COMORBID OPPOSITIONAL DEFIANT OR CONDUCT DISORDER PROBLEMS
IN CHILDREN AT HIGH-RISK FOR ATTENTION DEFICIT HYPERACTIVITY
DISORDER (ADHD): A COMPARISON OF EMOTIONAL, PSYCHOSOCIAL, AND
BEHAVIORAL ADJUSTMENT

By

DONG HUN LEE

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2005

This dissertation is dedicated to the most important people in my life: my father, my mother, and two younger brothers.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

LIST OF FIGURES

Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

COMORBID OPPOSITIONAL DEFIANT OR CONDUCT DISORDER PROBLEMS
IN CHILDREN AT HIGH-RISK FOR ATTENTION DEFICIT HYPERACTIVITY
DISORDER (ADHD): A COMPARISON OF EMOTIONAL, PSYCHOSOCIAL, AND
BEHAVIORAL ADJUSTMENT

By

Dong Hun Lee

December 2005

Chair: James Archer, Jr.
Major Department: Counselor Education

In comparison with pure forms of ADHD (Attention Deficit Hyperactivity

Disorder), relatively little is known about disruptive comorbid conditions of ADHD. In

this study the presence of comorbid ODD (Oppositional Defiant Disorder) or CD

(Conduct Disorder) symptoms in children with ADHD altered the correlates of ADHD

for emotional, psychosocial, and behavioral functioning. Additionally, the presence of

comorbid ODD or CD symptoms contributed differently to the degree to which children's

functioning is likely to be negatively affected.

Depression, psychosocial impairment, and ADHD behavior problems (Inattention,

Hyperactivity-Impulsivity, and ODD symptoms) were more closely related to the

comorbid condition of ADHD+CD. In contrast, psychosocial impairment and ADHD

behavior problems (only for ODD symptoms) were closely related to the comorbid

condition of ADHD+ODD. However, the presence of comorbid CD or ODD symptoms in children with ADHD was not correlated to anxiety symptoms.

The ADHD+CD group had the poorest outcome on areas of depression, psychosocial impairment, and ADHD behavior functioning. The ADHD+ODD group had poorer outcome than those of the ADHD alone group, but not as poor as the ADHD+CD group on psychosocial impairment and ADHD behavior (only for ODD symptoms) functioning.

Demographic variables (age, gender, race, and SES) and ADHD subtypes generally did not explain significant differences found between groups for emotional, psychosocial, and ADHD behavior functioning, although some variables were closely associated with specific groups. Group membership (i.e., ADHD alone, ADHD+ODD, and ADHD+CD) predicted psychosocial functioning and ADHD behavior functioning while it did not explain emotional functioning (i.e., depression and anxiety both).

Findings support preliminary evidence for the notion that the ADHD+CD group may constitute a separate and distinct clinical entity for depression, psychosocial, and ADHD behavior functioning in school-aged children compared to the ADHD alone group. Additionally, the ADHD+ODD group may constitute a separate clinical entity for psychosocial functioning and ODD symptoms of ADHD behavior functioning compared to the ADHD alone group.

The findings will expand counselors' understanding and knowledge of psychological and behavioral complications that ADHD children with comorbid ODD or CD symptoms are likely to experience as a result of impairment of the comorbidity.

CHAPTER 1
INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is the most commonly diagnosed behavioral disorder of childhood. According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV), prevalence estimates vary between 3 to 7% among children and youth (American Psychiatric Association [APA], 2000). Currently, the diagnosis of ADHD follows the guidelines in DSM-IV. Attention deficit hyperactivity disorder (ADHD) describes a pattern of behaviors characterized by inattention, hyperactivity, and impulsivity that manifest themselves at developmentally inappropriate levels when compared to peers (APA, 2000). As detailed by the DSM-IV, ADHD has three types: predominantly inattentive, predominantly hyperactive-impulsive, and combined. In addition, behaviors associated with ADHD must be present prior to age seven, be displayed in multiple settings such as school and home, impair an individual's functioning (e.g., social, educational, or occupational), and meet pre-established thresholds of symptom criteria.

More recent evidence suggests ADHD can be a lifelong disorder. Most children with ADHD continued to exhibit significant symptoms as adults (Barkley, Fischer, Edelbrock, & Smallish, 1990; Klein & Manuzza, 1991; Wender et al., 2001). Adults with ADHD also are at increased risk for antisocial behaviors, internalizing disorders, personality disorders, interpersonal difficulties, alcohol and drug abuse, and other maladaptive behaviors (Barkley et al., 1990; Biederman et al., 1993; Fischer, Barkley, Fletcher, & Smallish, 2002; Manuzza et al., 1993; Weiss & Hechtman, 1993). Although

1

some debate surrounds the question of the level of impairment in adulthood, long-term

outcome studies with carefully diagnosed ADHD subjects indicate that the syndrome

persists into adulthood in a majority of cases (Barkley et al., 1990; Mannuzza et al.,

1993). Therefore, there can be little doubt that ADHD can cause symptoms that impair

functioning throughout the lifespan.

Statement of the Problem

Increasing numbers of children and youth are being diagnosed with and treated for

attention and hyperactivity/impulsivity problems and related difficulties that have

seriously disrupted their functioning in school, at work, and in their family and social

relationships. Such individuals are also at greater risk for undergoing family conflict,

especially with their parents, who themselves may be predisposed to higher levels of

parenting stress, psychopathology, and marital discord (Barkley et al., 1990).

Despite the general agreement on its existence, however, ADHD is a concept in

which there is considerable uncertainty regarding the construct, its operational definition,

etiology, and treatment practices (Conners, 2002). The definition of ADHD has changed

at least five times in the past few decades, reflecting changes in our conceptualization of

the disorder but creating confusion among practitioners and the public, and making the

task of standardizing samples in research very difficult (Robin, 1998). Research and

clinical studies have shown that a complex set of behaviors has been observed in children

and adolescents with ADHD (Teeter, 1998). ADHD refers to a family of related chronic

neurobiological disorders that interfere with an individual's capacity to regulate activity

level (hyperactivity), inhibit behavior (impulsivity), and attend to tasks (inattention) in

developmentally appropriate ways. Additional studies suggest that children with ADHD

also have primary difficulties in following rules or demonstrate deficits in rule-governed

behavior and display tremendous variability in task performance (Barkley, 1998b). Barkley (1998a) suggests that inattention may be secondary to a child's inability to inhibit behaviors, and that executive control of dysfunctions or disinhibition (e.g., poor regulation of motor activity and impulsivity) underlie problems with inattention, hyperactivity, and impulsivity.

Notably, ADHD presents with other mental disorders much more frequently than it develops alone (Biederman, Newcorn, & Sprich, 1991). Children and youth with ADHD are at increased risk for concomitant externalizing disorders (e.g., oppositional defiant disorder, conduct disorder; Barkley, Fischer, Edelbrock, & Smallish, 1990; Biederman, Newcorn, & Sprich, 1991; Cohen, Velez, Brook, & Smith, 1989) as well as internalizing disorders (e.g., anxiety, depression, mood disorder; Biederman et al., 1991; Cohen et al., 1989; Jensen, Shervette, Xenakis, & Richters, 1993). Among students with ADHD, in addition, approximately 25% have a co-occurring learning disability (LD; Barkley, 1998b). Moreover, the impairments related to ADHD appear to be severe, pervasive, long lasting, and debilitating in the domains of life functioning – academic achievement, familial relations, peer competence, self-perceptions, accidental injuries, and psychological and adaptive functioning – that are necessary for achieving optimal development and competence, although ADHD is an extremely heterogeneous disorder, with a diversity of etiological pathways, clinical manifestations, and levels of severity (Hinshaw, 2002).

A growing body of research is reporting that children with ADHD have a much higher incidence of comorbid mental disorders, as well as that the consequences of ADHD with other comorbid mental disorders place afflicted individuals at noteworthy

risk to experience a lifetime of problems. (Goldstein & Goldstein, 1998). Thus, the issue

of comorbidity —- the presence of a coexisting condition—is essential in any

consideration of ADHD related impairment (Brown, 2000; Hinshaw, 2002; Pliszka et al.,

1999).

Nonetheless, until recently, too many studies of ADHD have failed to consider the

potential comorbidities of the ADHD samples under investigation (Hinshaw, 2002;

Jensen, Martin, & Cantwell, 1997; Loney & Milich, 1982). Given that the severity of

ADHD symptoms and their responses to treatment may vary significantly as a function of

existence or severity of the comorbid disorders, or interaction of changes in couple of

comorbid disorders that may be present at a given time (Brown, 2000), the investigation

of the impact and impairment of comorbidity on the outcomes of ADHD is a very

important area for further study.

In particular, it appears significant to investigate the impact and impairments of

comorbid disruptive disorders (i.e., oppositional defiant disorder [ODD] and conduct

disorder [CD]) in that they are most frequently comorbid in children with ADHD (Jensen

et al., 2001; Klein & Mannuzza, 1991; Treadwell & Trapani, 2000) and account for the

majority of poor behavior outcome among children with ADHD (Newcorn & Halperin,

2000), and there was debate as to whether ODD, CD, and ADHD truly constituted

separate entities, despite some recent research which shows these conditions may differ

in important and predictable ways (Pliszka, Carlson, & Swanson, 1999).

Moreover, for counselors who work at school or community settings, gaining an

accurate picture of psychological and behavioral complications from research findings

which school-aged children with ADHD and comorbid disruptive behavioral disorders

are likely to experience is extremely important. These understandings can be a valuable asset in efforts of developing counseling intervention and treatment programs.

Theoretical Framework

ADHD is increasingly conceptualized and understood as a neurologically based condition, with genetics found to play a significant role in increasing the risk that an individual will experience the disorder (Goldstein & Goldstein, 1998).

Researchers have formulated a number of integrated theories to explain ADHD and the dynamic relationship among various symptoms and clinical features of the disorder. Barkley (1996b, 1998a) proposes an integrated model of ADHD that posits behavioral disinhibition as the central deficit that negatively influences executive functions. Barkley's model (1996b, 1998a) suggests that there is a linkage between executive function, self-regulation, and goal-directed persistence that results from self-control and that this link explains the relationship between disinhibition and hyperactivity-impulsivity. ADHD is viewed not as a problem with inattention, but as a problem with inhibition that leads to faulty self-regulation and deficient executive function (Barkley, 1998a). This theory is predicated on the "race" model of inhibition that suggests that an event or stimulus triggers both activating and inhibiting response processes in the brain that compete (or race) to be executed first (Barkley, 1996b). Children with ADHD (e.g., individuals who are disinhibited) are slower to produce inhibitory responses (Schachar, Tannock, Marriott, & Logan, 1995).

According to theory, behavioral inhibition serves as the starting point for the six executive functions (e.g., working memory, self-regulation of affect, internalization of speech, and reconstitution of information, planning, and forethought); when inhibition is dysfunctional, these related functions are affected adversely (Barkley, 1996b). Executive

functions are tasks that help regulate, inhibit, and organize behavior. They help children choose, construct, execute and maintain optimal strategies for performing a task as well as to inhibit and alter strategies that become inappropriate (Schachar, Tannock, Marriott, & Logan, 1995).

Working memory permits the individual to create an "anticipatory set" and to build up forethought, or a sense of "future thinking," which in turn allows the individual to allot greater importance to future rather than to instant consequences (Barkley, 1996b). Barkley hypothesizes that these mechanisms are linked to inattention and disinhibition and that they help to explain the forgetfulness that is so commonplace in individuals with ADHD (Teeter, 1998).

Behavioral inhibition includes the process of inhibiting the initial emotional balance (e.g., self-regulation of affect) that is elicited by prepotent responses. This process "allows the individual to actually learn to provoke drive or motivational states that may be required for the beginning and upholding of goal-directed behavior" (Barkley, 1996b). Barkley suggests that executive control deficits will predict greater emotional reactivity, less objectivity, diminished social perspective thinking, and decreased ability to produce drive and motivation to help facilitate goal-directed behaviors.

Speech development plays a role in the process of executive-control functions. Both language and knowledge of rules of acceptable behavior grow in influence over behaviors and are related to the capacity for self-control and ability to plan and to direct behavior toward a goal (Barkley, 1996). Barkley suggests that internalization of speech would be expected to be less mature and more public (resulting in excessive talking), less

reflective, less organized, less influential in controlling one's behavior, and less rule oriented.

The final executive function considered in the behavioral inhibition model is reconstitution, or the ability to analyze and combine that develops from the processes of internal speech, mental prolongation, and behavioral inhibition (Barkley, 1996a). New ideas can be generated from this process, and creativity or new combinations of ideas and problem solving also come out. The ability to analyze a situation and to quickly, accurately, and efficiently put together a verbal plan of action to accomplish a goal has been shown to be inefficient in individuals with ADHD (Teeter, 1998).

All these executive functions underlie self-regulation, help to bring behavior under control over time, and allow the priority of long-term or future consequences over immediate ones. When these executive functions are not regulated, it leads to difficulties with communication, organization, and emotions. This can result in social and academic difficulties, along with depression, anxiety, and low self-esteem. Barkley (1996b) contends that ADHD is a problem with the performance of the executive system. Executive functions of ADHD children may improve with age, but they will exhibit increased difficulties in this area relative to counterparts at the same age with no ADHD (Barkley, 1998a). Thus, individuals with ADHD know what behaviors they need to display, but are unable to do so because of dysfunction of the executive system (Barkley, 1998a).

Individuals with ADHD may display more difficulties with executive functions if they have comorbid disorders such as ODD, CD, or anxiety disorder (Sarkis, 2002), but it is not known whether problems with executive functions are solely a characteristic of

ADHD or other comorbid disorders compound the impairment of the ADHD in relation to executive dysfunction (Barkley, 1996b). With regard to the high rates of comorbidity of ADHD with other mental disorders, Brown (2000) introduced two possible hypotheses to explain it (see p27).

One hypothesis is that ADHD symptoms may be just one aspect of the comorbid disorder. However, Brown suggested this argument is contradicted by Biederman, Faraone, and Lapey's (1992) neuropsychological studies that the cognitive impairments observed in children with ADHD are caused by the ADHD itself and do not appear to be accounted for by comorbid disorders. In other words, individuals with ADHD who have a comorbid disorder have all the requisite symptoms for the second disorder in addition to the requisite number of symptoms of an ADHD (Brown, 2000). Furthermore, ADHD can come out with no comorbid disorder.

Brown's (2000) other explanation for the high rates of comorbidity of ADHD is that ADHD is a name for a spectrum of impairments of cognitive executive functions that often appear together, although they may have differing etiologies, risk factors, and outcomes, and are often comorbid with a wide variety of psychiatry disorders, many of which may also be spectrum disorders. Brown suggested that this view of ADHD as a cluster of executive impairments that appear and may persist with and without comorbid disorders is consistent with the findings of Seidman et al. (1998) about neuropsychological assessments of children and adults with ADHD in that the impairments of executive function in these individuals tend to be persistent and relatively independent of any impairments of any comorbid psychiatric disorder that may be present. Thus, ADHD is increasingly viewed not from a categorical perspective but on a

dimensional basis. This shift to a dimensional view is supported by a robust literature suggesting that dimensional systems are not only better for defining severity but also much better predictors of outcome in later childhood and young adulthood (Fergusson & Horwood, 1995; Teeter, 1998).

Purpose of the Study

The purpose of this study is to investigate whether differences exist in the emotional, behavioral and psychosocial functioning among children with ADHD symptoms alone, ADHD children with comorbid ODD symptoms, and ADHD children with comorbid CD symptoms on measures of depression, anxiety, psychosocial impairments, and informants' behavioral rating scales for their children's ADHD symptoms (i.e., parent-reports). By identifying differences in correlates (e.g., psychological and social adjustment variables) of ADHD according to the presence of comorbid disruptive behavior disorders, this study contributes to the accumulating research regarding the impact of comorbid ODD and CD in relation to ADHD impairments. It also extends our understanding concerning the effect of age, gender, race, socioeconomic status, and ADHD subtypes on the areas of functioning for comorbid disruptive disorders. A conceptual map of this study is provided in Figure 1.

Research Questions and Design

The following questions were formulated in this study:

- Are the emotional, psychosocial, or behavioral functioning differently experienced by three groups of children with ADHD symptoms alone, ADHD children with comorbid ODD symptoms, and ADHD children with comorbid CD symptoms?

- Do age, gender, race, socioeconomic status (SES), ADHD subtypes, or group membership status (ADHD only, ADHD+ comorbid ODD, and ADHD+ comorbid CD) explain differences in the emotional, psychosocial, or behavioral functioning among the three independent groups.

Significance of the Study

Comorbidity undoubtedly complicates the ADHD picture. When two or more

disorders co-occur, the outcomes of one disorder might be erroneously attributed to the

other. Children with ADHD have a much higher prevalence of comorbid mental

disorders in that a number of clinically based studies have reported on a high rate of

comorbidity associated problems in ADHD (Barkley, 1996a; Biederman et al., 1991;

Faraone et al., 1998). The most common types of comorbidities reported have been ODD,

CD, and anxiety disorders, and LD (Lahey, McBurnett, & Loeber, 2000; Lahey, Miller,

Gordon, & Riley, 1999).

The consideration of comorbidity with disruptive disorders, LD, and internalizing

disorders appears important for prognosis and even for treatment response (Jensen et al.,

2001; Klein & Mannuzza, 1991), making specific attribution of impairment highly

suspect unless careful controls are used (Hinshaw, 2002). Furthermore, it is recognized

that such comorbid conditions as aggressive-spectrum disorders (Jensen et al., 1997;

Lahey et al., 2000), depression (Capaldi, 1991), and LD (Barkley, 1998b) each brings its

own risks for significant impairment (Hinshaw, 2002). Until recently, most researchers of

ADHD have tended to design their studies to focus to individuals who manifested

relatively "pure" forms of the disorder without complications of comorbidity (Brown,

2000).

Thus, such comorbidities-related studies are needed to provide basic data to mental

health professionals about the impact and the impairment of comorbidity on the outcomes

of ADHD. The present study expands our understanding about the impact of comorbid

disruptive behavior disorders (i.e., ODD and CD) in terms of emotional, behavioral, and

psychsocial correlates of ADHD. Furthermore, no previous study simultaneously

employed the most widely used criteria for the diagnosis of ADHD (i.e., those from the DSM-IV) and disruptive comorbid disorders.

Another significant need for the present study is to provide information about whether ODD, CD, and ADHD are reasonably distinct from one another (as displayed in the way they group by symptomatology). The high degree of overlap among the disruptive behavior disorders has resulted in wide debate as to whether ODD, CD, and ADHD truly represented separate entities (Pliszka, Carlson, & Swanson, 1999). In DSM-IV, as in DSM-III-R, ADHD, ODD, and CD are brought together under one heading, "Attention Deficit and Disruptive Behavior Disorders." Because the three categories are strongly associated, considerable attention was paid to comorbidity and the possibility of alternate formulations (Rapoport & Ismond, 1996). While the identification of correlates (e.g., emotional, behavioral, and psychosocial adjustment variables) of ADHD cannot explain causation, the degree to which correlates in ODD, CD, and ADHD differ argues for their existence as separate clinical entities (Kuhne, Schachar, & Tannock, 1997). It is important to verify the degree to which ODD, CD, and ADHD are similar or different with regard to the conceptualization of their respective diagnostic categories (Kuhne, Schachar, & Tannock, 1997).

Finally very few systemic studies of comorbidity patterns in clinically examined general population samples with ADHD have been published (Kadesjo & Gillberg, 2001). Such studies are needed to provide basic epidemiological data about the scope and patterns of comorbidity regardless of referral basis, service availability, and local practice (Kadesjo & Gillberg, 2001). Thus, the present study includes in its design non-referred, community-based samples, along with clinically diagnosed children.

Definition of Terms

Attention deficit hyperactivity disorder (ADHD): This disorder is a neurobehavioral syndrome characterized by short attention span, distractibility, impulsivity, and hyperactivity. Diagnosis is by interview, observation, and behavioral questionnaires.

