisher & Beckley, 1999; Tarter et al., 1977; Wood et al., 1983).

Although many of the results of this study differ from earlier studies, some findings concur with prior research. Results of this study are in agreement with findings from two studies that cited lower rates of behavior disorders among females. Herrero et al. (1994) determined that hyperactivity was a risk factor for an antisocial outcome in males but not in females. The results of this study indicating significantly fewer disruptive behavior disorders tend to support that conclusion, identifying lower rates of disruptive behavior disorders in females. Gaub and Carlson (1997) conducted a meta-analysis and critical review of literature with a specific look at the impact of gender on ADHD. Findings from this study support those results that reported females had “lower levels of hyperactivity, fewer conduct disorder diagnoses . . . [and] . . . lower rates of other externalizing behavior” (p. 1041).

Findings from this research reflect the ongoing problems among those with an ADHD diagnosis. Hechtman and Weiss (1986) noted ongoing problems for adolescents diagnosed with ADHD accompanied by poor self-confidence and a sense low self-esteem. The ages of the female participants involved in this study indicate that they were at a time in their lives when the establishment of a sense of self-identity occurs. Development of self-identity and an accompanying sense of self-esteem usually formed at this age are heavily dependent upon a feeling of “belonging” and the opinions of peers. Gaub and Carlson (1997) reported a trend for girls with ADHD to be more frequently avoided and rejected by their peers. This

researcher wonders if the substance use disorder and co-occurring mood-anxiety disorders might occur as a response to an enhanced awareness and personal sense of being “different.” Being “different” is made apparent in the behaviors typical of ADHD and confirmed by the ADHD diagnosis, peer reaction, avoidance, and rejection.

Concluding Remarks

In this investigation, the researcher sought to determine if a difference existed in the frequency with which ADHD and SUD diagnosed females between the ages of 10 and 25 presented with co-occurring disorders and selected specific substance groups. Significant differences were found in co-occurring disorders among the total ADHD cohort. This group of females was found to present with significantly more mood-anxiety disorders. Neither disruptive behavior disorders nor learning disorders were substantially represented. While research on ADHD-diagnosed females is relatively scant, this study has provided preliminary evidence that females diagnosed with ADHD and SUD differ from similarly diagnosed males. In light of the findings of this study, this researcher offers several recommendations for future research efforts and for clinicians and others working with females diagnosed with ADHD.

Recommendations

In this section the researcher makes recommendations for further study of females diagnosed with ADHD and SUD. These recommendations are designed to

extend the scant amount of current research on females and on the relationship of co-occurring disorders and selective substance use to specific ADHD diagnoses.

Research Recommendations

This study was exploratory in nature, designed to be an initial investigation into patterns of co-occurring disorders and substance use selection in females between the ages of 10 and 25 diagnosed with ADHD and SUD. The study was designed to extend the meager data on females. Due to the exploratory nature of this study and small sample size, many questions remain unanswered.

Gender Based Research

The overarching theme for future studies is increased research on females. Previous research, focusing primarily on males, has identified the close relationship between ADHD and SUD. Numerous studies have identified the presence of additional co-occurring disorders, especially in males. Research is needed to develop a deeper understanding of the relationship that exists between ADHD and co-occurring disorders in females. Prevention and treatment programs might benefit from insight based on a clearer understanding of the effect of those disorders as well as the function of substance use in females. Additionally, an understanding of the chronology with which the disorders evolve and present would ultimately inform preventive and treatment interventions for female children, adolescents, and adults. Therefore, additional research in this area is warranted to obtain a more complete understanding of the interaction of specific ADHD diagnoses with co-occurring

disorders and substance selection as they relate to the young female. Since previous research has included only a few females or has excluded them entirely, research questions designed to develop an enhanced understanding of ADHD in females would augment findings from this study. The following questions would enrich these findings. What function does substance use play in females? Is there a chronological order in the presentation of co-occurring disorders in females? If there is an order in which subsequent disorders present, does that serve a particular function? Does being a female impact the interaction of subtype and co-occurring disorders?

The commanding presence of co-occurring mood-anxiety disorders in females disclosed in this study differs from prior research focused primarily on males. This finding elicits additional questions. If, indeed, mood-anxiety disorders are prevalent in ADHD and SUD diagnosed females, then answers to other questions such as those that follow would enhance understanding. How would the findings differ if the sample were comprised of a more ethnically diverse group of females? What role does individual culture (rural vs. urban setting, family, social, educational and economic status, etc.) play in receiving diagnoses of these disorders? What purpose does the co-occurring disorder serve? Does ADHD serve a predictive value for co-occurring disorders, including SUD? What impact does age and developmental stage play in developing co-occurring mood-anxiety disorder? Would results differ if the sample size were larger? Would the findings be confirmed in future research?