Inattention (ADHD-I): Inattention is a subtype of ADHD. Children who are inattentive have a hard time keeping their mind on one thing and may get bored with a task after only a few minutes. Focusing conscious, deliberate attention to organizing and completing routine tasks may be difficult.

Hyperactivity/Impulsivity (ADHD-HI): Hyperactivity/impulsivity is another subtype of ADHD. Children who are hyperactive cannot sit still. They may roam around the room, squirm in their seats, wiggle their feet, and touch everything. They may also feel intensely restless. Children who are overly impulsive seem unable to curb their immediate reactions or think before they act.

ADHD combined type (ADHD-C): ADHD Combined type is diagnosed when an individual meets the criteria for both inattention and hyperactivity/impulsivity type.

Comorbid disorder: It indicates the presence of a coexisting condition, when two or more mental disorders co-occur.

Disruptive disorder: It indicates a pattern of misbehavior marked by inattention, making careless mistakes, lacking interest in matters considered serious. Disruption can be either passive (not doing what is reasonably to be expected) or active (doing what is not permitted) in social situations. ODD, CD, and ADHD are included for disruptive disorders.

Externalizing disorders: Externalizing disorders are those that have a disruptive quality to behavior such as acting-out, hyperactivity, aggression, antisocial behavior, and delinquency.

Internalizing disorder: Internalizing disorders are those that have components of internalizing behaviors such as anxiety, excessive inhibition, somatization, and depression.

Oppositional defiant disorder (ODD): ODD is a diagnosis of a persistent pattern of disobedient, negativistic, and provocative opposition to authority figures occurring between three and 18 years of age, manifested by temper tantrums, violation of minor rules, dawdling, argumentativeness, and stubbornness (DSM-IV, APA, 2000).

Conduct Disorder (CD): CD is a persistent behavior pattern of violating other's rights and ignoring age-appropriate social standards. Specific behaviors include lying, theft, arson, running away from home, aggression, truancy, burglary, cruelty to animals, and fighting (DSM-IV, APA, 2000).

Depression: Depression is a status of mood of sadness, despair, and discouragement. Depression may be a symptom of a number of mental and physical disorders, a syndrome of associated symptoms secondary to an underlying disorder, or a specific psychiatric disorder. Children are more difficult to diagnose with depression, because symptoms are more variable, diagnostic criteria are not universally agreed upon, and comorbidity with ADHD may mask the presence of depression.

Anxiety: Anxiety is a group of disorders characterized by 1) an internal state of extreme, disabling anxiety; and 2) an avoidance behavior pattern. Some anxiety disorders

are episodic in nature, such as the panic disorders, while others are more chronic, such as a generalized anxiety disorder.

Learning disabilities (LD): A disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written: the disorder may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.

Adjustment: Modification of attitudes and behavior to meet the demands of life effectively, such as carrying on constructive interpersonal relations, dealing with stressful or problematic situations, and handling responsibilities.

Emotional adjustment: An ability to maintain a balance in the affective aspects of life, to exert reasonable control over emotions (i.e., anger, depression, hostility etc.), and to express emotions that are appropriate to the situation.

Behavior adjustment: Age-appropriate actions, reactions, and interactions in response to external or internal stimuli, including objectively observable activities, introspectively observable activities, and unconscious processes.

Psychosocial adjustment: An ability to recognize the existence of others as total individuals that occurs in late infancy, evolving into independent interaction with others on the basis of reciprocity about age three into sophisticated relational patterns in adolescents and adulthood.

Socioeconomic status (SES) effects: SES is characterized by the economic, social, and physical environments in which individuals live and work, as well as by demographic and genetic factors.

Diagnostic Interview Schedule for Children (DISC-IV): DISC-IV

(NIMH, 1997) is a highly structured interview instrument, developed by NIMH (the

National Institute of Mental Health), that is designed to be administered by interviewers

without clinical training who are intended for large-scale epidemiologic clinical surveys

of children. The interview covers mental disorders of children and adolescents over thirty

diagnoses based on diagnostic criteria as specified in DSM-IV, DSM-III-R, and ICD-10.

The interview is organized into six diagnostic sections: the Anxiety Disorders, Mood

Disorders, Disruptive Disorders, Substance-Use Disorders, Schizophrenia, and

Miscellaneous Disorders (Eating, Elimination, and so on).

Children's Depression Inventory (CDI): The CDI is an instrument that measures

depressive symptoms. The CDI has 27 items and consist of the following scales:

Negative Mood, Interpersonal Problems, Ineffectiveness, and Negative Self-Esteem.

Revised Children's Manifest Anxiety Scale (RCMAS): The RCMAS measures

the level and nature of anxiety in children. It is composed of 37 items and provides four

subscales: Worry/Oversensitivity, Social Concerns/Concentration, Physiological Anxiety,

and Lie Scale.

The Swanson, Nolan and Pelham (SNAP-IV) Teacher and Parent Rating

Scale: The SNAP-IV Rating Scale is a revision of the Swanson, Nolan and Pelham

(SNAP) Questionnaire (Swanson et al., 1992, 1999).

Columbia Impairment Scale (CIS): The CIS is an instrument that provides an

overall estimate of psychosocial impairment. Parents or caregivers rate for their children

on 13 items. This measure correlates highly with more extensive assessment of

psychosocial impairment, which evaluates four basic areas of child's functioning;

Interpersonal relations, Broad psychopathological domains, functioning in job or

schoolwork, and use of leisure time.

Overview

A growing body of research is reporting that children with ADHD have a much

higher incidence of comorbid mental disorders, as well as that the consequences of

ADHD with other comorbid mental disorders places afflicted individuals at noteworthy

risk to experience a lifetime of problems. Given that the severity of ADHD symptoms

and their responses to treatment may vary significantly as a function of existence or

severity of the comorbid disorders, or interaction of changes in a couple of comorbid

disorders that may be present at a given time, the issue of comorbidity is essential in any

consideration of ADHD related impairment.

Nonetheless, until recently, too many studies of ADHD have failed to consider the

potential comorbidities of the ADHD samples under investigation. In particular, it

appears significant to investigate the impact and impairments of comorbid disruptive

disorders (i.e., oppositional defiant disorder [ODD] and conduct disorder [CD]) in that

they are most frequently comorbid in children with ADHD and account for the majority

of poor behavior outcome among children with ADHD.

Thus, such comorbidities-related studies are needed to provide basic data to mental

health professionals about the impact and the impairment of comorbidity on the outcomes

of ADHD. Another significant need is to provide information about whether ODD, CD,

and ADHD are reasonably distinct from one another (as displayed in the way they group

by symptomatology).

The purpose of this study is to investigate the impact of comorbidity of ADHD

with oppositional defiant disorder or conduct disorder on the emotional, behavioral and

psychosocial functioning. This study has five chapters and an appendix. The present chapter provides a rationale and background information for the study. Chapter 2 provides a relevant literature review about the comorbidities of ADHD and impairments. The research method, design, study participants, statistical analyses, and information about rating scales employed are described in chapter 3. Interpretation of statistical outputs and findings from the analysis are presented in chapter 4. The conclusion and implications of this study are discussed in chapter 5.
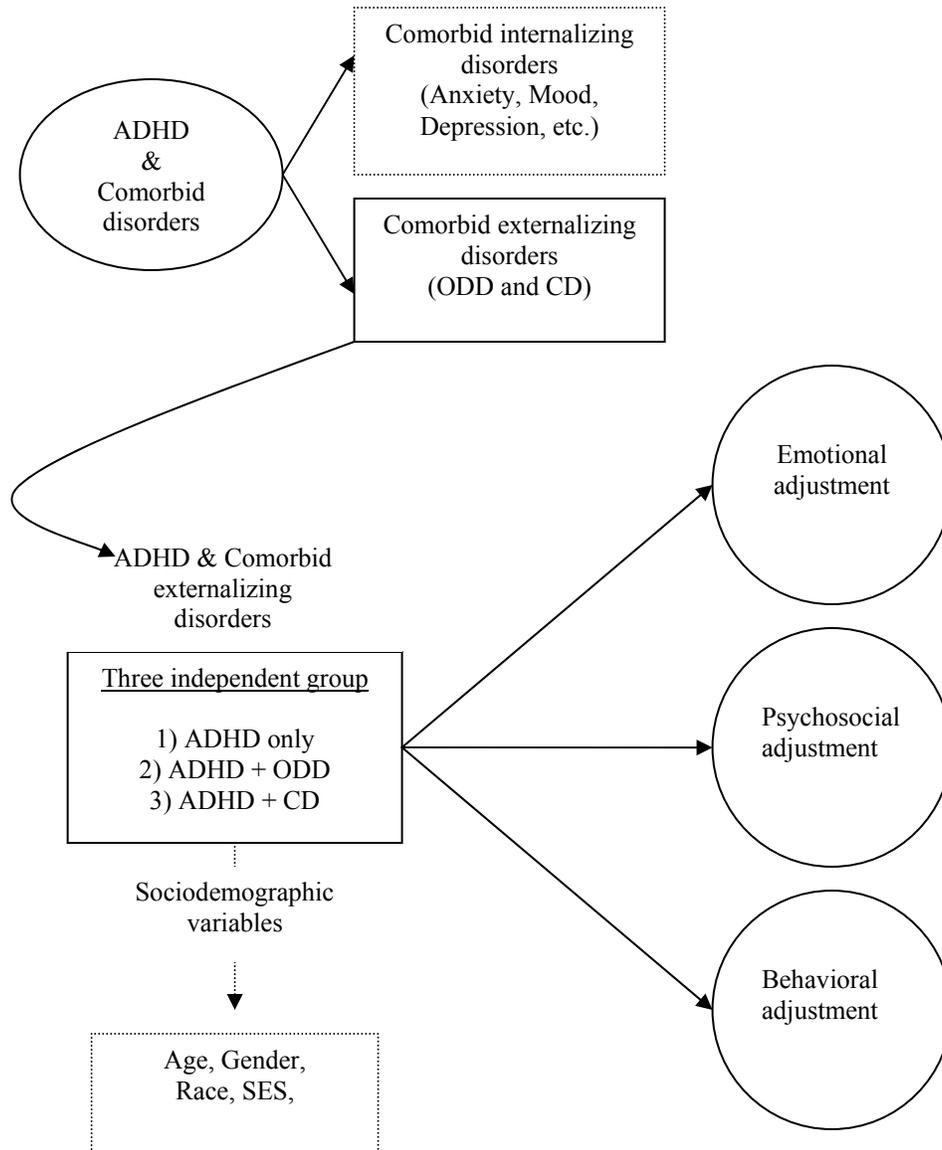
Figure 1. Conceptual map of this study

CHAPTER 2
REVIEW OF THE LITERATURE

This review of literature is organized into 6 sections:

- Issues and controversies of ADHD: etiology and historical changes within ADHD

- Literature describing ADHD subtypes, related impairments and comorbidities

- Literature describing ADHD variations by the effect of age, gender, race, and SES

- Literature describing emotional, behavioral, and psychosocial correlates of ADHD

- Literature describing issues of ADHD and comorbid disruptive behavior disorders (comorbid ODD and CD)

- Summary of this chapter

Issues and Controversies of ADHD: Etiology and Historical Changes

ADHD has been reviewed extensively in the psychological, medical, family, and school-based literature as it has become the most widely diagnosed childhood mental disorder (Barkley, 1998b) occurring in 3% - 7% of school-age children (APA. 2000). ADHD will persist into adulthood for approximately 40% of the cases (Klein & Mannuzza, 1991). ADHD is the most studied of all childhood psychological disorders and yet is still not fully understood (Barkley, 1998a).

ADHD's Etiology

At this time, the etiology of ADHD has not been determined (Barkley, 1998b). However, studies investigating causative factors of ADHD show strong support for the heritability of ADHD (Faraone, Biederman, Chen, Milberger, & Tsuang, 1995; Gillis, Gilger, Pennington, & DeFries, 1992; Teeter & Semrud-Clikeman, 1995). For example, studies suggest that one-third of all fathers who had ADHD in their youth bear children

who have ADHD (Biederman et al., 1995). In the investigation of twins, the majority of

identical twins share symptoms of ADHD (Goodman & Stevenson, 1989).

Although some critics argue that environmental factors cause behavioral,

attentional-hyperactive, and impulsive problems in children, there is little evidence to

support the notion that ADHD can arise purely out of social or environmental factors,

such as poverty, family chaos, diet, or poor parent management of children (Barkley,

1998b). Although family dysfunction, parental psychopathology, and poor parental

management skills may exacerbate the problems a child experiences and certainly may

complicate treatment, these factors do not form the etiological basis of ADHD (Teeter,

1998).

Additionally, research findings suggest that for some individuals something did

affect or influence the brain during development, probably in the early weeks of

pregnancy. For example, research shows that a mother's use of cigarettes, alcohol, or

other drugs during pregnancy may have damaging effects on the unborn child (Silver,

2004). It has been reported that there is clear association between mother's use of alcohol

or substance and deficits in neuropsychological performance and cognitive functions that

cause ADHD symptoms (Pope & Yurgelun-Todd, 1996; Sher, Martin, & Wood, 1997).

ADHD appears to be result of a neurotransmitter deficiency in a specific area of the

brain, but the cause of this deficiency is not fully understood (Silver, 2004). In recent

years, as new tools and techniques for studying the brain have been developed, scientists

have been able to test more theories about what causes ADHD.

Historical Changes of ADHD within DSM

Some of the controversy surrounding ADHD stems from the label and definitional

changes that have occurred over the years. General agreement has been reached that the

diagnosis of ADHD should be made based upon the diagnostic criteria in the American

Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM).

This approach can cause confusion because each revision of the DSM has included

comprehensive changes in the criteria and sub typing of ADHD despite the advantages of

a common nomenclature.

DSM-II (APA, 1968), the first edition to cover child disorders, provided only a

clinical description of "hyperkinetic reaction of childhood." DSM-III (APA, 1980)

provided three lists of symptoms (inattention, hyperactivity, and impulsivity). The DSM-

IV committee, informed by targeted literature reviews (Applegate et al., 1997) and field

tests of proposed changes to the diagnostic criteria (Frick et al., 1994; Lahey et al., 1994;

Waldman, Lilienfield, & Lahey, 1995), decided the DSM-III and DSM-III-R was flawed

in specifying three symptom lists and differentiating factor structures of ADHD

(McBurnett, Pfiffner, & Ottolini, 2000).

Key to the DSM-IV reorganization was the overwhelming evidence that ADHD

symptoms consist of an inattentive factor and a hyperactive-impulsive factor. Depending

on the type of ADHD, six out of nine possible inattention symptoms and/or six out of

nine impulsivity-hyperactivity symptoms are required for a diagnosis of ADHD. Another

key change was use of an impairment measure-the children's Global Assessment Scale

(GAS). The validation of assessing the extent and severity of inappropriate behaviors has

been improved by use of the GAS during the field trials to assess impairment and by the

requirement that symptoms be present in two situations (Rapoport & Ismond, 1996).

Onset of symptoms must be before age 7, and some impairment must be present in two or

more settings, in social, academic, or occupational functioning.

Although the DSM-IV has made the standards a bit clearer, its postulates for the criteria can be challenged because of the weakness of the empirical support and the strength of the contrary evidence (Carey, 2002). For example, substantial problems are evident in that (1) ADHD behaviors may be not clearly distinguishable from normal temperament variations, (2) there is absence of consistent evidence that ADHD symptoms are related to brain malfunction, and (3) there is neglect of the role of the environment and interactions with it as factors in etiology (Carey, 2002). Another shortcoming of the DSM-IV diagnostic criteria can be pointed out that the hyperactive-impulsive type and the combined type have much in common and these two types tended to be less distinguishable from each other (McBurnett, Pfiffner, & Ottolini, 2000; Paternite, Loney, & Roberts, 1996). The basic distinction between two types is simply the relative lack of academic problems (following from the lack of inattention symptoms). There remains the unresolved question of whether ADHD-H might develop into ADHD-C in some cases (McBurnett, Pfiffner, & Ottolini, 2000).

ADHD Subtypes, Related Impairment and Comorbidities

By DSM-IV, subtype is determined based on whether symptoms are predominantly inattentive, predominantly hyperactive-impulsive, or combined. An improvement in DSM-IV's ADHD diagnosis is in assessing the extent and severity of inappropriate behaviors. Some investigations of the DSM-IV based ADHD subtypes, including field trials for DSM-IV (Lahey et al., 1994), have suggested that each subtype has its own unique clinical differentiation, including specific behavioral patterns that are prevalent and varying comorbidities and related impairments that exist within each subtype. However, demonstrating that impairment pertains to ADHD as broadly construed does not answer the question as to whether the impairment results more from the inattentive-

disorganized versus the hyperactive-impulsive symptoms (Hinshaw, 2002). The results of studies about the subtypes are not always consistent and sometimes demonstrate opposing views (Arbus, 2003).

With regard to these inconsistencies, Hinshaw (2002) contended that the subtype is confounded with comorbid conditions. Paternite, Loney, and Roberts (1996) and Hinshaw (2002) assert that the ADHD subtypes show substantially different patterns of comorbidity, with the inattentive type more likely to demonstrate association with internalizing features and disorders (particularly anxiety) and the hyperactive-impulsive and combined type more prone to incorporate serious aggression and conduct disorder.

Because of these inconsistencies and confounding, it appears important that future studies to control for both ADHD subtypes and comorbidity are needed to examine the relationship of ADHD to impairment. A critical issue in the future study will be to determine whether any impairment relate to the core symptom patterns of ADHD as opposed to comorbid conditions that may accompany ADHD. The following is a summary of the information that is currently available surrounding three subtypes of ADHD.

Predominantly Inattentive Type (ADHD-I)

Inattention represents a child's inability to maintain his/her attention or respond to play activities or tasks, or to follow through with rules and instructions (Barkley, 1998b). In school, difficulties increase since inattention causes problems in carrying out classroom assignments, making it appear as if the child is not listening to instructions (Ismond & Rapoport, 1996). Tasks are poorly organized, and homework and other tasks requiring sustained mental effort are avoided and disliked. They also found lose focus and persistence when performing a boring activity.

In the DSM-IV field trials, children diagnosed with ADHD-I were found to have much lower levels of delinquency, aggression, and conduct disorder symptoms relative to the two other subtypes, whereas these children with ADHD-I tend to display more academic problems, especially in math, and are more likely to use school services for help than are the other two subtypes (Lahey et al., 1994). Children with ADHD-I subtype often have below average or failing grades in school (Lahey et al., 1994). Moreover, children with ADHD-I subtype exhibit less externalizing behavior and have been shown to be more internalizing (i.e., anxious and depressed) relative to the other subtypes (Gaub & Carlson, 1997). This subtype typically consists of older children and more females than are the other subtypes (Gaub & Carlson, 1997).

Predominantly Hyperactive-Impulsive Type (ADHD-HI)

Children who are diagnosed with ADHD-HI subtype can't sit still, may feel intensely restlessness, and are unable to curb their immediate reactions or think before they act. Children with ADHD-HI subtype were found to exhibit abnormally high levels of motor activity and deficient impulse control relative to other children. Hyperactivity-impulsivity symptoms cause concern particularly in the school setting because of extreme fidgetiness and difficulty in playing or working quietly. Waiting in lines or waiting for the proper time to speak are also difficult.

Children with ADHD-HI subtype have been found to show lower rates of academic problems compared to the other two subtypes (Gaub & Carlson, 1997). In contrast, children with ADHD-HI subtype as a group were found to exhibit significant problems with peer functioning and externalizing problems in later studies (Lahey et al., 1998), although DSM-IV field trials found no peer/social impairment as related to ADHD-HI subtype (Lahey et al., 1994).

The study by Lahey et al. (1998) also found the ADHD-HI group to have high rates of accidental injury and special educational programming. Moreover, children with ADHD-HI subtype seem to gain access to treatment programs faster than in the other two subtypes because of the subtype's much more disruptive trait than the other two (Farone et al., 1998). The average age of the children diagnosed with ADHD-HI subtype is younger than the other subtypes (Farone et al., 1998). In the current DSM-IV, ADHD-HI subtype is a new diagnostic classification, supported in factor-analytic studies of DSM-IV field trials (Lahey et al., 1994). Unfortunately, informant agreement regarding which subtype a child belongs to has never systemically evaluated (Mitsis et al., 2000).

Predominantly Combined Type (ADHD-C)

ADHD Combined type is diagnosed when individual meets the criteria for both inattention and hyperactivity/impulsivity type. DSM-IV field trials found that these children with ADHD-C subtype were more impaired on the Global Assessment Scale than counterparts in the other subtypes (Lahey et al., 1994a). Teacher reports show that children with the combined type are seen as more deviant in peer relations, incite their peers and have difficulty meeting teacher expectations relative to children with ADHD-I subtype (Barkley, DuPaul, & McMurray, 1990). Children with this subtype were found to be predominantly male and often actively rejected by peers (Eiraldi et al., 1997).

ADHD Variations by the Effect of Age, Gender, Race, and Socioeconomic Status

DSM-IV's requirement that ADHD symptoms not only be present but also be impairing an individual's functioning may help to differentiate between normal variations in temperament and ADHD (Robin, 1998). However, any guideline defining "clinically significant impairment," is not provided specifically in the DSM-IV for ADHD diagnosis, thus leaving this open to clinician's subjective interpretation (Robin, 1998).

The range and definition of significant impairment become especially important when considering the need for educational and counseling interventions. Depending on the influence of age, gender, race, and SES, impairments of ADHD and comorbid disorders may differ.

Age Effect

Generally neither ADHD nor comorbid disorders are static in their manifestations. Research indicates that the developmental outcome of ADHD manifests differently in the children and adolescents. The course of ADHD varied with approximately half of the few prospectively studied patient groups going on to do well, while the other half continued with significant levels of symptoms of ADHD from childhood to adolescence (Barkley et al, 1990), and through adulthood (Weiss & Hechtman, 1993). For example, Weiss and Hechtman (1993) found that 66 percent of their sample continued to report significant levels of hyperactive symptoms in adulthood. In addition, longitudinal research and clinical experience both support the contention that inattention remains relatively stable with increasing age, while hyperactive-impulsive symptoms declines with age (Conners et al., 1998a, 1998b; DuPaul et al., 1997, 1998; Hart et al., 1995).

Moreover, retrospective follow-up studies suggest that several comorbid disorders are more likely to occur in children with ADHD if they are followed into adolescence. For example, approximately 20-50% of hyperactive children are likely to have CD by adolescence (Barkley et al., 1990; Biederman et al., 1996). Given the strong relationship of CD to antisocial personality disorder, 25% of hyperactive subjects will have antisocial personality disorder in young adulthood, (Barkley, 2002). And because antisocial personality disorder is a known risk factor for substance abuse, it is found in several studies the elevated risk of 10-17% having substance use disorder in the adulthood

(Barkley, 2002). However, results of studies differ in finding comorbid internalizing disorders (i.e., depression or anxiety) present in the adolescent or young adulthood years of hyperactive children followed prospectively (Barkley, 2002).

Due to the variations of ADHD manifestation by age, Murphy & Barkley (1996) suggests that different diagnostic criteria are needed at different age. Murphy and Barkley (1996) asserted the importance of different symptoms may be quite different at different age (e.g., disorganization and financial responsibility may be important at older ages rather than running around in childhood), as well as the thresholds that define deviance are likely to differ from children to adult. Likewise, Robin (1998) also indicated that applying the same diagnostic threshold across all ages may result in diagnosing a larger than expected percentage of preschoolers and a smaller than expected percentage of older adolescents and adults, given the samples in DSM-IV field trials were primarily ages 4 to 17 (Lahey et al., 1994a). The appropriateness of the item set for capturing the core features of the disorder may also be different at different ages (Robin, 1998). Thus, more developmentally referenced criteria need to be developed for use in the diagnosis of ADHD.

Gender Effects

ADHD appears differently by gender regardless of age. Research on ADHD generally suggests that males display greater frequencies and higher intensities of these characteristics than do females in the general population (Robin, 1998; DuPaul, 1991). Likewise, clinic studies continue to report that 60% to 90% of children diagnosed with ADHD are male, and community studies report ratios between 2:1 (male versus female, respectively) and 3:1 (Angold et al., 2000; Gaub & Carlson, 1997; Lahey et al., 1994a; Quinn & Nadeau, 2000; Wasserman et al., 1999; Zito et al., 1997).

Gender differences have also been reported in primary ADHD symptoms and comorbid conditions. A meta-analytic results in Gershon (2002)'s gender study showed that girls who are diagnosed with ADHD manifested fewer symptoms on hyperactivity, inattention and impulsivity as well as less externalizing problems than do male counterparts. In contrast, ADHD girls displayed greater intellectual impairments and more internalizing problems such as depression and anxiety than do ADHD boys. Gershon (2002) also indicated that ADHD females were rated as less hyperactive based on parent and teacher ratings, as well as teachers rated ADHD boys as significantly more impaired than ADHD girls in comparison to parent reports.

Some researchers has raised a possibility that ADHD prevalence estimates of girls with ADHD may be under-represented, because girls are much less likely to be hyperactive and aggressive at any age (Arnold, 1996; Katz, Goldstein, & Geckle, 1998; Quinn & Nadeau, 2000; Ratey, Miller, & Nadeau, 1995; Smith & Johnson, 1998). For example, McBurnett et al (2000) found that the most common subtype across the clinic samples is ADHD-C whereas the most common subtype in community samples is ADHD-I, as compared in several studies of DSM-IV types on several demographic characteristics. Given that children having the most impaired subtype are referred to clinics, but that ADHD-I is actually the most prevalent in girls, many girls without hyperactivity may go unidentified (Quinn & Nadeau, 2000). The higher percentage of adult females being diagnosed with ADHD suggests that girls with this disorder are being missed in childhood (Quinn & Nadeau, 2000). These differences in gender may be often inextricably confounded within studies.

Race Effects

Cultural/ethnic influences may affect a child's or adolescent's ability to socialize with peers from different backgrounds because of contrasting social habits, interaction styles, religious practices and observations, and even dress. In the reported prevalence estimates of ADHD, there are variations across cross-cultures, as well as studies within the U.S. across different cultural and ethnic settings. For example, reports of studies in the international literature show a prevalence that is around 5% for children during middle childhood, based on DSM-III or DSM-IV diagnostic criteria (Bird, 2002). Additionally, the expected prevalence estimates fluctuates depending on the gender and the age group studied, with male and middle childhood predominance (Bird, 2002).

According to studies reported in the U.S. across different cultural and ethnic settings, over-representation of African American children has been reported in many studies relative to Caucasian American, while Mexican American students were proportionally underidentified (Costello & Janiszewski, 1990; Jarvinen & Sprague, 1995; Reid et al., 1998; Samuel, George, Thornell, 1999). Based on a study by Hunt & Marshall (1994), the racial differences in the identification of ADHD symptoms are consistent with findings that African Americans were generally placed in classes for mild mental retardation at approximately twice the rate that would be expected.

With regard to over-representation of African-American children in many studies for identification of ADHD symptoms, serious concerns have been expressed regarding the assessment of ADHD with culturally different students (Reid et al., 1998). Critics have pointed out that ADHD as a disorder and the instruments designed to assess it both were derived from the perspective of Western professionals, using Western concepts of disorder and measurements, and without regard to cultural difference (Anderson, 1996;

Barkley, 1998c). Furthermore, critics contend that issues other than behavior may involve the results of behavior rating scales for African American students. One criticism is that culturally different individuals are more likely to be exposed to prenatal risk factors, psychosocial stressors, and economic disadvantage, which in turn affect educational and behavioral outcomes (Reid et al., 1998).

Another criticism is that commonly used ADHD assessment instruments could be misleading or invalid when used with culturally different students (Reid et al., 1998). Norms for the Caucasian group, for example, may not be appropriate for the African-American group, or there may be systemic pattern of items bias that would inflate the scores of minority students (Jarvinen & Sprague, 1996). However, it is impossible to determine if differences are due to the use of the scale with a culturally different population or to a real difference in the base rate of ADHD-like behaviors across different race/ethnic groups, although the results of many studies confess the possibility of cross-cultural differences (Reid et al., 1998).

A final critique is that although different cultures conceptualize the ADHD syndrome as having similar characteristics, the threshold for deviance, both among clinicians, as well as among informants, may have strong cultural determinants. (Bird, 2002). For example, a cross-cultural research supports the existence of cultural variations in understanding ADHD-related behaviors or symptoms. Ho et al. (1996) reported that significantly higher rates of hyperactivity obtained in their study are closely associated with a low tolerance by Chinese adults for hyperactive behaviors in children, which lead them to set a lower threshold for the behaviors and therefore they would be more likely to report them.

Socioeconomic Status (SES) Effects

Economic factors play a major role in the development of a child's social skills and style (Lindsay & Whitman, 2000). ADHD is a disorder that can be managed but not cured. Thus, it is beneficial to determine factors that have found to be protective or predictive of positive outcomes. One of the important results of the longitudinal studies that have been conducted is to identify factors that come out to have some protective function for children and adolescents with ADHD and that help to predict outcomes for this group (Teeter, 1998).

As one of these predictor variables, the effect of SES variables (i.e., parent's occupational prestige, educational level, income level, or single-parent status) has been investigated to identify whether children's clinical problems interact cumulatively with adverse environments across the course of development of ADHD. For example, Barkley (1998b) indicates that SES and stability of family are correlated with positive outcomes such as academic performance, educational attainment, and level of adult employment for individuals with ADHD. Likewise, low-SES family was found to predict a negative outcome in both a community sample (Farrington, 1991a, 1991b; Nagin & Trembly, 2001; Stattin & Trost, 2000) and a sample of clinic referred disruptive behavior disorder boys (Lahey et al., 2002).

Additionally, Fischer et al. (1993) suggested that education status in mothers was a more significant predictor of social adjustment in adolescents than were the child characteristics or behaviors (e.g., hyperactivity, conduct disorder, and preschool adjustment). Furthermore, antisocial behaviors were related to maternal mental health problems and job instability in fathers, and high rates of family moves rather than to child characteristics (Fischer et al., 1993). Pevalin et al. (2003) also showed that boys from a

community sample who had a single parent were predicted to have higher levels of antisocial behavior over time.

Research also suggests that SES has consistently been found to moderate behavioral treatment outcomes for children with ADHD (Eiraldi, 2000). For example, lower scores on independent SES variables, such as single-parent status, low income, and education, are related with a poorer behavioral treatment response (Webster-Stratton & Hammond, 1990; Knapp & Deluty, 1989), lower adherence, and higher attrition (Biederman et al., 1991). Moreover, Bussing et al. (2003a) also found that parental support networks vary by socioeconomic status among children at high risk for ADHD. In conclusion, SES and family stability were found to be related to increased antisocial and delinquent problems of children with ADHD.

Emotional, Behavioral, and Psychosocial Correlates of ADHD

ADHD is a biogenetically based neurodevelopmental disorder. Neurobiological factors appear to predispose children to certain psychological and social problems. Studies investigating the various correlates of ADHD appear to be important for several reasons. First, many studies indicate that children with ADHD exhibit difficulties early in life that carry on into adolescence and adulthood (Teeter, 1998). Second, adolescent and adult outcome data suggest that more serious problems may appear, especially when comorbid disorders, such as ODD or CD, are also present (Teeter, 1998). Finally, there is a critical need to understand complex interactions among neurodevelopmental anomalities and the subsequent cognitive, psychological, academic, and social problems associated with ADHD (Teeter, 1998).

A recent study by Sarkis (2002) examined the impact of comorbid conditions of ADHD in a sample of 106 children (ranged ages 7 to 15) on executive functioning on a

measure of the Tower of London (i.e., a test of executive function). All participants met

the diagnostic interview (K-SADS-PL) and most of them had comorbid anxiety disorders,

mood disorders, or ODD. The comorbid conditions were found to not have significance

on executive function as measured by the TOL. Sarkis (2002) suggested comorbid

disorders may not affect neuropsychological functioning.

Thus, there is a critical need for further studies to continue to examine whether

comorbid conditions affect other functioning (i.e., psychological, academic, or social

problems) of children with ADHD. Moreover, counselors need to further understand the

interactions of how biogenetic vulnerabilities affect emotional, behavioral, and

psychosocial adjustment of children with ADHD to develop and implement intervention

programs in school, mental health clinic, or community counseling settings.

Emotional Correlates

The emotional correlates of ADHD include various forms of depression

(Biederman, Newcome, & Sprich, 1991; Tannock, 2000), anxiety (Biederman et al.,

1993, 1996; Teeter, 1998), and low self-esteem (Weiss & Hetchman, 1993). Children

with a diagnosis of ADHD may experience the primary or secondary emotional

disturbances as having ADHD, which must be recognized and addressed along with

ADHD. In particular, emotional maladjustment in children with ADHD may display

salient in school environment. Silver (2004) described emotional picture of ADHD

children from his clinical experiences as follows.

> Some children with ADHD might focus their anxiety on school, exhibiting a fear
> of going to school (i.e., school avoidance) or a fear of doing school work. This
> anxiety might expand into a generalized anxiety disorder. Some children might
> become so upset when faced with homework that they will not start it, or they
> might become upset as soon as they have any difficulty doing the work. Others
> might become fearful in the classroom and appear to withdraw from any potentially

frustrating or uncertain situations by getting upset, resisting the work, or pulling back and become passive. They become unavailable for learning (p.93).

Some children with ADHD do not develop the ability to cope with the pain of frustration and failure experienced at school; they experience a true sense of depression. Failures, inadequacies, and poor interactions with peers and significant adults leave these children feeling angry and devalued. Younger children, who often are unable to experience the depression internally, may express their feelings irritable and aggressive toward everyone. After repeated lack for success in school, some children develop a feeling of worthlessness, resulting in a poor self-image and low self-esteem. Depression might lead to regression. Some children retreat to an earlier stage of psychological or social development. Earlier behaviors or immature, infantile interactions recur (p.94).

In studies, the relationship of ADHD to risk for depression or anxiety has been controversial (Barkley, 2002). Barkley (2002) indicated that many follow-up studies (Barkley et al., 1990) simply did not inspect their samples for these possible associations because other studies (Mannuzza, Klein, & Addalli, 1991; Weiss & Hechtman, 1993) had not reported higher rates of these symptoms in their own samples at adolescent follow-up. However, more recent investigations of clinic-referred children suggest that such depression or anxiety symptoms may be more common than was once believed (Barkley, 2002).

For example, some studies found depression to occur in about 9-32% of ADHD children (Biederman, Newcorn, & Sprich, 1991). Anxiety disorder symptoms were found to occur in from 27% to 30% in clinic-referred children with ADHD and 8% to 26% in non clinic-referred children with ADHD (Biederman et al., 1992; Tannock, 2000).

Additionally, a prospective 4 year follow-up study by Biederman et al. (1996) reported that 44 % of adolescent samples had anxiety symptoms whereas 45% of adolescent samples had depression symptoms. Biederman et al. (1996) report the overlap between ADHD and Mood Disorders symptoms ranges from 25% to 75% in referred samples and 15% to 19% in non-referred children.

Specifically, Angold and Costello (1993) report in five out of seven community studies in review the rate of ADHD was significantly higher in children who had depression (0-57%) than those without depression. Spencer et al. (2000) also report that, in a recent investigation of children (mean age 11) who were consecutively referred to an outpatient psychopharmacological clinic, 103 (76%) had a comorbid diagnosis of ADHD out of 136 children diagnosed with depression. As well, Biederman et al. (1995) report that 49 (74%) had a comorbid ADHD disorder out of the 66 children who had severe impairment associated with depression.

Unlike the studies of ADHD and depression, a more consistent finding was found regarding the degree of overlap between ADHD and anxiety (Pliszka, Carlson, & Swanson, 1999). About a quarter of the children with ADHD meet a least one anxiety disorder in both clinic-referred children and community samples (Biederman et al., 1991; Biederman et al., 1992; Pliszka, 1989); similarly, approximately a quarter of the children with anxiety disorders meet concurrent criteria for ADHD (Last et al., 1987; Strauss et al., 1988). Additionally, there are conflicting reports regarding whether the anxiety symptoms occurs more often in youngsters with the ADHD-I subtype (Abikoff, 2002), although some researchers indicated that children with ADHD-I are more likely to have a diagnosis of tension-anxiety or anxiety-depression than are children with ADHD-HI (Teeter, 1998). Thus, it may be expected that the correlates of ADHD with depression and anxiety symptoms is common and complex patterns of ADHD with anxiety or depression exists.

However, the investigation of the internalizing symptoms, where individual is dealing with a more complex set of signs and symptoms, is made more difficult in many

ways by the less "objective" nature than externalizing behaviors (i.e., fighting, temper outbursts, or stealing), that lend themselves to quantification (Plizka et al., 1999). Although some internalizing symptoms are relatively discernible, such as weight loss or a suicide attempts, others, such as feeling guilty or irritable, are highly subjective and difficult to assess in child population.

Another difficulty in investigations of the internalizing symptoms is that the reliability of both parent and child reports is lower for internalizing symptoms than for externalizing symptoms (Plizka et al., 1999) in both standard clinical interviews (Piacentini et al., 1993) and research interviews (Jensen et al., 1995; Schwab-Stone et al., 1993). For example, a child may report that he is depressed, anxious, and has trouble sleeping but deny all other problems. The parent may deny that the child is depressed but report difficulties in concentration and loss of appetite.

In addition, parent-child agreement is also low both on the presence or absence of depressive symptoms (Boyle et al., 1993; Pliszka, 1992), and anxiety symptoms (Bird et al., 1992). For example, half of the ADHD children who met criteria for anxiety disorder by their own report were not expressed as anxious by their parents (Pliszka, 1992) and parents and children agree on the presence of anxiety symptoms only about half the time (Bird et al., 1992). Both studies suggest that parents may often be unaware of their child's internalizing symptoms (Angold, 1988).

The correlates of ADHD with affective symptoms appear important for research and clinical practice as a result of its influence on diagnosis and intervention. There are several plausible hypotheses for the correlates of ADHD with anxiety or depression. First, some researchers suggest that the diagnosis of ADHD in some children may be a

misdiagnosis of an underlying depressive disorder (Plizka et al., 1999; Brumback, 1988). For example, "irritable mood" in children can be used in the place of depressed to make a diagnosis of affective disorder in children, but children with ODD/CD are often irritable as part of their temper outbursts (Plizka et al., 1999). Even children with ADHD, as part of their impulsiveness, may be emotionally labile (Plizka et al., 1999). Children with ADHD or ODD will have irritable periods that are very short lived and usually associated with a specific frustration. Psychomotor agitation and diminished concentration are easily confused with hyperactivity and inattentiveness in ADHD.

Second, other researchers have suggested that depressive symptoms in hyperactive children with ADHD may be secondary to chronic failure and demoralization associated with ADHD (Plizka et al., 1999) as described above by Silver (2004) about the negative experiences of ADHD children in school.

A final hypothesis is that the correlates of ADHD and anxiety or depression may reflect separate disorders inherited independently of each other (Plizka et al., 1999). A subsequent family study has confirmed this pattern of inheritance for the two disorders (Perrin & Last, 1996). For example, in family studies of children with ADHD, the rate of mood disorders in children with ADHD and their first-degree relatives was significantly higher than the rate in control children and their first-degree relatives (Biederman, Faraone, et al., 1991). In another family study to explore the pattern of inheritance of ADHD and anxiety, the rate of anxiety disorders were elevated only in the relatives of ADHD/anxiety children and not in the relatives of ADHD-only children, relative to control group (Biederman et al., 1991; Biederman et al., 1992).

The causes and determinants for the development of the correlates of ADHD with affective symptoms in children remain unknown (Spencer, Wilens, Biederman, Wozniak, & Harding-Crawford, 2000). Nonetheless the literature indicates that depressive/anxiety symptoms and disorders commonly develop among individuals with ADHD in childhood, adolescence and adulthood, and moreover, their manifestation and outcome may not be benign (Spencer, Wilens, Biederman, Wozniak, & Harding-Crawford, 2000). If not recognized and intervened well, the combination of depressive/anxiety symptoms and ADHD may aggravate adjustment and functioning of children with ADHD as well as lead to impairing conditions.