Perhaps a different research design would provide a more complete understanding of these questions. Certainly, use of qualitative analysis would provide a richer picture of the gender issue as it relates to co-occurring disorders. Specific

inquiries might begin with recollections of initial awareness of ADHD. Descriptions of significant events and corresponding feelings surrounding interpersonal interactions (reactions of parents, teachers, friends), academic performance, developing a sense of self, and how these were impacted by the presence of ADHD would provide clarification. Additional questions might focus on developing an awareness of symptoms that developed into other disorders and the order in which they presented. Descriptions of these feelings and experiences would provide a richer understanding of co-occurring disorders in females.

In the area of substance selection, this research disclosed no preferential substance selection for the total ADHD sample of females, by specific ADHD diagnosis or for those diagnosed with mood-anxiety disorders. Due to sample distribution, this researcher was unable to test the question of substance selection for disruptive behavioral disorders and for learning disorders. These findings raise questions in the same vein as those previously cited in connection to co-occurring disorders. Again, the initial question involves whether the findings from this study would be confirmed by future studies in other settings or conditions. How would a difference in the sample size, diversity of sample population, or focus of the treatment center from which data are collected impact results? Findings from these research questions would add depth and richness to the findings of this study. Qualitative questions addressing early experiences surrounding substance use, continued use despite problems, and the function that psychoactive substances and intoxication provide would also furnish a substantive understanding of the function of SUD in ADHD-diagnosed females.

Future gender-based research is needed to enhance understanding of ADHD and the relationship co-occurring disorders, especially substance use disorder, play in females. Findings based on additional studies of this nature might assist in identification of risk and protective factors, as well as contribute to providing insight for treatment and prevention programs.

ADHD Diagnosis Based Research

Regardless of gender, research that is directed toward the specific ADHD subtype or diagnosis is virtually nonexistent. This may be attributed to the relatively recent addition, in 1994, of specific subtypes to the diagnostic codes. Findings from this study relating to the specific ADHD diagnoses were limited by the sample size, and some questions remain untested due to the small sample. In addition to those questions, there are additional research questions, such as those that follow, which could enhance an understanding of ADHD females. What would longitudinal studies conducted on females disclose regarding the presentation of co-occurring disorders? Is the manifestation of co-occurring disorders influenced by subtype? Would the ADHD subtype influence treatment for co-occurring disorders?

Additional questions could also enhance findings from this study. How or would the use of a larger sample change the findings? Would results differ if data were extracted from a site with a primary focus on mental health rather than SUD? What impact would broadening the categories of coexisting disorder groups and expanding the number of venues from which the sample would be drawn have on results? Would the findings from this study be confirmed in future research?

Qualitative questions could add depth and richness to the understanding of the ADHD subtype. The focus of questions might begin with a description of the experience of ADHD and SUD by females diagnosed with each subtype. Further questions might include the function that intoxication serves (by subtype), exploring the idea of co-occurring disorders functioning as coping mechanisms, and, if they do, seeking to determine if there is a variation by subtype. For all of these questions, it would be important to determine if the findings are reflective of females only. Findings from additional research of this nature would enhance understanding of differences among the various ADHD diagnoses.

Clinical Recommendations

This research has reported a significant difference in the presence of co-occurring disorders among SUD and ADHD-diagnosed females. While a significant difference endorsing mood-anxiety disorders was identified for co-occurring disorder groups for the total ADHD cohort, no significant differences were found among the specific diagnoses. A significant difference was not found for substance selection for the total cohort, for specific diagnoses, nor within co-occurring disorders. Initially designed to explore the relationship of gender and subtype on co-occurring disorders and substance selection, findings from this study support some prior research yet differ from other studies. In light of the specific findings regarding co-occurring disorders, it seems appropriate that this researcher makes recommendations for clinicians treating ADHD-diagnosed females.

Education

Parents, teachers, and day care providers have the most frequent contact with children and are, therefore, in a position to observe affective and behavioral changes. An educational program focused on symptoms of ADHD and mood-anxiety disorders in females could heighten awareness of these caregivers. These observations might serve to proactively identify nascent development of the disorders. Identification and early diagnosis and treatment of ADHD and/or affective disorders may prevent SUD, observed in the female participants in this study. Javorsky and Gussin (1994) determined that “young adults with ADHD had a six-fold risk for substance abuse disorder as compared with matched peers” (p. 170). Wilens et al. (1997) concisely stated, “ADHD children should be a focus for preventive and early intervention programs aimed at reducing the risk for PSUD before the illness begins and becomes chronic” (p. 480).