Behavioral Correlates

The behavioral correlates of ADHD include high rates of aggressive, oppositional, and antisocial behaviors (Barkley, 1990a; Teeter, 1998), accidental injuries (Farmer & Peterson, 1995; Johnson & Rosen, 2000; Szatmari, Offord, & Boyle, 1989), aggressive driving behavior on the road (Barkley et al., 1993, 1996b; Richards, Deffenbacher, & Rosén, 2002), and substance abuse associated with antisocial behavior (Grilo et al., 1995; Martin, Earleywine, Blackson, & Vanyukov, 1994). Robin (1998) described behavioral pictures of ADHD children from his clinical experiences as follows:

> Behavioral problems are the number one associated difficulty in children and adolescents with ADHD. Such behavioral problems frequently take the form of noncompliance to parent's requests, stubbornness, argumentativeness, back talk, rebellion, getting easily annoyed, and generally agitating siblings and others in provocative ways. The children often behave in such a defiant manner to avoid completing effortful tasks such as household chores or homework. Agitating others and making a general nuisance out of oneself is sometimes an expression of hyperactivity in children. Because a certain amount of rebelliousness is normal as young teenagers individuate from their parents, it is often difficult for parents to determine whether a given children or adolescent's defiance is a natural developmental phenomenon or an associated feature of ADHD (p.19).

There appears to be a strong relationship between overall social adjustment difficulties, early aggression and later antisocial behaviors (Teeter, 1998). Teeter (1998) suggested that antisocial behaviors in young ADHD children predict the same problems for adolescents and adults. Antisocial behaviors beginning in late childhood or early adolescence can be problematic for between 20% and 45% of adults. Weiss et al. (1971) found aggression appears to be a critical factor in this pattern. About 25% among them is likely to display antisocial personality disorder (Barkley, 1998b).

When argumentative, defiant behavior reaches clinical proportions, ODD is diagnosed as a comorbid condition to ADHD (Robin, 1998). It is reported that a disturbing behavioral and psychological pattern tends to emerge over time, especially when ADHD co-occurs with ODD or CD (Teeter & Semrud-Clikeman, 1995). Children with associated CD and/or ODD features tend to develop more serious antisocial and chronic juvenile delinquency, and involve criminal activity over time (Teeter, 1998; Weiss & Hechtman, 1993). Approximately, ODD arises in 59% to 73% of children or adolescents with ADHD (APA, 2000). A smaller number of children or adolescents with ADHD display more serious conduct problems, including lying, stealing, truancy, and physical aggression (Robin, 1998; Biederman et al., 1996).

Furthermore, ADHD children or adolescents with comorbid CD have been found to be at high risk for substance abuse, although the relationship between substance use/abuse and ADHD itself remain unclear (Grilo et al., 1995; Silver, 2004; Martin et al., 1994). Children with ADHD-HI are more likely to manifest aggressive and antisocial symptoms even when a comorbid CD is not given (Barkley, 1998b).

With regard to accidental injuries of children with ADHD, some studies found that children with ADHD is more likely to experience higher rates of accidental injuries (i.e., accidental poisonings, broken limbs, head injuries, and hospitalizations, as well as risk factors for accidents and injuries during sports activities) than comparison group (Lahey et al., 1998; Szatmari, Offord, & Boyle, 1989). Such accidental injuries may significantly contribute to time away from school, personal and family distress, and risk for further morbidity (Hinshaw, 2002).

In addition, Barkley and his colleagues (1993, 1996b) found that unmedicated ADHD individuals in later their life involve worse driving habits and more negative driving-related outcomes than do non-ADHD controls. Richards, Deffenbacher, and Rosén (2002) also found that young adults with high ADHD symptom experience more driving anger, display such anger in more hostile/aggressive ways while driving, and are also apt to be involved more crash-related outcomes on the road, relative to low ADHD symptom group. Richards et al. found that young adults with high ADHD symptom show significant difficulties in anger control and anger expression, along with more psychological distress and more liable anxious/depressed moods than the students without ADHD.

Psychosocial Correlates

The psychosocial correlates of ADHD include low self-esteem (Robin, 1998), peer relationships (Hinshaw, 2002; Lahey et al., 1998), and familial interactions (Fletcher, Fischer, Barkley, & Smallish, 1996). The key aspects of ADHD often influence negatively with an individual's ability to interact effectively with peers or family members. Additionally, emotional or behavioral factors, whether primary or secondary,

contribute to a child's social competence. Silver (2004) provided a psychosocial picture

of ADHD children from his clinical experiences as follows;

> Children with ADHD often do not relate well to peers and may not be accepted by
> their peers. This peer rejection can be devastating and can lead to feelings of
> loneliness, poor self-image, and low self-esteem. Research has shown that the
> longer-term outcome for children without positive peer relationships can include
> occupational difficulties, alcoholism, and other emotional problems. The ADHD
> behaviors may contribute to social problems. These social problems are seen
> throughout the school setting. Students with ADHD can be disruptive in the
> classroom. They might be inattentive and require frequent comments from the
> teacher to return to the task at hand. They might be verbally intrusive, interrupting
> the teacher or other students. Many adolescents with ADHD have difficulty being
> socially competent (p.106).
>
> They lack social skills and have difficulty reading social cues correctly. They do
> not recognize the tone of voice or the body language that suggests their behaviors
> are annoying someone. They may have limited age-appropriate social skills needed
> to interact in a positive way with peers. The social data come in but are not
> correctly interpreted. The individual needs to be able to read the other person's
> visual and auditory social signals, and the individual needs to understand how
> others are reading their body language (p.107).

The development of social skills and the attainment of peer relationship are of

critical importance in childhood (Hartup, 1996). Peer relationship is one of the most

deleterious impairments of ADHD (Hinshaw, 2002). For example, rejection by peers

during the elementary grades is strongly related to such long-term negative outcomes as

school dropout, delinquency, and adult mental health problems (Parker & Asher, 1987).

Additionally, many studies suggested peer relationships are strongly predictive of

psychosocial functioning in later life. The longitudinal studies suggest that poor self-

esteem was found to be one of the factors to convey unique risk for serious

maladjustment in adolescence and adulthood (Robin, 1998; Hinshaw, 2002). For

example, Slomkowski, Klein, and Mannuza (1995) examined ADHD males and

comparable controls, who are followed up at adolescent (mean age of 18) and then again

at a mean age of 26. In their follow-studies, the ADHD males, compared to controls,

showed lower self-esteem and psychosocial adjustment by adolescence and lower occupational status in adulthood on ADHD.

Children with ADHD tend more likely to be rejected by their peers (Whalen & Henker, 1992; Hinshaw, 2002). ADHD children have extremely low social preferences from peers (i.e., as shown by high levels of negative sociometric ratings and nominations by peers; Hinshaw & Melnick, 1995). Additionally, teacher reports suggested that ADHD children are clearly seen as rejected by classmates (Gaub & Carlson, 1997; Lahey et al., 1994a; 1998) as well as children with ADHD, compared to their peers, are more likely to receive more negative attention from teachers (Milich & Landau, 1989). Additionally, the specific difficulties experienced by children with ADHD include making and keeping friends (Hinshaw, 2002; Lahey et al., 1998).

The numerous problems associated with ADHD affecting normal social interaction patterns of children with ADHD originate from lack of reciprocation and the intrusive and disruptive behavior styles such as off-task, rule-breaking, aggressive, bossy behaviors (Erhardt & Hinshaw, 1994). Thus, issues of comorbidity appear to be of crucial importance in reference to the considering psychosocial functioning of children with ADHD (Hinshaw, 2002). Certainly, the most peer-rejected subgroup included ADHD children with comorbid disruptive behavior symptoms (Hinshaw & Melnick, 1995). ADHD children without ODD or CD also show marked social impairments compared to their peers without ADHD as well as comorbid aggression leads to the most extreme levels of peer rejection,. Thus, the subgroup of ADHD children with comorbid disruptive behavior may incur particularly severe peer disapproval (Hinshaw & Melnick, 1995).

With regard to ADHD subtypes, ADHD-HI children with comorbid CD started

more fights with their peers than did the ADHD-I children with a comorbid CD or major

depression (Carlson, Lahey, Frame, Walker, & Hynd, 1987). ADHD-I type is more likely

to receive peer neglect (i.e., they receive few positive or negative nominations from

peers) while the combined type is highly rejected (Wheeler & Carlson, 1994). This higher

level of rejection for the combined type may be well associated with to the tendency for

this subgroup to manifest comorbid disruptive behavior (Hinshaw, 2002).

In adolescence, difficulties with social interactions can persist and may develop

into more serious forms of psychopathology or antisocial problems. In an effort to be

accepted, teens with ADHD may engage in various risk-taking behaviors (e.g., drug and

alcohol use) to be accepted (Barkley, 1998b). Some researchers suggest that social

problems of individuals with ADHD may be related to neurological problems. Namely,

the problems in reading social cues (reading facial expressions, reading hand and arm

gestures, reading posture and stance, knowing proper social space, knowing where and

when to touch, understanding tone and rhythm of speech, understanding tone of voice)

are common in individuals with ADHD, which may be another reflection of a visual or an

auditory perception problem (Silver, 2004). Others believe that ADHD children may

know what to do in social and peer-related situations, but they typically fail to do it

(Barkley, 1998b). Therefore, the social difficulties of children with ADHD appear to be

related specifically to deficits of performance rather than those of knowledge or skill

itself (Whalen & Henker, 1992).

ADHD is closely associated with obvious impairments in essential family

relationship patterns. Reciprocally, such maladaptive family relationships and parent-

child interactions lead to antisocial personality and limited social competence with peers (Hinshaw, 2002). Families of children with ADHD were found to have greater levels of marital conflict (Cunningham, Benness, & Siegel, 1988), parenting stress, and a feeling of incompetence as parents (Donenberg & Baker, 1994). Furthermore, mothers of ADHD children displayed more discordant and negative parenting beliefs or practices than do comparison parents during parent-child interactions (Anderson, Hinshaw, & Simmel, 1994).

In addition, some studies (Barkley, Anastopoulos, Guevremont, & Fletcher, 1992; Fletcher, Fischer, Barkley, & Smallish, 1996) reported that the majority of the negativity in the family interactions related to ADHD is related to comorbid disruptive behaviors in the child (particularly in the interactions of ADHD/ODD or ADHD/CD sons with their mothers). Thus, comorbidity of ADHD with disruptive behavior disorders also may increase the levels and types of family-related impairments (Hinshaw, 2002).

ADHD and Comorbid Disruptive Behavior Disorders (Comorbid ODD and CD)

Disruptive behavior disorders include ODD and CD. In DSM-IV, ADHD, ODD, and CD are under one heading, "Attention Deficit and Disruptive Disorders." The DSM-IV field trails in Disruptive behavior Disorders were the most extensively conducted (Rapport & Ismond, 1996); the trials included more than 500 boys and girls ages 4 through 17 who were referred from a variety of clinical settings. The high rate of comorbidity of ADHD with disruptive behavior disorders is consistent across many studies. The rate of this comorbidity largely exceeds what would be predicted based on probability estimates derived from the prevalence of each disorder alone (Newcorn & Halperin, 2000). Furthermore, the figures have been replicated across several

epidemiological and clinical samples (Biederman et al., 1991). Therefore, this occurrence is actual and has substantial clinical significance.

Among children diagnosed with ADHD, a 30% to 50 % was found to have comorbid CD or ODD in clinical settings (Biederman., 1990; Biederman, Munir, & Knee, 1987). Among school children displaying ADHD symptoms, 25 % to 35 % reports to show behavioral disorders by parent and teacher (August & Garfinkel, 1993). The prevalence of ADHD with comorbid ODD, CD, and aggression among children appear to be much higher in clinical samples than in epidemiological samples, because the co-occurrence of these conditions is likely to cause substantial impairment and to result in increased referrals for mental health treatment (Newcorn & Halperin, 2000).

ADHD children with comorbid disruptive behaviors appear to be display a greater amount of negative outcomes in their functioning than children with ADHD alone. According to Treadmill and Trapani (2002), ADHD children with comorbid disruptive behaviors are more likely to display severe ADHD symptoms (Walker et al., 1987), to display deficits in social information processing (Milich & Dodge, 1984), to have peer rejection (Johnston & Pelham, 1986), to be at high risk for the development of antisocial disorders (Schachar, Rutter, & Smith, 1981), and to have psychosocial adversity and parental psychopathology (Lahey et al., 1988).

Examination of the diagnostic criteria for ADHD, ODD, and CD suggests that there is very little overlap in the primary symptoms used to classify these disorders. However, the frequent co-occurrence of inattention, hyperactivity, impulsivity, oppositionality, and aggression within children indicates that these symptom domains are very closely related (Newcorn & Halperin, 2000). Additional work is needed to identify developmental

trajectories, outcomes, and adjustments among ADHD children with comorbid disruptive behaviors.

ADHD and Comorbid ODD

DSM-IV Diagnostic Criteria and Features of ODD

ODD includes two primary features (1) a recurrent pattern of defiant, argumentative behaviors in opposition to demands typically made by adult authority figures and (2) negative, hostile, angry mood (APA, 2000). DSM-IV specifies eight criteria for diagnosis of ODD. At least four symptoms need to persist for at least 6 months. A controversial issue as to the diagnosis of ODD is a matter of degree, as it seems difficult to differentiate when the occurrence of these symptoms is normal, especially when viewing typical adolescent emancipation behaviors or temper outbursts in young children (Rapport & Ismond, 1996). Thus, a greater frequency and severity of these problems should be exhibited than is typical for children of comparable age and development level. Clinically significant impairments should be present in social, academic, or occupational functioning. Regarding the criterion of significant clinical impairment, DSM-IV does not define further (Robin, 1998).

None of these criteria involve either overt aggression and fighting or such covert antisocial behavior as stealing and lying, which are part of CD. Symptoms usually appear by age eight, usually occur before adolescence, and often increase with age. Prior to puberty more males than females are affected, but the male to female ratio equalizes after puberty (Treadmill & Trapani, 2002). With DSM-IV the incidence of ODD is somewhat more prevalent in that 22% more cases were identified in the field trials (Lahey et al., 1994b). Up to 65% of children and adolescents with ADHD develop ODD

(Barkley, 1998b). Prevalence estimates for ODD in children range as high as those for

CD (Fergusson, Horwood & Lynskey, 1993).

Comorbid ODD

Prevalence Estimates. According to the summary by Barkley (1998), 54-67% of

ADHD children have ODD. Some epidemiological studies have shown a high incidence

of ADHD with comorbid ODD; 30-45% of patients with ADHD have ODD (Pelham,

Evans, Gnagy, & Greenslade, 1992). A German school sample reported a 50% rate of

comorbid ODD with ADHD (Baumgaertel, Wolraich, & Dietrich, 1995). ADHD children

with comorbid ODD had an earlier age of onset than children with only ODD (i.e.,

approximately age three versus age five; Treadmill & Trapani, 2002). The overall number

of problems was significantly greater for ADHD children with comorbid ODD as

compared to ADHD alone (Paternite, Loney, & Roberts, 1995). There exists little support

for comorbidity to exacerbate impaired cognitive or neuropsychological functioning.

Among the boys referred for treatment due to behavior problems, those diagnosed with

ADHD, ODD, or both did not differ statistically on cognitive and attentional measures

from each other or behavior-disordered children not meeting diagnostic criteria

(Paternite, Loney, & Roberts, 1995), and on measures of executive functioning (i.e.,

Sarkis, 2002).

Functioning and Impairment. There have been only a few studies that have

evaluated functioning differences between children with ADHD alone and ADHD

children with comorbid ODD. For example, Gadow & Nolan (2002) reported that ADHD

children with comorbid ODD, compared to three groups of children (ADHD alone, ODD

alone, and non ODD/ADHD comparison group), received the highest ratings of severity

for the symptoms of the two disorders (i.e., ADHD and ODD), displayed difficulties with peers, and displayed developmental deficits.

The findings are consistent with results of a cross-national study in a sample of Japanese ADHD patients with ages 7 to14 years (Harada, Yamazaki, & Saitoh, 2002). Harada et al. reported that comorbid ODD group, compared to ADHD only or ODD only group, displayed more internalizing problems (i.e., higher depression and anxiety symptoms) than the ADHD or the ODD group, as well as presented more relationship problems with teachers (than the ADHD group) and with friends (than the ADHD or ODD group). Those children have more problems with mothers than the ADHD group while have less problems than the ODD group.

Kuhne et al., (1997) also suggested that the presence of comorbid ODD or CD problems in children with ADHD altered the correlates of ADHD across number of areas, including greater ADHD symptom severity and social dysfunction. Specifically, ADHD children with comorbid ODD are closely related to some social and academic correlates (i.e., social withdrawal, elevated academic achievement paired with higher perceived scholastic competence) while ADHD children with comorbid CD are closely related to other psychological and familial correlates (i.e., higher aggression, anxiety, maternal pathology, and decreased self-esteem). Kuhne et al. (1997) found distinctive profiles of the disruptive behavior disorders and the deleterious effects on the quality of life experienced by the comorbid conditions.

However, although children diagnosed with ODD only or comorbid ODD displayed greater aggressive behaviors than children diagnosed with ADHD or not

meeting diagnostic criteria, overall difference to differentiate between the groups was not supported statistically (Treadmill & Trapani, 2002).

ADHD and Comorbid CD

DSM-IV Diagnostic Criteria and Features of CD

The essential feature of CD is repetitive and persistent behavior that violates the rights of others or age-appropriate societal norms (APA, 2000). CD includes elements of physical aggression and direct or clandestine antisocial acts in addition to defiance and rebelliousness. There are two of the characteristics of CD: (1) lack of remorse for antisocial behavior and (2) extreme self-centeredness (Robin, 1998).

Typically, those meeting criteria for CD also meet criteria for ODD; in such cases CD takes precedence as a diagnosis (Robin, 1998); at least 3 diagnostic criteria need to have been present for the past 12 months, with at least one diagnostic criteria present for the past 6 months. The child must exhibit significant problems in the social, domestic, educational, or occupational realm. Once diagnostic criteria are met, the disorder is then classified in terms of severity, ranging from mild to moderate and severe. Aggression may be displayed because of misattributing the intent of others as hostile when environmental cues are unclear (Treadmill & Trapani, 2002). The current subtypes in the DSM-IV have been verified by the finding that early onset has a worse prognosis and is predictive of adult Antisocial Personality Disorder (Rapport & Ismond, 1996). Mild forms conduct-disordered behaviors tend to dissipate with maturity, but more severe forms are likely to be chronic.

CD differs from and is more severe than ODD. CD is also associated with the early onset of sexual behavior, smoking, drinking, marijuana, and other drug use in the adolescent (Robin, 1998). CD children are likely to have more school suspensions and

police contacts than do ODD children (Frick et al., 1992). While ODD and CD are distinct, most studies of these conditions in ADHD children have lumped the conditions together (Plizka, et al., 1999).

Prevalence estimates for CD in children range from 4% to 10% (Fergusson et al., 1993), and high rates of comorbidity with ADHD are common (Treadmill & Trapani, 2002). Forty to 60% of adolescents with ADHD meet the diagnostic criteria for CD (Barkley, 1990). Among adolescent males diagnosed with CD, 16% met diagnostic criteria for ADHD (Thompson et al., 1996). Males diagnosed with CD and comorbid ADHD reported significantly more conduct symptoms, an earlier age of onset of CD, and greater and earlier substance involvement, than those without comorbid ADHD (Treadmill & Trapani, 2002). Additionally, males with CD and ADHD had a greater number of psychiatric diagnoses, including depression, anxiety, and mania, than those with only CD (Robin, 1998). Given the high rates of comorbidity of ADHD and CD, there has been some debate over whether they are separate syndromes, whether they represent two manifestations of an underlying disorder, or whether they may share an underlying symptom basis (i.e., impulsivity) although discriminant validity between CD and ADHD was supported (Newcorn & Halperin, 2000; Szatmari et al., 1989). However, the differential diagnosis between ADHD and CD is quite clear-cut (Robin, 1998). ADHD adolescents are not normally involved in the kinds of antisocial behaviors that are criteria for CD. ADHD typically involves an early onset of behavioral disinhibition whereas CD reflects an early negative temperament and familial/social adversity rather than impulsive, aggressive and antisocial behavior. CD has also been associated with single parenting, parental divorce, low SES, and parental psychopathology

(Treadmill & Trapani, 2002). However, ADHD was not associated with these attributes (Hinshaw, 1987).

Comorbid CD

Prevalence estimates. According to Barkley (1998b) 20-56% of ADHD children have CD. Similarly, Biederman and colleagues (1991) reported ADHD and CD co-exist in 30% to 50% of cases through a review of 29 studies including referred and non-referred samples. Another study by August and Garfinkel (1993) indicated 5% of children with mild ADHD symptoms (i.e., when symptoms numbered from six to nine) met criteria for CD. In contrast, 20% of children with severe ADHD symptoms (i.e., with ten or more symptoms) met criteria for CD. Additionally, depending on when ADHD is seen in several settings (a pervasive definition of ADHD) relative to when ADHD disturbances are exhibited in only one setting (a situational definition), 10% of ADHD children by the situational definition had comorbid CD symptoms while 20% of those children by the pervasive definition of ADHD (reported by at least two sources) had comorbid CD symptoms (August & Garfinkel, 1993).

Functioning and Impairments. Research suggests higher comorbid rates of ADHD with CD were observed when ADHD was more severe, pervasive, and persistent (Treadmill & Trapani, 2002). For example, children with more severe ADHD symptoms, compared to children with mild ADHD symptoms, displayed higher aggressive conduct problems (McGee, Williams & Silva, 1984). Thus, the presence of conduct problems covaries with the severity of ADHD symptoms (Treadmill & Trapani, 2002). Additionally, CD symptoms may be a strong predictor variable of the persistence of ADHD (Treadmill & Trapani, 2002), given that boys with persistent ADHD were more likely to display CD than boys with non-persistent ADHD or those without an ADHD

diagnosis (Hart et al., 1995). Indeed, the comorbid diagnoses of ODD and other internalizing disorders (i.e., anxiety disorders, major depression, and dysthymia) do not predict the persistence of ADHD in these samples. Furthermore, children with CD are more likely to have a comorbid diagnosis of ADHD than vice versa (Abikoff & Klein, 1992).

Epidemiological and clinical studies suggest that children who were comorbid for ADHD and CD display the risk factors and associated features of both disorders (Newcorn & Halperin, 2000; Schachar & Tannock, 1993; Szatmari et al., 1989). The functioning of ADHD children with comorbid CD manifests the discrete nature of each disorder. For example, Treadmill and Trapani (2002) reported that children with ADHD, regardless of comorbid CD, are more likely to display deficits in neuropsychological functioning and cognitive impairments such as inhibitory control (Schachar & Tannock, 1995) and ability to sustain attention (Klorman et al., 1988), as well as psychosocial adversity (McGee, Williams, & Silva, 1984). In contrast, children diagnosed with CD, either pure or comorbid with ADHD, were characterized as having lower socioeconomic status and experiencing higher levels of psychosocial adversity, including increased family problems (Schachar & Tannock, 1995).

The comorbidity of ADHD with CD significantly increases the seriousness of the disorder (Plizka et al., 1998). For example, Robin (1998) indicated that ADHD adolescents with comorbid CD have more commonly childhood-onset for CD (onset between ages 6 and 8), with an even earlier onset of antisocial behavior and a greater number of arrests than adolescents with CD alone (Forehand, Wierson, Frame, Kempton, & Armistead, 1991), with higher persistence into adulthood, with a poorer prognosis

(Barkley, 1998b). Over time, children with ADHD and comorbid CD are more likely to persist in antisocial behavior and are at much greater risk than ADHD children for the development of personality disorder, criminal behavior, and substance abuse (Plizka et al., 1998). Indeed, ADHD children with comorbid CD display greater severity on measures of delinquency and aggression than children with ADHD alone (Biederman et al., 1993).

Some researcher has indicated that most adolescents with ADHD and CD may come from severely disrupted families characterized by parental discord, substance abuse, and pathology (Plizka et al., 1998). Others do not support the association of familial problems with the comorbidity in that some children who had difficult temperaments and severe hyperactivity and aggression from a very early age come from affluent, upper-middle-class families having reasonable parenting skills and empathy which was used to raise other children without such problems (Robin, 1998).

Although there is still considerable overlap and diagnostic imprecision, recent research indicates that ADHD and CD are separate and discrete phenomena (Newcorn & Halperin, 2000). Children with these conditions without comorbidity manifest different core symptoms and different patterns of psychosocial correlates. In contrast, those with comorbidity manifest the symptoms and psychosocial correlates of both disorders and account for the poorest outcome within each group. The finding as to ADHD children with comorbid CD may indicate comorbid CD accounts for the poorest outcome or the increased risk for poor outcome among children with ADHD (Newcorn & Halperin, 2000).

Summary

This chapter included a review of the literature related to the issues of emotional, behavioral and psychosocial correlates of children with ADHD and comorbid disruptive behaviors disorders.

In the light of the findings of the literature review, there are important several reasons to give rationale of the needs of this study. First, a growing body of studies reports children with ADHD has a much higher incidence of comorbid disruptive disorders (i.e., ODD and CD) and suggests consideration of the impact of the comorbidity on the outcomes of ADHD in future investigations. Second, research findings indicate the disruptive comorbid conditions of ADHD are more likely to account for poor outcomes of life functioning areas (i.e., social, academic, psychological, and familial correlates), although there exist little support for the comorbid conditions to exacerbate impaired cognitive or neuropsychological functioning. Third, a very few studies also found that the deleterious effects of the comorbid disruptive conditions may be related to different correlates according to the presence of comorbid conditions (i.e., ODD or CD), despite a little information currently available in the area.

Therefore, further works are needed for investigation of the impact of comorbid disruptive disorders on emotional, behavioral, and psychosocial functioning. The findings will expand our understanding of the impact of comorbid disruptive disorders on psychological areas as well as provide information about features of whether ADHD, ODD, and CD are reasonably distinct from one another in terms of psychological functioning areas.

CHAPTER 3
METHODOLOGY

Overview of the Study

Chapter three explains the procedures and methodology that were employed in this study. The study was conducted to compare emotional, behavioral and psychosocial functioning of children with ADHD symptoms alone, ADHD + comorbid ODD symptoms, and ADHD + comorbid CD symptoms. In this study, the impairments of children with ADHD and comorbid disruptive behavioral disorders was investigated using a data set obtained through a database system of the Program for ADHD Detection and Service Use (PADSU, Principal Investigator, Dr. Regina Bussing) located at the Department of Psychiatry, Pediatrics, and Health Policy and Biobehavioral Sciences of the University of Florida.

The PADSU has been collecting data of children with ADHD for a study of ADHD Detection and Service Use supported by National Institute of Mental Health (NIMH) since 1998, which was to identify barriers to detection of service needs for ADHD and to access the extent to which children with ADHD receive services across health-care sectors.

The data set used in this study includes 164 children at high risk for ADHD and their informants (i.e., parent), who completed ADHD psychiatric diagnosis interviews, psychological and social measures, and behavioral rating scales, as well as comparable school data on age, gender, race, SES, attendance, discipline record, and special education status. Study hypotheses and procedures for sampling and measurements for

the present study along with characteristics of the entire database system managed at the

PADSU are introduced in this chapter.

Characteristics of the Entire Database System

The entire database system consists of data gathered in three stages. The data for

the PADSU study were collected between 1998 and 2005. Using school district

registration records, the PADSU identified 12,009 elementary school students enrolled in

kindergarten through fifth grade during the 1998-1999 school years in a public school

district in Florida as qualified for the study from 13,180 student populations. Bussing's

(2003b) description follows:

> Children were qualified for the study if they lived in a house with a telephone, were
> not receiving special services for mental retardation or autism, and were from
> Caucasian or African American backgrounds. Children from other ethnic
> backgrounds were excluded because they comprised less than 5% of the total
> population. Selection was restricted to 1 child per household. From this pool of
> 12,009 eligible children, 3,158 were chosen using a gender-stratified random
> design that oversampled girls by a margin of 2 to 1 to ensure adequate
> representation. Telephone contact was made with 78% of the selected sample ($n =$
> 2,035) and of these, 79% ($n = 1,615$) agreed to participate. Parent permission for
> teacher behavior questionnaires was obtained for 96% (n = 1,549) of the
> respondents, and 77% (n = 1,187) of the mailed teacher questionnaire were
> completed and returned. Of 1,615 children screened, 24% (n=381) were identified
> as being diagnosed or treated for ADHD, suspected of having ADHD, or there was
> parental concern about behavior problems in children with parent scores of the
> Swanson-Nolan-and-Pelham-IV (SNAP-IV), a standardized parent or teacher
> symptom screening measure, elevated 2 standard deviations (SD) above age and
> gender norm (Phase 1). From this pool of 381 children, 70% (n=266) participated
> in follow-up home interviews that included diagnostic and service use assessment
> (Phase 2; p. 178).

Briefly, Phase 1 of the PADSU study assessed 1,615 children for ADHD risk using

standardized parent and teacher reports (i.e., SNAP-IV). In Phase 2, those children

considered at high risk for ADHD ($n = 266$) and their parents underwent diagnostic,

service use, and caregiver strain assessments at participants' homes or community

locations. Phase 3 consisted of a 12-month telephone follow-up survey collecting service

use and SNAP-IV-based behavioral problems reports, which was completed by 220

parents and teachers. A flow chart of procedures in sampling and measurements of the

PADSU study as related to the present study are provided at Figure 1.

The institutional Review Board of the University of Florida and the school district

research director approved the PADSU study. Informed consent was obtained from

parents in all the three phases of the study, while informed child assent was obtained

before each child interview. Children and their parents were interviewed separately, with

the questions being read aloud to the children, who were given the option to mark their

own answers. An overwhelming amount (98%) of the parents who completed the

interview was mothers (Bussing, 2003a).

Study Hypotheses

In reference to possible differences on measure of emotional, behavioral, and

psychosocial functioning of children with ADHD and disruptive behavior disorders, the

following hypotheses are proposed.

1.   There will be a significant difference among three groups of children with ADHD
     alone, ADHD and comorbid ODD, and ADHD and comorbid CD on a measure of
     anxiety.

2.   There will be a significant difference among three groups of children with ADHD
     alone, ADHD and comorbid ODD, and ADHD and comorbid CD on a measure of
     depression.

3.   There will be a significant difference among three groups of children with ADHD
     alone, ADHD and comorbid ODD, and ADHD and comorbid CD on a measure of
     psychosocial impairment.

4.   There will be a significant difference among three groups of children with ADHD
     alone, ADHD and comorbid ODD, and ADHD and comorbid CD on a measure of
     ADHD behavior problem.

5.   Age will explain possible group differences in the total scores of depression,
     anxiety, psychosocial impairment, or behavior problem measure.

6. Gender will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

7. Race will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

8.   SES will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

9.   ADHD subtypes will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

10.   Group membership (i.e., ADHD alone, ADHD and comorbid ODD, and ADHD and comorbid CD group) will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

Procedures

The present study examines a portion of the larger database system that has been collected at the PADSU since 1998. At the PADSU, data has been gathered for a study of ADHD detection and service use of children enrolled in public elementary schools in Florida. The procedures in data collection have been taken through a three-phase for the PADSU study between 1998 and 2005.

This researcher was granted access to a portion of the entire database system for the limited purpose necessary to conduct this study. A written Data Use Agreement was made between the researcher and the PADSU (Dr. Regina Bussing) and this researcher for purposes of defining the terms and conditions of the use of the database system maintaining ethnical standards and confidentiality requirements as specified by the PADSU policy and the Institutional Review Board of the University of Florida (Appendix).

In order to conduct the present study, data sets for ADHD and comorbid disruptive behavioral disorders were drawn from the entire three-phase database system. In order to ensure children and their parent's confidentiality, children's names were coded.

Participants

A sample of 164 children was selected to form the following three independent groups based on the presence or absence of comorbid disruptive behavioral disorders: children with ADHD symptoms alone ($n = 65$), ADHD + comorbid ODD ($n = 75$), and ADHD + comorbid CD ($n = 24$). The first group included all children who were diagnosed with ADHD symptoms only. The second group included all children who were diagnosed having ADHD symptoms and comorbid ODD symptoms. The third group included all children who were diagnosed having ADHD symptoms and comorbid CD symptoms. The three groups are independent and mutually exclusive.

Diagnoses of ADHD, ODD, and CD were made using a psychiatric diagnostic interview, Diagnostic Interview Schedule for Children (DISC-IV; NIMH, 1997), with the child's parent alone. Students ranged in age from 5 through 12 ($M = 8.05$, $SD = 1.75$). Forty nine percent ($n = 80$) were males and fifty one percent ($n = 84$) were females. Sixty nine percent ($n = 113$) were whites while thirty one ($n = 51$) blacks.

Measures

The present study used the data set in areas of functioning experienced by children with ADHD and comorbid disruptive disorders as measured by depression, anxiety, and psychosocial impairment scales at Phase 2, as well as behavioral problems ratings at Phase 3.

Child and parent characteristics. Sociodemographic characteristics, including gender, age, race, and SES status (based on Hollingshead scores), were obtained from school district administrative records and confirmed during interviews. Based on federal government guidelines involving family income, lunch status was identified as subsidized

and nonsubsidized, with subsidized lunch corresponding to lower socioeconomic status

(Bussing, 2003a).

Diagnostic Interview Schedule for Children (DISC-IV-Parent version).

Diagnoses of ADHD, ODD, and CD were determined by administering the Diagnostic

Interview Schedule for Children-IV (DISC-IV), based on the DSM-IV. The parent

version of the DISC-IV was used because of the young age of the sample and the lack of

a self-report version for younger children. The use of the parent version for a diagnosis

were also made in light of previous studies aggregating data from parents and children

which found parents alone were effective informants for disruptive disorders

(Bird, Gould, & Staghezza, 1992; Bussing, 2003b). The interview is designed to obtain

selected DSM-IV diagnoses based on parent reports of the child's past and present

behavioral symptoms. Consistent with DSM-IV diagnostic criteria for ADHD, counts of

6 or more for either subtype constitute diagnostic levels.

DISC-IV is a highly structured interview instrument, developed by NIMH

(the National Institute of Mental Health), that is designed to be administered by

interviewers without clinical training who are intended for large-scale epidemiologic

clinical surveys of children. The interview covers mental disorders of children and

adolescents over thirty diagnoses based on diagnostic criteria as specified in DSM-IV,

DSM-III-R, and ICD-10. The interview is organized into six diagnostic sections: the

Anxiety Disorders, Mood Disorders, Disruptive Disorders, Substance-Use Disorders,

Schizophrenia, and Miscellaneous Disorders (Eating, Elimination, and so on).

The DISC questions highly structured. Parents are asked if their children

experienced specific symptoms related to a disorder during the past 6 months. If a parent

reports that a child experienced a given symptom, additional follow-up questions are asked. The one exception is conduct disorder. Symptoms of conduct disorder are recorded for the previous 6 months and the previous year. Consequently the dataset contains 2 criterion count variables, one for the previous 6 months and one for the previous year.

The possible responses to the most of DISC questions are "Yes" (1), "No" (0), and "Not Applicable" (8) or "Don't Know" (9). During the scoring process, the "Don't Know" responses were recorded as "No". Parent responses capture whether the parent knows that their child has experienced a symptom. If a parent does not know if their child experienced the symptom, symptoms were coded "No". There are very few "open-ended" responses in the DISC.

In its earlier versions, the DISC has been shown to have moderate to substantial test-retest reliability and internal consistency (Fisher, Shaffer, & Piacentini, 1993; Schwab-Stone et al., 1994). Despite its greater length and complexity, test-retest reliability results on the DISC-IV have compared favorably with the earlier versions (Shaffer et al., 2000; Shaffer et al., 2003). Community field trials demonstrated good reliability for some diagnoses. Kappa values for specific diagnoses include: 0.77 for ADHD: 0.76 for ODD, 0.41 for CD, 0.65 for Major Depression, and 0.79 overanxiety disorder.

Children's Depression Inventory (CDI). The CDI, a 27-item self-report measure for children aged 7-17 years (Kovacs, 1998), was used to assess depressive symptoms. CDI consists of the following scales: (1) Negative Mood, (2) Interpersonal Problems (3) Ineffectiveness, (4) Anhedonia, and (5) Negative Self-Esteem. On each item child selects

option that best fits him or her: "I am sad all the time"; "I am sad many times"; "I am sad once in a while". CDI raw scores were converted into age- and gender-adjusted T scores.

Alpha coefficients of reliability for the CDI have been reported in various samples. These reliability coefficients range from .71 to .89, indicating good internal consistency of the instrument. Test-retest reliability estimates are .82 over 2 weeks and .77 over 1 month. The validity of CDI support that the inventory assesses important constructs which have strong explanatory and predictive utility in the characterization of depressive symptoms in children and adolescents. A significant main effect for gender was found ($F(1) = 16.2$, $p<.001$), indicating that boys in the normative sample scored higher on the total CDI than girls. Main effects were also found for gender on the Interpersonal Problems ($F = 60.5$, $p<.001$), Ineffectiveness ($F = 33.1$, $p<.001$), Anhedonia ($F = 4.9$, $p<.001$) factors. A discriminate function analysis, based on the CDI scores from 134 children and adolescents clinical group and those form 1,266 normative sample, yielded a significant discriminant function ($F(1,1397) = 11.85$, $p = .0006$).

Revised Children's Manifest Anxiety Scale (RCMAS). The RCMAS, a 37 yes-no item self-report measure for children aged 6-19 years (Reynolds & Richmond, 1997), was used to assess anxiety symptoms. It provides scores for Total Anxiety and four subscales: (1) Worry/Oversensitivity, (2) Social Concerns/Concentration, (3) Physiological Anxiety, and (4) Lie Scale. RCMAS raw scores were converted to age- and gender-adjusted T scores.

Internal consistency and test-retest reliability coefficients of the RCMAS are also reported to be high (Reynolds & Richmond, 1985). For the Total Anxiety score, an internal consistency estimate is .83 with the test development sample of 329 children.

Coefficient alpha reliabilities estimates are .84 for white males, .85 for black males, .85

for white females, and .78 black females. Coefficient alpha reliabilities estimates, based

on a national standardization sample ($N = 4,972$) of RCMAS, are .60s and .70s for the

Physiological Anxiety scale, .70s and .80s for the Worry/Oversensitivity scale, and .60s

for the Social Concerns/Concentration scale. A test-retest reliability coefficient over 9

months is .68 for the Total Anxiety score in a sample of 534 children. The Lie Scale

correlated .58 across 9 months.

The RCMAS displays suitable convergent and divergent validity (e.g., supporting a

three factor structure of each scale except Lie Scale). Coefficients of congruence

(e.g., r_c) were .99 for Physiological Anxiety, .99 for Worry/Oversensitivity, .96 for

Social Concerns/Concentration, and .99 for Lie Scale. Corresponding s indices were .79,

.92, .92, and 1.00. Coefficients of congruence for factor structures were consistent for

gender and ethnicity (r_c = .99 and .98, respectively).

Columbia Impairment Scale (CIS). The CIS is a 13-item scale designed to assess

children's a global measure of psychosocial impairment based on a parent-report measure

(Bird et al., 1993). It originally was developed for the National Institute of Mental Health

Methods for the Epidemiology of Child and Adolescent Mental Disorders Study

(Flisher et al., 1997). This measure evaluates four basic areas of child's functioning; (1)

Interpersonal relations, (2) Broad psychopathological domains, (3) Functioning in job or

schoolwork, and (4) Use of leisure time.