Screening and Diagnosis

For many children, the diagnosis of ADHD occurs prior to the age of 7, while for others it may be diagnosed at an older age. Prior research has indicated that the age of diagnosis may be contingent upon overt manifestation of symptoms related to specific subtype. Results from this study established the existence of a relationship between ADHD and co-occurring mood-anxiety disorders among the total cohort, although additional findings were unable to align the selection of a specific substance group to a specific ADHD diagnostic group or co-occurring disorder. The order in

which ADHD, SUD, and co-occurring mood-anxiety disorders present remains unclear. ADHD or mood-anxiety disorders may serve a predictive value in identifying the presence of the other and may forewarn the possibility of SUD. It does appear that vigilance is recommended for the symptoms of these disorders.

Enhanced education and open lines of communication for all caregivers could provide an early identification for symptoms of these disorders. This information would be shared with pediatricians, internists, family practitioners, psychologists, or qualified educational personnel who could arrange for the screening and evaluation for ADHD or other disorders. Educated caregivers collaborating with appropriately trained professionals in early identification and treatment could serve to reduce treatment time and possibly prevent development of co-occurring disorders.

Conclusion

This research began as an exploratory investigation into the experience of females ages 10 to 25 diagnosed with ADHD and SUD. Differences in the frequency of co-occurring disorders and selective substance groups were analyzed for the total ADHD cohort, as well as by specific ADHD diagnoses. Due to the small sample size and disproportionate distribution of participants among the co-occurring disorders, it was not possible to assess differences among specific ADHD diagnoses for co-occurring disruptive behavior disorder or for co-occurring learning disorders. Data from the archived intake records of the collaborating substance abuse treatment center were analyzed using chi-square tests of proportion (goodness-of-fit tests) and exact tests of association. Findings for these females ages 10 to 25 diagnosed with

ADHD and SUD indicated a statistically significant difference was present in co-occurring mood-anxiety disorders among the total ADHD sample, but none was found for either substance selection or by specific diagnoses. While these findings support other accounts regarding the presence of coexisting disorders, the disproportionate findings favoring co-occurring mood-anxiety disorder contrast prior research in males.

In general, females with ADHD have been neglected by clinicians and researchers. Given the limited amount of research addressing these females, continued focused research is recommended.

Appendix A
Site Project Approval

**HAZELDEN®**

P.O. Box 11
Center City, MN 55012-0011
Phone 651-213-4000
FAX 651-213-4544
www.hazelden.org
Equal Opportunity Employer

May 30, 2002

Nancy Clinton
7769 Kenmure Drive Apt 10
Portage, MI 49024-5079

Dear Ms. Clinton:

The Hazelden Research Action Team has granted preliminary approval to your proposal, "Comorbid disorders and selective substance use in female adolescents diagnosed with Attention Deficit Hyperactivity Disorder." Your proposal must be reviewed and approved by the Institutional Review Board at your university before data collection can begin.

Once your proposal has been approved by the Western Michigan University's IRB, please forward a copy of the proposal and approval letter to the address provided below.

Please note that all identifying information will be removed from archival data in accordance with the privacy standards specified in the Health Insurance Portability and Accountability Act (HIPAA; see <http://www.hhs.gov/ocr/hipaa>).

Thank you for your interest in conducting a study at Hazelden.

Sincerely,

Valerie Slaymaker, Ph.D.
Research Scientist
Butler Center for Research
P O Box 11 (CR 9)
Center City MN 55012-0011
(651) 213-4746
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Rebuilding Lives, Restoring Families, Building Communities

Appendix B
Human Subjects Institutional Review Board
Letter of Approval

WESTERN MICHIGAN UNIVERSITY



Human Subjects Institutional Review Board

Date: June 14, 2002

To: Suzanne Hedstrom, Principal Investigator
Nancy Clinton, Student Investigator for dissertation

From: Mary Lagerwey, Chair

A handwritten signature in cursive script, appearing to read "Mary Lagerwey", is written over the printed name.

Re: HSIRB Project Number 02-06-07

This letter will serve as confirmation that your research project entitled "Co-Occurring Disorders and Selective Substance Use in Females Ages 10-25 Diagnosed with Attention Deficit Hyperactivity Disorder" has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: June 14, 2003

Wohlschlag Hall, Kalamazoo MI 49008-5456
PHONE: (616) 387-8233 FAX: (616) 387-8276

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