Items are scored on a 4 point Likert scale ranging from No Problem to A Very Big

Problem with the potential total score from 0 to 52. A score of $\geq$ 16 is considered

indicative of definite impairment, therefore highest scores indicate greater levels of

impairment. It has been demonstrated that the CIS provides an adequately reliable and

valid measure of impairment as well as correlates highly with the clinician–determined

scores of the Children's Global Assessment Scale (Bird et al., 1993; Shaffer et al., 1983).

The CIS has been tested in a combined clinic and community sample for internal

consistency, as well as construct validity. The CIS also has been tested in a several

ethnic/racial community sample as part of the Methods for the Epidemiology of Child

and Adolescent Mental Disorder (MECA) for test-retest reliability and construct and

concurrent validity. Test-retest reliability estimates were .89 for parent and .63 for child

version. Discriminant validity also is high that children who used mental health services

were significantly ($p<.001$) more impaired than those who had not used. Concurrent

validity estimates, compared to a measure of Children's Global Assessment Scale

(C-GAS), were .63 (e.g., Pearson r) for parent and .43 for child.

The Swanson, Nolan and Pelham (SNAP-IV) Parent Rating Scale. The SNAP-

IV is a standardized rating scale consisting of operationalized DSM-IV criteria for

ADHD. SNAP-IV was used to assess the severity of behavioral problems as rated by

parent report forms. It contains the items from the DSM-IV criteria for ADHD. Also

items are included from the DSM-IV criteria for ODD.

The SNAP-IV is based on a 0 to 3 rating scale: Not at All = 0, Just a Little = 1,

Quite A Bit = 2, and Very Much = 3. Subscale scores on the SNAP-IV are calculated by

summing the scores on the items in the subset and dividing by the number of items in the

subset.

The internal consistency of the original SNAP was reportedly high (greater than .9

for all symptom clusters), and two-week test-retest reliability was .7 for inattention items,

.8 for impulsivity items, and .9 for hyperactivity items. Norms have been established for the SNAP for boys and girls of elementary school age for average ratings per item (Swanson, 1992). Scores that are 2 SD above the norm indicate severe symptom levels. The SNAP-IV displays suitable convergent and divergent validity as well as diagnostic accuracy is high. A factor analysis was performed and a 2-factor solution was obtained, representing Inattention and Hyperactivity/Impulsivity. These two factors explained 77.78% of the variance. The ADHD-I items had higher loadings than the ADHD-HI items on the Inattention factor, which accounted for 41.52% of the variance; the ADHD-HI items had higher loadings than the ADHD-I items on the Hyperactivity/Impulsivity factor, which accounted for 32.26% of the variance.

Statistical Data Analysis

Analysis of Variance (ANOVA) analyses was used to ascertain whether emotional, behavioral or psychosocial functioning was experienced differently by three groups of children with ADHD symptoms alone, ADHD + comorbid ODD symptoms, and ADHD + comorbid CD symptoms on measures of depression, anxiety, psychosocial impairments, or behavioral problem ratings. However, the one-way ANOVA does not specifically indicate which pair of groups exhibits statistical differences. Thus, Post Hoc tests (i.e., Tukey HSD) were conducted to determine which specific groups were differentially displayed.

And then, two-way ANOVA analyses were conducted to investigate the effects of demographic (i.e., age, gender, race, and SES) variables and ADHD subtypes on the depression, anxiety, psychosocial impairment, ADHD behavior symptom scores for each independent group.

Finally, Regression analyses also were used to estimate the amount of variance that explained by the effect of age, gender, race, SES, ADHD subtypes, and group membership in order to identify whether the variables predict differences in areas of the functioning experienced by the three independent groups. A significance level of this study was set at .05.

| 13,180 | The number of elementary students enrolled in a school district in Florida. |

| 3,158 selected | Using a gender-stratified random design, 3,158 children were selected, that oversampled girls (2:1) to ensure adequate representation |

| 2,035 contacted | Telephone contact was made with 75% of selected sample (n=2,035) and of these, 79% (n=1,615) agreed to participate. |

| Phase 1 (1998 ~ 1999) | Of 1,615 children screened, 24% (n=381) were identified as 1) being diagnosed or treated for ADHD, 2) suspected of having ADHD, or there was parental concern about behavior problems in children with parental scores of SNAP- IV. |

| Phase 2 (1999 ~ 2000) | • From this pool of 381 children, 70% (n=266) participated in follow-up home interviews that included diagnostic and service use assessment.
• Diagnoses of ADHD, ODD, and CD were made using the DISC-IV Parent version (Diagnostic Interview Schedule for Children).
• 266 children completed diagnostic and service use assessment including psychological/social measures such as Children's Depression Inventory (CDI), Revised Children's Manifest Anxiety Scale for Children (RMAS), and Columbia Impairment Scale (CIS). |

| Phase 3 (2001~) | • Phase 3 consisted of a 12-month telephone follow-up survey collecting service use and SNAP-IV behavioral rating scales completed by 220 parents and school teachers. |

Figure 2. A flow chart of procedures for sampling and measurements of the PADSU study

CHAPTER 4
RESULTS

The purpose of this study was to investigate whether emotional, behavioral and psychosocial functioning were experienced differently by three groups of children with ADHD alone, ADHD + ODD, and ADHD + CD symptoms on measures of depression, anxiety, psychosocial impairment, and ADHD behavior symptoms. Main effects of age, gender, race, SES, and ADHD subtypes on the emotional, behavioral, and psychosocial functioning for the three independent groups were also examined.

Specifically, the following hypotheses were investigated in this study:

1. There will be a significant difference among three groups of children with ADHD alone, ADHD+ODD, and ADHD+CD for anxiety symptoms.

2. There will be a significant difference among three groups of children with ADHD alone, ADHD+ODD, and ADHD+CD for depression symptoms.

3. There will be a significant difference among three groups of children with ADHD alone, ADHD+ODD, and ADHD+CD for psychosocial impairment symptoms.

4. There will be a significant difference among three groups of children with ADHD alone, ADHD+ODD, and ADHD+CD for ADHD behavior symptoms.

5. Age will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

6. Gender will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

7. Race will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

8. SES will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

9. ADHD subtypes will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

10. Group membership (i.e., ADHD alone, ADHD and comorbid ODD, and ADHD and comorbid CD group) will explain possible group differences in the total scores of depression, anxiety, psychosocial impairment, or behavior problem measure.

Three separate sets of analyses were performed to investigate above the hypotheses. First, one-way ANOVA (Analysis of Variance) analyses were used to compare the three groups of children (i.e., ADHD alone, ADHD+ODD, and ADHD+CD group) for each of the outcome measures of depression, anxiety, psychosocial impairment, and ADHD behavior. Post hoc tests (i.e., Tukey HSD) then were conducted to localize differences among groups.

Second, two-way ANOVA analyses were conducted to investigate the effects of demographic (i.e., age, gender, race, and SES) and other (ADHD subtypes) variables on the depression, anxiety, psychosocial impairment, ADHD behavior symptom scores for each independent group. Regression analyses then were conducted to estimate which variables predicted mean scores of depression, anxiety, psychosocial impairment, ADHD behavior symptoms for each independent group.

Finally, multiple linear regression analyses were conducted by stepwise procedures to determine the independent relationship of group membership to the total score of depression, psychosocial, and ADHD behavior symptoms. All predictor variables (gender, race, age, SES, and ADHD subtypes) were put together as independent variables with group membership to determine possible influence of group membership.

Descriptive Statistics

A sample of 164 children was selected to form the following three independent groups based on the presence of comorbid disruptive behavioral disorders: children with ADHD symptoms alone ($n = 65$), ADHD + comorbid ODD symptoms ($n = 75$), and ADHD + comorbid CD symptoms ($n = 24$).

Children ranged in age from 5 through 12 ($M = 8.05$, $SD = 1.75$). Forty nine

percent ($n = 80$) were males and fifty one percent ($n = 84$) were females. Sixty nine

percent ($n = 113$) were whites while thirty one ($n = 51$) blacks. In order to investigate age

effects, children were classified into two age groups (i.e., a 5 to 8 year children for

younger group and a 9 to 12 year children for older group). Fifty seven percent ($n = 93$)

were included in a 5-8 year group and forty three percent ($n = 71$) were included in a 9-12

year group.

Procedures established in previous studies were followed (Bussing et al., 2003a;

Bussing et al., 2003c). Children were classified as high and low SES group; a

Hollingshead score of 33 or greater for high SES group and less than 33 for low SES

group. Fifty seven percent ($n = 94$) were included in the high SES group and forty three

percent ($n = 70$) were included in the low SES group.

Additionally, ADHD subtypes of participants also were investigated to determine

the effects of ADHD subtypes. Thirty two percent ($n = 53$) were diagnosed as ADHD

inattentive type. Twenty seven percent ($n = 27$) were diagnosed as ADHD hyperactive-

impulsive type. Fifty one percent ($n = 84$) were diagnosed as ADHD combined type.

Descriptive statistics for the samples are displayed in Table 1.

Group Differences: One-way ANOVA Analyses

Before conducting ANOVA analyses, both assumptions of normality and

homogeneity of variance were tested. Test of normality showed that data did not

demonstrate a problem with the normality of the distribution. The Levene tests showed

that the assumption of homogeneity of variance was met for the total scores of

depression, anxiety, psychosocial impairment, and ADHD behavior (p > .05,

respectively). Specifically, results of the Levene tests are provided in Table 2.

Table 1. Descriptive characteristics of samples

	ADHD alone		ADHD+ODD		ADHD+CD	
	N	*%*	*N*	*%*	*N*	*%*
Total	65	39	75	46	24	15
Gender						
Male (*n*= 80)	32	40	37	46	11	14
Female (*n*= 84)	33	39	38	45	13	16
Race						
White (*n* = 113)	48	42	53	47	12	11
Black (*n* = 51)	17	33	22	43	12	24
Age						
5-8 year (*n* = 93)	38	41	48	51	7	8
9-12 year (*n* = 71)	27	38	27	38	17	24
SES						
High (*n* = 94)	41	43	43	46	10	11
Low (*n* = 70)	24	34	32	46	14	20
ADHD subtype						
Inattentive (*n* = 53)	29	55	18	34	6	11
Hyperactive-Impulsive (*n* = 27)	13	48	11	41	3	11
Combined (*n* = 84)	23	27	46	55	15	18

Table 2. Homogeneity of variance

Rating Scale	Levene Test
Depression Scores	$F(2, 145) = 2.246, p > .05$
Anxiety Scores	$F(2, 157) = 2.531, p > .05$
Psychosocial Impairment Scores	$F(2, 137) = .767, p > .05$
ADHD Behavior Scores	$F(2, 137) = .710, p > .05$

Emotional Functioning

Depression. Results of group comparison on depression symptoms are presented

in Table 3. An analysis of variance indicated a significant difference among all three

groups in depression symptoms (F [2, 145] = 2.45, p < .1). Total mean score of

depression symptoms for ADHD+CD children (M = .47) were significantly higher than

those for ADHD alone (M = .33) and ADHD+ODD (M = .36) children. The total mean

score of depression symptoms for ADHD+ODD children were significantly higher than

those for ADHD alone children.

Additional post hoc comparison (i.e., Tukey HSD) analyses were followed to

determine where the actual mean differences were. In contrast to the findings from

significant mean score differences, post hoc multiple comparison tests indicated that only

ADHD+CD group was significantly different from the group with ADHD alone (p = .07)

with the ADHD+CD group displaying a higher level of depression symptoms than the

ADHD alone group. No significant group differences were found between ADHD+CD

and ADHD+ODD groups and between ADHD+ODD and ADHD alone groups.

Anxiety. Results of group comparison on anxiety symptoms are presented in Table

4. An analysis of variance showed no significant difference among all three groups on

anxiety symptoms (F [2, 157] = .78, p > .1). Total mean scores of anxiety symptoms for

each group were .50 for ADHD alone, .53 for ADHD+ODD, and .56 for ADHD+CD

children. Likewise, subscale mean scores (i.e., physiological anxiety,

worry/oversensitivity, and social concerns/concentration) of the anxiety symptom

measure did not differ among all three groups. Thus, additional post hoc comparisons

were not performed for multiple comparison tests.

Psychosocial Functioning

Results of group comparison on psychosocial impairment symptoms are presented

in Table 5. An analysis of variance showed a significant difference among all three

groups in total mean score (F [2, 137] = 20.00, p = .000) of psychosocial impairment

symptoms. Total mean score of psychosocial impairment symptoms for ADHD+CD children (M = 2.91) were significantly higher than those for ADHD alone (M = 1.97) and ADHD+ODD (M = 2.35) children. The total mean score of ADHD+ODD children also were significantly higher than those for ADHD alone children.

Additionally, post hoc comparisons yield significant differences among all the three groups. Specifically, the ADHD+CD group displayed a higher level of psychosocial impairment symptoms than those of ADHD alone group (p = .000) and the ADHD+ODD group (p = .001). The ADHD+ODD group displayed a higher level of psychosocial impairment symptoms than those of the ADHD alone group (p = .002).

Behavior Functioning

Results of group comparison on ADHD behavior symptoms are presented in Table 6. An analysis of variance showed a significant difference among all three groups in total mean scores (F [2, 137] = 12.58, p = .000) and subscale mean scores (F [2, 137] = 3.12, p < .05 for Inattention subscale, F [2, 137] = 5.34, p < .01 for Hyperactive-Impulsive subscale, and F [2, 137] = 16.22, p < .0001 for ODD subscale) of ADHD behavior symptoms. The total mean score of ADHD behavior symptoms for ADHD+CD children (M = 2.04) was significantly higher than those for ADHD alone (M = 1.50) and ADHD+ODD (M = 1.73) children. The total mean score of ADHD behavior symptoms for ADHD+ODD children was significantly higher than those for ADHD alone children.

Based on the total scores of ADHD behavior symptoms, post hoc comparisons indicated that the ADHD+CD group had a higher level of ADHD behavior symptoms than those of ADHD alone group (p = .00) and ADHD+ODD group (p = .013). The ADHD+ODD group had a higher level of ADHD behavior symptoms than those of the ADHD alone group (p = .014).

On three subscales (i.e., Inattention, Hyperactivity-Impulsivity, and ODD subscale), each subscale mean score of ADHD+CD children was also significantly higher than those for ADHD+ODD and ADHD alone children. Each subscale mean score of ADHD+ODD children also was significantly higher than those for ADHD alone children.

Based on the subscale mean scores, post hoc results indicated ADHD+CD group displayed a higher level of Inattention, Hyperactivity-Impulsivity, and ODD subscale symptoms than those of the ADHD alone group. However, no group differences were found between ADHD+ODD and ADHD+CD children for inattention and hyperactivity-impulsivity symptoms; group differences were found between ADHD+ODD and ADHD+CD children for ODD symptoms. Findings from subscale mean scores are provided in Table 6.

The Effects of Gender, Race, Age, SES, and ADHD Subtype: Two-way ANOVA and Regression Analyses

Emotional Functioning on Depression.

Results of two-way ANOVAs on depression symptoms are presented in Table 7. The results showed no main effects for gender, age, and ADHD subtypes. There also were no interaction effects of group membership (i.e., ADHD alone, ADHD + ODD, and ADHD + CD group) to gender, age, and ADHD subtypes. In contrast, the results showed main effects for race ($F[5, 142] = 2. 89, p < .1$) and SES ($F[5, 142] = 5. 67, p < .05$). Significant interaction effect was found only between SES and group membership ($F[5, 142] = 3. 08, p = .049$). The finding from race comparisons means that generally black children experienced higher levels of depression symptoms regardless of group membership.

Based on the results of the two-way ANOVAs, separate linear regression analyses were conducted for each group to determine the independent relationships of race and SES to total score of depression symptoms (see Table 10). Regression equations found lower SES group explained higher depression score only for ADHD alone group (β = -.4.485). The variance explained by SES for the ADHD alone group is 15.7%. SES did not significantly predict the total score of depression symptoms for two other groups. This means that SES differences are significant in the ADHD alone group. However, there were no race effects in regression equations for all three groups.

Finally, multiple linear regression analyses were conducted by stepwise procedures to determine the independent relationship of group membership (i.e., ADHD alone, ADHD+ODD, and ADHD+CD group) to the total score of depression symptoms (see Table 11). All predictor variables (gender, race, age, SES, and ADHD subtypes) were put together as independent variables with group membership to determine possible influence of group membership. Regression equations indicated that group membership did not significantly contribute to the overall prediction of depression symptoms score (p = .080). None of other variables except SES significantly predicted total score of depression symptoms.

Psychosocial Functioning

Results of two-way ANOVAs on psychosocial impairment symptoms are presented in Table 8. The results showed no main effects for gender, race, and SES. There were also no interaction effects of group membership to gender, race, and SES. In contrast, the results showed main effects for age (F[5, 134] = 3. 41, p < .1) and ADHD subtypes (F[8, 131] = 4. 25, p < .05). Significant interaction effects were found only between age and group membership (F[5, 134] = 3. 03, p < .1). The finding from ADHD subtypes

means that children with combined type experienced higher levels of psychosocial impairment regardless of group membership.

Based on the results of the two-way ANOVAs, separate linear regression analyses were conducted for each group to determine the independent relationships of age and ADHD subtypes to total score of psychosocial impairment symptoms (see Table 10). Regression equations showed that age was negatively related to prediction of total psychosocial impairment score only for ADHD+CD group (β = -.694). The variance explained by age for the ADHD+CD group is 20.8%. Age did not significantly predict total score of psychosocial impairment symptoms for two other groups. This means that age differences are significant in the ADHD+CD group. Additionally, regression equations found ADHD subtypes were positively related to prediction of total psychosocial impairment score for ADHD+CD group (β =.328). The variance explained by ADHD subtypes is 6.8% for ADHD alone group and 18.1% ADHD+CD group respectively. However, there is no race effect in regression equations for ADHD+ODD group.

Finally, multiple linear regression analyses were conducted by stepwise procedures to determine the independent relationship of group membership (i.e., ADHD alone, ADHD+ODD, and ADHD+CD group) to the total score of psychosocial symptoms (see Table 11). All predictor variables (gender, race, age, SES, and ADHD subtypes) were put together as independent variables with group membership to determine possible influence of group membership. Regression equations showed that group membership significantly contributed to the overall prediction of psychosocial impairment symptom score (p = .000). Group membership explained 22.2% of the variance on psychosocial

impairment symptom scores. ADHD subtypes significantly contributed to the overall

prediction of scores of psychosocial impairment symptoms (p = .020). Group

membership and ADHD subtypes accounted for 25.2% of the variance on psychosocial

impairment symptom scores.

Behavior Functioning

Results of two-way ANOVAs on ADHD behavior symptoms are presented in

Table 9. The results showed no main effects for gender and SES. Additionally, there were

no interaction effects of group membership to gender and SES. In contrast, the results

showed main effects for race (F[5, 134] = 10.10, $p < .01$), age (F[5, 134] = 10.60,

$p < .001$), and ADHD subtypes (F[8, 131] = 8.50, $p = .000$). However, there were no

significant interaction effects of group membership to age, race, and ADHD subtypes.

These findings on main effects for age, race, and ADHD subtypes mean that younger age,

blacks, and ADHD combined type are associated with higher levels of ADHD behavior

symptoms regardless of group membership.

Based on the results of the two-way ANOVAs, separate linear regression analyses

were conducted for each group to determine the independent relationships of race, age,

and ADHD subtypes to total score of ADHD behavior symptoms (see Table 10).

Regression equations found race and ADHD subtypes were positively related to

prediction of total ADHD behavior symptom scores only for ADHD alone group

(β = 2.87 for race and β =.156 for ADHD subtypes). Age was negatively related to

prediction of total ADHD behavior symptoms score only for ADHD alone group

(β = -.354). The variance explained by race, age, and ADHD subtypes for the ADHD

alone group is 9.3%, 19.7%, and 12.9% respectively. This means that race, age, and

ADHD subtype differences are significant in the ADHD alone group. However, there is

no race, age, and ADHD subtype effects in regression equations for ADHD+ODD and ADHD+CD groups.

Finally, multiple linear regression analyses were conducted by stepwise procedures to determine the independent relationship of group membership (i.e., ADHD alone, ADHD+ODD, and ADHD+CD group) to the total score of ADHD behavior symptoms (see Table 11). All predictor variables (gender, race, age, SES, and ADHD subtypes) were put together as independent variables with group membership to determine possible influence of group membership. Regression equations found group membership significantly contributed to the overall prediction of ADHD behavior symptom score ($p = .000$). Group membership explained 10.6% of the variance on ADHD behavior symptom score. ADHD subtype, race, and age also significantly contributed to the overall prediction of scores of ADHD behavior symptoms. ADHD subtype, group membership, race and age accounted for 34.7% of the variance on ADHD behavior symptom score.

Summary

For depression, psychosocial impairment, and ADHD behavior symptoms, significant group differences were found on total mean scores across groups. Mean scores are significantly higher for ADHD+CD children than ADHD alone and ADHD+ODD children. Mean scores of those symptoms are significantly higher for ADHD+ODD children than ADHD alone children. However, no differences on anxiety symptoms were found across groups.

Additional post hoc tests (i.e., Tukey HSD) revealed localization of differences between groups. Findings from psychosocial impairment and ADHD behavior symptom scores are consistent with those of mean score comparisons. For depression symptoms,

however, post hoc results found only differences between the ADHD+CD and ADHD alone groups to be significant. The ADHD+CD group displays significantly higher levels of depression symptoms than ADHD alone group. Group differences were not found between ADHD+CD and ADHD+ODD groups as well as between ADHD+ODD and ADHD alone groups.

Results of two-way ANOVAs revealed effects or interactions of demographic and other variables for the depression, psychosocial impairment, and ADHD behavior symptom scores for each group. For depression symptoms, significant main effects or interaction effects were found for race and SES. For psychosocial impairment symptoms, significant main effects or interaction effects were found for age and ADHD subtype. For ADHD behavior symptoms, significant main effects were found for race, age, and ADHD subtypes.

Regression analyses revealed which variables predicted mean scores of depression, psychosocial impairment, ADHD behavior symptoms for each group. SES was negatively related to prediction of total depression symptom score for ADHD alone group. Age and ADHD subtypes also significantly contributed to prediction of total psychosocial impairment symptom score for ADHD+CD group. Age was negatively related to prediction of total depression symptom score for ADHD alone group while ADHD subtypes were positively related. Additionally, race, age, and ADHD subtypes significantly contributed to prediction of total ADHD behavior symptom score for ADHD alone group. Race and ADHD subtypes were positively related to prediction of total ADHD behavior symptom score for ADHD alone group while age was negatively related.

Finally, multiple linear regression analyses revealed independent relationship of group membership to total score of depression, psychosocial, and ADHD behavior symptoms across groups. Group membership did not significantly contribute to the prediction of depression symptoms. However, group membership significantly contributed to the prediction of psychosocial impairment and ADHD behavior symptoms.

Table 3. Means, standard deviations, F value, and post hoc comparison of total depression score (CDI)

Child- rated depression symptoms	ADHD alone ($n = 59$) [a]		ADHD+ODD ($n = 68$) [b]		ADHD+CD ($n = 21$) [c]			
	Mean	SD	Mean	SD	Mean	SD	F Value $df = (2,145)$	Post hoc comparisons (Tukey HSD)
Total	.33	.21	.36	.23	.47	.29	2.45*	ADHD+CD > ADHD alone

Note: CDI = Child Depression Inventory, [a] There are 6 missing values from original samples ($n = 65$), [b] There are 7 missing values from original samples ($n = 75$), [c] There are 3 missing values from original samples ($n = 24$), *$P < .1$, **$P < .05$, ***$P < .01$, ****$P < .001$, *****$P < .0001$.

Table 4. Means, standard deviations, and F values of total and subtotal anxiety score (RCMAS)

Child- rated anxiety symptoms	ADHD alone ($n = 64$)[a]		ADHD+ODD ($n = 74$)[b]		ADHD+CD ($n = 22$)[c]			
Subscale	Mean	SD	Mean	SD	Mean	SD	*F* Value $df = (2,157)$	
Physiological anxiety	.50	.21	.53	.24	.48	.28	.41	NS
Worry/ oversensitivity	.50	.26	.53	.29	.55	.33	.33	NS
Social concerns/ concentration	.44	.25	.50	.27	.50	.26	.88	NS
Total	.50	.19	.53	.23	.56	.21	.78	NS

Note: RCMAS = Revised Child Manifested Anxiety Scale, NS = Not Significant,
[a] There are 1 missing values from original samples ($n = 65$), [b] There are 1 missing values from original samples ($n = 75$),
[c] There are 2 missing values from original samples ($n = 24$).

Table 5. Means, standard deviations, F values, and post hoc comparison of total psychosocial impairment score (CIS)

Parent-rated psychosocial impairment symptoms	ADHD alone $(n = 56)$ [a]		ADHD+ODD $(n = 62)$ [b]		ADHD+CD $(n = 22)$ [c]			
	Mean	SD	Mean	SD	Mean	SD	F Value $df = (2,137)$	Post hoc comparisons (Tukey HSD)
Total	1.97	.54	2.35	.6	2.91	.69	20.00*****	ADHD+CD > ADHD+ODD > ADHD alone

Note: CIS = Columbia Psychosocial Impairment Scale, [a] There are 9 missing values from original samples ($n = 65$),
[b] There are 13 missing values from original samples ($n = 75$), [c] There are 2 missing values from original samples ($n = 24$),
*$P < .1$, **$P < .05$, ***$P < .01$, ****$P < .001$, *****$P < .0001$.

Table 6. Means, standard deviations, F value, and post hoc comparison of total behavior score (SNAP-P)

Parent-rated ADHD behavior symptoms	ADHD alone (n = 56) [a]		ADHD+ODD (n = 62) [b]		ADHD+CD (n = 22) [c]			
Subscale	Mean	SD	Mean	SD	Mean	SD	F Value $df = (2,137)$	Post hoc comparisons (Tukey HSD)
Inattention	2.61	.68	2.71	.67	3.03	.63	3.12**	ADHD+CD > ADHD alone
Hyperactive-Impulsive	2.32	.71	2.54	.67	2.88	.75	5.34***	ADHD+CD > ADHD alone
ODD	1.98	.68	2.45	.75	3.04	.98	16.22*****	ADHD+CD > ADHD+ODD > ADHD alone
Total	1.50	.40	1.73	.42	2.04	.54	12.58*****	ADHD+CD > ADHD+ODD > ADHD alone

Note: SNAP-P = The Swanson, Nolan and Pelham (SNAP-IV) Parent Rating Scale, ODD = Oppositional Defiant Disorder,
[a] There are 9 missing values from original samples (n = 65), [b] There are 13 missing values from original samples (n = 75),
[c] There are 2 missing values from original samples (n = 24), *P < .1, **P < .05, ***P<.01, ****P < .001, *****P < .0001.

Table 7. Means, standard deviations, and F values of predictor variables for total depression symptoms score (CDI)

		ADHD alone (n = 59)		ADHD+ODD (n = 68)		ADHD+CD (n = 21)		
		Mean	SD	Mean	SD	Mean	SD	F (*df*)
Gender	Female [a]	.36	.23	.41	.26	.48	.28	1.60 (5,142)
	Male [b]	.31	.18	.32	.20	.45	.33	
	Gender x Group membership (Interaction)							0.12
Race	White [c]	.31	.31	.37	.24	.39	.31	2.89 (5,142)
	Black [d]	.42	.42	.35	.23	.54	.27	
	Race x Group membership (Interaction)							1.32
Age	Low [e]	.38	.24	.36	.25	.46	.12	.197 (5,142)
	High [f]	.29	.17	.37	.21	.47	.32	
	Age x Group membership (Interaction)							.828
SES	Low [g]	.44	.25	.35	.23	.53	.25	5.67* (5,142)
	High [h]	.27	.16	.37	.24	.38	.33	
	SES x Group membership (Interaction)							3.08*
ADHD Subtype	Inatten [i]	.27	.17	.36	.28	.55	.40	.19 (8,139)
	Hy-Imp [j]	.37	.22	.39	.31	.33	.25	
	Combin [k]	.40	.24	.36	.20	.45	.25	
	ADHD subtype x Group membership (Interaction)							1.13

Note: *P < .05, **P<.01, ***P < .001, ****P < .0001.
[a] Female (*n* = 78), [b] Male (*n* = 70); [c] White (*n* = 104), [d] Black (*n* = 44);
[e] Ages 5 to 8 year group (*n* = 77), [f] Ages 9 to 12 year group (*n* = 71);
[g] Low SES group (*n* = 64) based on Hollingshead scores (low < 33),
[h] High SES group (*n* = 84) based on Hollingshead scores (high ≥ 33);
[i] Inattentive type (*n* = 49), [j] Hyperactive-Impulsive type (*n* = 23), [k] Combined type (*n* = 76).

Table 8. Means, standard deviations, and F values of predictor variables for total psychosocial impairment symptoms score (CIS)

		ADHD alone (n = 56)		ADHD+ODD (n = 62)		ADHD+CD (n = 22)		
		Mean	SD	Mean	SD	Mean	SD	F (df)
Gender	Female[a]	2.02	.60	2.35	.67	2.85	.87	.00 (5,134)
	Male[b]	1.91	.47	2.35	.54	2.96	.43	
	Gender x Group membership (Interaction)							0.32
Race	White[c]	1.97	.55	2.37	.59	2.78	.87	.28 (5,134)
	Black[d]	1.98	.53	2.29	.65	3.03	.46	
	Race x Group membership (Interaction)							.62
Age	Low[e]	2.01	.55	2.32	.64	3.41	.70	3.41 (5,134)
	High[f]	1.94	.55	2.42	.54	2.72	.61	
	Age x Group membership (Interaction)							3.03
SES	Low[g]	1.98	.50	2.32	.73	2.96	.72	.51 (5,134)
	High[h]	1.97	.57	2.37	.51	2.84	.69	
	SES x Group membership (Interaction)							.18
ADHD Subtype	Inatten[i]	1.84	.45	2.31	.62	2.38	.63	4.25* (8,131)
	Hy-Imp[j]	1.87	.68	2.27	.64	3.23	.11	
	Combin[k]	2.15	.56	2.39	.60	3.08	.67	
	ADHD subtype x Group membership (Interaction)							1.18

Note: *P < .05, **P<.01, ***P < .001, ****P < .0001.
[a] Female (n = 74), [b]Male (n = 66); [c]White (n = 98), [d]Black (n = 42);
[e]Ages 5 to 8 year group (n = 77), [f]Ages 9 to 12 year group (n = 63);
[g]Low SES group (n = 56) based on Hollingshead scores (low < 33),
[h]High SES group (n = 84) based on Hollingshead scores (high ≥ 33);
[i]Inattentive type (n = 49), [j]Hyperactive-Impulsive type (n = 23), [k]Combined type (n = 76).

Table 9. Means, standard deviations, and F values of predictor variables for total ADHD
behavior symptom score (SNAP-P)

		ADHD alone (*n* = 56)		ADHD+ODD (*n* = 62)		ADHD+CD (*n* = 22)		
		Mean	SD	Mean	SD	Mean	SD	*F* (*df*)
Gender	Female [a]	1.52	.43	1.67	.43	1.93	.71	1.36 (5,134)
	Male [b]	1.48	.37	1.78	.41	2.15	.20	
	Gender x Group membership (Interaction)							0.84
Race	White [c]	1.43	.40	1.67	.42	1.88	.61	10.10*** (5,134)
	Black [d]	1.72	.32	1.87	.42	2.20	.43	
	Race x Group membership (Interaction)							.19
Age	Low [e]	1.66	.35	1.77	.45	2.30	.33	10.60**** (5,134)
	High [f]	1.31	.37	1.64	.37	1.94	.58	
	Age x Group membership (Interaction)							1.20
SES	Low [g]	1.56	.33	1.82	.40	2.06	.51	1.46 (5,134)
	High [h]	1.47	.44	1.66	.43	2.01	.60	
	SES x Group membership (Interaction)							.16
ADHD Subtype	Inatten [i]	1.32	.35	1.45	.32	1.81	.70	8.50***** (8,131)
	Hy-Imp [j]	1.62	.44	1.60	.36	1.96	.11	
	Combin [k]	1.63	.38	1.88	.41	2.14	.50	
	ADHD subtype x Group membership (Interaction)							.427

Note: *P < .1, **P < .05, ***P<.01, ****P < .001, *****P < .0001.
[a] Female (*n* = 74), [b]Male (*n* = 66); [c]White (*n* = 98), [d]Black (*n* = 42);
[e]Ages 5 to 8 year group (*n* = 77), [f]Ages 9 to 12 year group (*n* = 63);
[g]Low SES group (*n* = 56) based on Hollingshead scores (low < 33),
[h]High SES group (*n* = 84) based on Hollingshead scores (high ≥ 33);
[i]Inattentive type (*n* = 47), [j]Hyperactive-Impulsive type (*n* = 19), [k]Combined type (*n* = 74).

Table 10. Regression coefficients for predictors within each group that showed significant main effect or interaction (group membership x predictor) on two-way ANOVAs on depression, psychosocial impairment, and ADHD behavior symptom score

	ADHD alone				ADHD+ODD				ADHD+CD			
	R^2	F (df)	p	β	R^2	F (df)	p	β	R^2	F (df)	p	β
Depression symptoms												
Race	.044	2.620 (1,57)	.111		.032	.069 (1,66)	.793		.118	1.412 (1,19)	.249	
SES	.157	10.591 (1,57)	.002	-4.49	.002	.133 (1,66)	.716		.077	1.578 (1,19)	.224	
Psychosocial impairment symptoms												
Age	.004	.210 (1,54)	.649		.006	.006 (1,60)	.546		.208	5.242 (1,20)	.033	-.694
ADHD sub type	.068	3.933 (1,54)	.052		.005	.273 (1,60)	.603		.181	4.433 (1,20)	.048	.328
ADHD behavior symptoms												
Race	.093	5.520 (1,54)	.022	2.87	.047	2.984 (1,60)	.089		.091	1.993 (1,20)	.173	
Age	.197	13.227 (1,54)	.001	-.354	.019	1.182 (1,60)	.281		.089	1.965 (1,20)	.176	
ADHD sub type	.129	8.031 (1,54)	.006	.156	.211	16.078 (1,60)	.000		.076	1.640 (1,20)	.215	

Note: * indicates statistical significance, $p < .05$.

Table 11. Stepwise multiple linear regression analyses: Predictors of depression, psychosocial impairment, and ADHD behavior symptom score

Predictor Variables	R^2	β	S.E.	t	p	R^2 change
Depression Score[a]	.035					
Intercept		.418	.029	14.341	.000	
Gender		-.136			.094	
Age		-.020			.810	
Race		.076			.395	
Group Membership		.143			.080	
ADHD Subtype		.060			.475	
SES		-.090	.039	-.188	.022	.035
Psychosocial Impairment Score [b]	.252					
Intercept		1.399	.140	10.003	.000	
Gender		-.055			.462	
SES		.040			.605	
Age		-.001			.992	
Race		-.002			.978	
Group Membership		.418	.071	5.878	.000*	.222
ADHD Subtype		.130	.055	2.352	.020*	.030
ADHD Behavior Score [c]	.347					
Intercept		1.138	.097	11.794	.000	
Gender		.030			.682	
SES		.028			.727	
ADHD Subtype		.149	.038	3.973	.000*	.169
Group Membership		.213	.048	4.439	.000*	.106
Race		.221	.073	3.044	.003*	.044
Age		-.164	.068	-2.415	.017*	.028

Note: * indicates statistical significance, $p < .05$.
[a] $F(1,146) = 5.347, p = .022$; [b] $F(1,137) = 5.531, p = .020$; [c] $F(1,135) = 5.833, p = .017$.

CHAPTER 5
DISCUSSION

The purpose of this study was to investigate whether emotional, psychosocial, or behavioral functioning was experienced differently by three groups of children with ADHD symptoms alone, ADHD + ODD, and ADHD + CD symptoms on measures of depression, anxiety, psychosocial impairment, or ADHD behavior problem. Effects of age, gender, race, SES, and ADHD subtypes on the emotional, psychosocial, or behavioral functioning for three independent groups were also examined. Thus, the discussion focuses on group differences in those areas of functioning as well as whether possible group differences exist as a function of the demographic variables (age, gender, race, and SES) and ADHD subtypes.

Group Differences in Functioning

Possible Differences in Emotional Functioning

Depression. Although analysis of variance showed significant differences among three independent groups on mean scores of depression symptoms, post hoc multiple comparison tests yielded a significant difference only between ADHD+CD and ADHD alone groups. As hypothesized, ADHD+CD group displayed significantly higher levels of depression symptoms than ADHD alone group. However, contrary to hypothesis there were no significant differences between ADHD+CD and ADHD+ODD groups as well as between ADHD+ODD and ADHD alone groups on depression symptoms.

The finding from the current study that there were no significant differences between ADHD+ODD and ADHD alone groups on depression symptoms is unexpected

given that some previous studies reported that the ADHD+ODD group manifested significantly higher depression symptoms than the ADHD only group on children self-rating (Harada, Yamazaki, & Saitoh, 2002) and informant-ratings (i.e., parent and teacher reports; Gadow & Nolan, 2002). The previous studies indicated that the existence of comorbid ODD was distinct as a clinical entity for depression symptoms and suggested that children with both sets of symptoms (i.e., ADHD and ODD) were at greater risk for difficulties with depression symptoms.

However, in this study the presence of comorbid ODD symptoms in children with ADHD did not exert influence on a correlate of ADHD with depression symptoms. Additionally, there were no significant differences between the ADHD+CD and the ADHD+ODD groups for post hoc comparison tests on depression symptoms. However, given significant mean differences found among all the three groups with the ADHD+ODD group displaying significantly higher mean scores than the ADHD alone group, the three groups appear to be linearly related to depression symptoms. Further studies are needed to support the correlates of ADHD only and comorbid groups with depression.

Based on finding from the current study, the ADHD+CD group is more likely to manifest depression symptoms compared to ADHD alone group. The presence of comorbid CD symptoms in children with ADHD appears to be closely related to depression symptoms. The ADHD+CD group had the poorest outcome on depression symptoms. Children from ADHD+CD group are likely to be at greater risk for difficulties with depression. Thus, the finding indicates that ADHD+CD group may be clearly differentiated from ADHD alone group on depression symptoms. Depression symptoms

may function as a distinctive clinical profile of children with ADHD and comorbid CD symptoms.

It is not yet clear whether the depression symptoms should be considered to be (1) part of ADHD or (2) part of CD. Researchers have reported that depression may be a co-occurring condition with either ADHD (Angold & Costello, 1993; Biederman et al., 1996; Spencer, 2000) or CD (Angold & Costello, 1993; Capaldi, 1992). Some researchers suggested depression symptoms in children with either ADHD or CD may be secondary to chronic failure and demoralization associated with each disorder (Plizka et al., 1999; Silver, 2004). Others suggested that the correlates of either ADHD or CD with depression may reflect separate disorders inherited independently of each disorder (Biederman, Faraone, et al., 1991; Plizka et al., 1999).

Although the findings from the current study showed that depression symptoms appear to be more closely linked to the condition of CD, not to the condition of ADHD, further studies are needed to investigate whether the depression symptoms of ADHD children with comorbid CD are part of the disorders or consequences of developmental or environmental factors. The higher levels of depression symptoms in children with ADHD and comorbid CD symptoms are of concern because the joint presence of these disorders appears to increase the risk for serious and life-threatening psychiatric conditions.

Anxiety. Contrary to the hypothesis analysis of variance did not show significant differences among the three groups on mean scores of anxiety symptoms. Additionally, mean scores of each subscale (i.e., physiological anxiety, worry/oversensitivity, and social concerns/concentration scale) did not show differences between groups. Thus, post hoc comparison tests were not conducted for the total score and subscale scores.

The findings from comparisons among groups on anxiety symptoms are generally inconsistent with results from some previous studies that reported significant group differences on anxiety symptoms according to the presence of comorbid CD or ODD symptoms in children with ADHD. Specifically, in a sample of clinically diagnosed children the ADHD+CD group experienced higher levels of anxiety symptoms than the ADHD only or the ADHD+ODD group on parent- and/or child self-rating (Kuhne, Schachar, & Tannock, 1997). However, group differences between ADHD+ODD and ADHD only groups were not found.

In contrast, in another study the ADHD+ODD group manifested significantly higher anxiety symptoms than the ADHD only group on both parent and teacher ratings in the community sample as well as on parent ratings in the clinic sample (Gadow & Nolan, 2002). Additionally, an international study using a clinic sample reported conflicting results depending on the type of subscale used to measure anxiety (State-Trait Anxiety Inventory; Harada, Yamazaki, & Saitoh, 2002). On state-anxiety subscale score, the ADHD+ODD group manifested significantly higher anxiety symptoms than the ADHD only group whereas on trait-anxiety subscale score there were no significant difference between groups.

The previous studies generally indicated that ADHD+CD or ADHD+ODD group showed the poorest outcome on anxiety symptoms compared to ADHD alone group. However, based on findings from the current study, the presence of comorbid CD or ODD symptoms in children with ADHD may not be related to anxiety symptoms. Thus, anxiety symptoms may not be a distinctive clinical profile of children with ADHD and comorbid CD or ODD symptoms. One possible explanation regarding these

inconsistencies is that sample selection (i.e., community sample vs clinic sample),

assessment methods (use of different anxiety measure), and rater effects (i.e., self-rating

vs informants-rating) used by previous studies and the current study differ and may

account for the discrepancy across studies for group difference on anxiety symptoms.

Thus, further studies are needed to clear these confounding results of correlates of ADHD

and comorbid groups to anxiety symptoms.

Possible Differences in Psychosocial Functioning

Analysis of variance showed significant differences among three groups on mean

scores of psychosocial impairment symptoms. Post hoc comparison tests also yielded

significant differences among groups. As hypothesized, the ADHD+CD group displayed

significantly higher level of impairments in four areas of psychosocial functioning (i.e.,

interpersonal relations, psychopathological domains, functioning in schoolwork, and use

of leisure time) than those of the ADHD+ODD and the ADHD alone groups. The

ADHD+ODD group displayed significantly higher level of impairments in the four areas

of psychosocial functioning than those of the ADHD alone group.

The findings from a comparison among groups on psychosocial impairment

symptoms are generally consistent with some previous studies that reported significant

group differences on several areas of social functioning according to the presence of

comorbid CD or ODD symptoms in children with ADHD. For example, in a study by

Kuhne et al. (1997) which investigated child's peer relationships and engagement in

extracurricular and leisure activities as well as family relations/effects, greater social

adjustment difficulties were found in both the ADHD+ODD and the ADHD+CD groups

than in the ADHD only group on parent- and teacher-ratings. In their results, both

comorbid groups (i.e., ADHD+ODD and ADHD+CD group) displayed relatively similar

problems in many social areas. However, Kuhn et al.'s study reported no difference between the ADHD+CD and the ADHD+ODD groups on those areas of social functioning.

Likewise, ADHD+ODD group displayed greater risk for peer conflicts than ADHD only group on parent- and teacher-ratings in a community sample (Gadow & Nolan, 2002). Problems in relationships with teachers, friends, and mothers were more frequently observed in the ADHD+ODD group than in ADHD only group on child self-ratings in a clinic sample (Harada, Yamazaki, & Saitoh, 2002). Thus, the previous studies indicated that the presence of comorbid ODD or CD symptoms in children with ADHD was closely related to difficulties in social functioning while ADHD+CD group did not differ from ADHD+ODD group on social functioning.

In contrast to previous studies, in this study the ADHD+CD children displayed the highest levels of psychosocial impairment symptoms compared to those of the ADHD+ODD and the ADHD alone groups. The ADHD+ODD group displayed higher levels of psychosocial impairment symptoms than ADHD alone group while the ADHD+ODD group displayed lower levels of impairments than the ADHD+CD group. The ADHD+CD group had the poorest outcome on psychosocial functioning.

One possible explanation regarding the significant differentiation among the three groups on psychosocial impairment symptoms is that the presence of comorbid ODD or CD symptoms may contribute differently to the degree to which children's psychosocial functioning is likely to be negatively affected. Since the diagnostic criteria for CD are more severe than for ODD and CD includes elements of physical aggression and antisocial acts in addition to defiance and rebelliousness, an individual's ability to

interact effectively with peers or family members is likely to be influenced more negatively for children with comorbid CD than those with comorbid ODD. According to Frick et al. (1992), children with CD are likely to have more school suspensions and police contacts than do ODD children.

Although the key symptoms of ADHD often negatively influence an individual's ability to interact effectively with peers or family members, the most peer- or family-rejected subgroup included ADHD children with comorbid disruptive behavior symptoms (i.e., comorbid CD or ODD; Hinshaw & Melnick, 1995). The numerous and serious problems associated with ADHD affecting normal social interaction patterns of children with ADHD appear to mostly originate from disruptive behavior disorder features such as rule-breaking, aggressive, and antisocial behaviors.

For example, some studies (Barkley et al., 1992; Fletcher et al., 1996) reported that the majority of the negativity in the family interactions related to ADHD is related to comorbid disruptive behaviors in the children (particularly in the interactions of ADHD+ODD or ADHD+CD sons with their mothers). Thus, comorbidity of ADHD with disruptive behavior disorders may increase the levels and types of family-related impairments of psychosocial functioning.

Thus, issues of comorbidity appear to be crucially important in consideration of psychosocial functioning of children with ADHD (Hinshaw, 2002). Although ADHD children without ODD or CD also show marked social impairments compared to their peers without ADHD, comorbid disruptive behavior features leads to the most extreme levels of social functioning. The subgroup of ADHD children with comorbid disruptive behavior disorders may incur particularly severe peer or family disapproval.

The findings from the current study regarding psychosocial functioning support previous studies that reported that ADHD children with comorbid disruptive behaviors are more likely to display deficits in social information processing (Milich & Dodge, 1984), to experience peer rejection (Johnston & Pelham, 1986), and to have psychosocial adversity (Lahey et al., 1988).

In conclusion, findings suggest that children from both comorbid groups are likely to be at greater risk for difficulties with psychosocial functioning. The presence of comorbid CD or ODD symptoms in children with ADHD appears be closely related to psychosocial impairment symptoms. The findings also indicate that the three groups may be clearly differentiated from each other on a continuum of psychosocial impairment symptoms. Thus, psychosocial impairment symptoms may function as a distinctive clinical profile of children with ADHD and comorbid CD or ODD symptoms.

Given that difficulties with social interactions in childhood and adolescence may develop and can persist into more serious forms of psychopathology or antisocial problems (Barkely, 1998b), the consideration of children with ADHD and comorbid disruptive behavior disorders (ODD and CD) in reference to poor psychosocial functioning is of special importance for treatment.

Possible Differences in Behavior Functioning

Analysis of variance showed significant differences among groups on total mean score of ADHD behavior symptoms as well as mean scores of each subscale (i.e., Inattention, Hyperactivity-Impulsivity, and ODD symptoms subscale). Post hoc comparison tests also yielded significant differences among groups on total mean score of ADHD behavior symptoms. As hypothesized, the ADHD+CD group displayed significantly higher levels of ADHD behavior symptoms than the ADHD+ODD and the

ADHD alone group. The ADHD+ODD group also displayed significantly higher levels of ADHD behavior symptoms than the ADHD alone group.

With regard to post hoc comparison tests for mean scores of each subscale, group differences were found only between the ADHD+CD and the ADHD alone groups on both Inattention and Hyperactivity-Impulsivity subscale. For the ODD subscale, group differences were found among all the three groups. The ADHD+CD group displayed consistently higher levels of inattention, hyperactivity-impulsivity, and ODD symptoms than in the ADHD alone or the ADHD+ODD group.

The findings from a comparison among groups on ADHD behavior symptoms are generally consistent with previous studies that investigated possible group differences on ADHD subtypes and aggression symptoms relative to the presence of comorbid conditions. In a study by Harada et al. (2002), the number of ADHD subtype symptoms between ADHD+ODD and ADHD only groups did not differ, and the number of ODD symptoms for both groups also did not differ. Likewise, in a study by Kuhne et al. (1997), there were no significant group differences between the ADHD+ODD and the ADHD only groups on aggression symptoms on both parent- and teacher-ratings. However, the ADHD+CD group displayed significantly higher aggression symptoms than the other two groups on both ratings.

Thus, the previous studies indicated that the presence of comorbid CD symptoms in children with ADHD was closely related to children's aggression whereas the presence of comorbid ODD was neither related to aggression symptoms nor ADHD subtype symptoms. Likewise, the ADHD+CD children in this study displayed the highest levels of ADHD behavior symptoms (i.e., inattention, hyperactivity-impulsivity, and ODD

symptoms) compared to those of the ADHD alone group. In contrast to previous studies, the ADHD+ODD group in this study displayed higher levels of ODD symptoms than the ADHD alone group while the ADHD+ODD group displayed lower levels of ODD symptoms than the ADHD+CD group.

Findings from the current study indicate that the presence of comorbid CD in children with ADHD was closely related to ADHD behaviors symptoms (i.e., inattention, hyperactivity-impulsivity, and ODD symptoms) whereas the presence of comorbid ODD in children with ADHD was related only to ODD symptoms. The ADHD+CD group had the poorest outcome on ADHD behavior functioning. Children from the ADHD+CD group are likely to be at greater risk for difficulties with behavior functioning.

Given that previous research indicates that ADHD children with comorbid disruptive behaviors are likely to display more severe ADHD symptoms (Walker et al., 1987) and that children with more severe ADHD symptoms tend to display higher aggressive conduct problems compared to children with mild ADHD symptoms (McGee et al., 1984), the findings from the current study that both comorbid groups are more likely to display higher ADHD behavior symptoms could be expected. However, further studies are needed to support the finding that there were no significant differences between the ADHD+ODD and the ADHD alone groups on inattention and hyperactivity-impulsivity symptoms, particularly since relatively little is known about comorbid ODD or CD. Furthermore, although a very few previous studies (Harada et al., 2002; Kuhne et al., 1997) also reported findings that the ADHD+ODD and the ADHD only groups did not differ on the number of ADHD subtype symptoms, ODD symptoms and aggression

symptoms, the previous studies with regard to the sample size and resulting statistical power was relatively limited.

In conclusion, the findings from current study indicate that the ADHD+CD group may be clearly differentiated from the ADHD alone group on ADHD behavior symptoms. The ADHD+ODD group may be differentiated from the ADHD alone group only on ODD symptoms. Thus, ADHD behavior symptoms may function as a distinctive clinical profile of children with ADHD and comorbid CD symptoms. However, given significant mean differences found among all three groups with the ADHD+ODD group displaying significantly higher mean scores than ADHD alone group on the three subscales, the three groups appear to be linearly related to a continuum of ADHD subtype symptoms.

Effects of Demographic Variables and ADHD Subtypes

In contrast to somewhat ample scholarship on pure ADHD in children and adolescents, less is known as to effects of demographic variables (age, gender, race, and SES) and ADHD subtype on areas of emotional, psychosocial, or behavioral functioning according to the presence of comorbid CD or ODD symptoms. A comparison of findings from the current study was limited due to unavailability of previous studies. Thus, the following sections focus on providing preliminary evidence of the effects of demographic variables and ADHD subtype on those areas of functioning for both comorbid groups. The following sections cover areas of depression, psychosocial, and ADHD behavior symptoms. Anxiety is not included because there were no differences among groups on this dimension.

Emotional Functioning

      Depression. SES was associated with depression symptom score only in ADHD

alone group. Race, gender, age, and ADHD subtypes did not predict the total scores of

depression symptoms for any of three groups. Although there were main effects for race,

an association between race and the depression symptom scores was not found for any

group.

      For the ADHD alone group, SES was negatively related to prediction of the

depression symptom score (the variance explained by SES was 15.7%). Thus, low SES

children in ADHD alone group are likely to have higher depression symptoms. However,

SES variable did not predict depression symptom scores for either of the comorbid

groups. The finding of association of lower SES children with higher depression

symptom score in ADHD alone group is consistent with previous studies that investigated

whether children's clinical problems interact cumulatively with adverse environments

(i.e., single-parent status, low income, and parent's education level, etc.) across the

course of development of ADHD.

      The previous studies indicated that stability of family was correlated with positive

outcomes of academic performance and educational attainment (Barkely, 1998b) whereas

low-SES family environments were found to predict a negative outcome for children with

ADHD such as social maladjustments (Fischer et al., 1993), behavior problems (Stattin &

Trost, 2000; Nagin & Trembly, 2001), antisocial behaviors (Fischer et al., 1993; Pevalin

et al., 2003), and even a poorer behavioral treatment response (Webster-Stratton &

Hammond, 1990).

      However, the finding that SES variable did not predict depression symptom scores

for comorbid CD group was unexpected given that some researchers has indicated that

children diagnosed with CD, either pure or comorbid with ADHD, were characterized as having lower socioeconomic status and experiencing higher levels of psychosocial adversity, including increased family problems (Plizka et al., 1998; Schachar & Tannock, 1995). In contrast, others do not support the association of familial problems with the comorbidity of ADHD and CD in that some children who had ADHD and CD symptoms from a very early age come from affluent, upper-class families having reasonable parenting skills and empathy which was used to raise other children without such problems (Robin, 1998). Thus, the association of SES status in children with ADHD and comorbid CD remain unclear.

One possible explanation based on the findings from the current study is that depression may be more closely correlated with ADHD, not with CD, especially when adverse SES environments are involved. However, further studies are needed to support the findings from the current study because the causes and determinants for the development of the correlates of SES status with depression symptoms in children ADHD alone or ADHD+CD group has been unknown.

In conclusion, only SES variable contributed to the prediction of the group difference between the ADHD alone and the ADHD+CD groups on depression symptom scores. However, it is difficult to generalize this finding because SES status was associated only with the ADHD alone group, not with the ADHD+CD group. Contrary to the hypothesis other demographic variables (race, gender, and age) did not explain depression symptom scores for any of three independent groups. Additionally, group membership (i.e., ADHD alone, ADHD+ODD, ADHD+CD) itself did not explain total scores of depression symptoms.

Another finding from current study is that ADHD-I (Inattention) subtype was associated with the depression symptom score only for the ADHD alone group (variance explained was .8%), although ADHD subtypes did not explain the depression symptom score across groups. The finding of association between ADHD-I subtype and the ADHD alone group is consistent with some researchers' (Gaub & Carlson, 1997; Hinshaw, 2002; Paternite, Loney, & Roberts, 1996) assertions that ADHD-I subtype is more likely to be associated with internalizing features or disorders (i.e., anxiety and depression) relative to other subtypes. However, there was no association between ADHD-I subtype and two comorbid groups for depression symptom scores.

Psychosocial Functioning

Age and ADHD subtypes were associated with psychosocial impairment symptom score only in ADHD+CD group. Gender, race, and SES did not explain the symptom scores for any of three independent groups.

For the ADHD+CD group, age was negatively related to prediction of the psychosocial impairment symptom score (the variance explained by age was 20.8%) Thus, children in lower age (children in ages 5 to 8 compared to children in ages 9 to 12 in higher age group) are more likely to account for higher psychosocial impairment symptoms in ADHD+CD group. However, age did not predict the symptom score for the ADHD+ODD or the ADHD alone group.

This finding of an association of children in lower age with higher psychosocial impairment symptom score in the ADHD+CD group was unexpected given that CD symptoms of older children and teenagers are usually taken more seriously than those of younger children because the consequences are greater – i.e., teenage CD symptoms like drug or alcohol abuse or antisocial acts. Further studies are needed to support the finding

of age effect in reference to informant effects. In this study, psychosocial impairment measure was rated by parents, mostly mothers. Thus, the finding from the current study may be confounded with informant effects (i.e., halo effects, gender role expectations, caregiver effects).

ADHD subtypes were positively related to prediction of psychosocial impairment symptom score only in ADHD+CD group (the variance explained by ADHD subtypes was 18.1%). Specifically, ADHD-C (Combined) subtype accounted for higher psychosocial impairment symptom score in the ADHD+CD group whereas Inattention or Hyperactivity-Impulsivity subtype did not predict the symptom score in the ADHD+CD group. The finding of an association of ADHD-C subtype with the higher symptom scores in the ADHD+CD group is consistent with findings from some previous studies with children having ADHD alone.

For example, DSM-IV field trials found that children with ADHD-C subtype were more impaired on the Global Assessment Scale than counterparts in the other subtypes (Lahey, et al., 1994a). Additionally, teacher reports showed that children with ADHD-C subtype were seen as more deviant in peer relations, incited their peers, and had difficulty meeting teacher expectations relative to children with ADHD-I subtype (Barkley, DuPaul, & McMurray, 1990). Children with this subtype were also found to be often actively rejected by peers (Eiraldi et al., 1997). The finding from current study indicates that ADHD-C subtype may be a predictor variable not only for the ADHD alone group but for the ADHD+CD group on psychosocial functioning.

Group membership (the variance explained was 22.2%) and ADHD subtypes (the variance explained was .3%) explained total scores of psychosocial impairment

symptoms. The finding regarding group membership supports previous results in this study that there were significant differences between three independent groups on psychosocial impairment symptom score. Thus, three groups can be differentiated from each other as a clinical entity by psychosocial functioning.

Behavior Functioning

Race, age, and ADHD subtypes were associated with ADHD behavior symptom scores only in ADHD alone group. Gender and SES did not explain the total scores of ADHD behavior symptom score for any of three independent groups.

For ADHD alone group, race was positively related to the prediction of ADHD behavior symptom score (the variance explained was 9.3%) while age was negatively related (the variance explained was 19.7%). Thus, lower age and black group are more likely to account for higher ADHD behavior symptom score in ADHD alone group. However, race and age did not predict the symptom score for ADHD+ODD or ADHD+CD group.

The finding of association of children in lower age with higher ADHD behavior symptom may be related to developmental outcomes of ADHD. Neither ADHD nor comorbid disorders generally are static in their manifestations. For example, research indicates that the developmental outcome of ADHD manifests differently in children and adolescents. The course of ADHD varied with approximately half of the few prospectively studied patient groups going on to do well, while the other half continued with significant levels of symptoms of ADHD from childhood to adolescence (Barkley et al., 1990), and through adulthood (Weiss & Hechtman, 1993). Thus, researchers indicate there is much variation of ADHD and comorbid disorders in manifestations by age.

The finding of association of black children with higher ADHD behavior symptom in ADHD alone group is consistent with those from many previous studies. For example, compared to white children, black children have a higher prevalence of ADHD symptoms (Costello & Janiszewski, 1990; Jarvinen & Sprague, 1995; Reid et al., 1998).

Various explanations have been offered for these differences in prevalence rate. Some believe black children are more likely to be exposed to prenatal risk factors, psychosocial stressors, and economic disadvantage, which in turn adversely impacts ADHD behaviors (Reid et al, 1998; Samuel et al., 1999). Others question the validity of instruments used to assess ADHD, believing they are normed only on whites or that items bias distorts scores of children from some minority groups (Jarvinen & Sprague, 1995; Reid et al., 1998). Some believe the concept of ADHD and instruments designed to assess it reflect Western perspective, that neither the concept nor instruments considers cultural differences, and that the threshold for establishing ADHD may have cultural determinants (Anderson, 1996; Barkley, 1998b; Bird, 2002).

In conclusion, race and age contributed to the prediction of the group difference among three independent groups on ADHD behavior symptom scores. However, it is also difficult to generalize this finding because the two variables were associated only with ADHD alone group, not with ADHD+ODD or ADHD+CD group. Contrary to the hypothesis other demographic variables (i.e., gender and SES) did not explain ADHD behavior symptom score for any of three independent groups.

The finding that gender was not associated with ADHD behavior symptom score in ADHD alone group was unexpected given that male's higher manifestation of primary ADHD symptoms over female have been reported in many previous studies (Gaub &

Carlson, 1997b; Gershon, 2002). Generally, ADHD is thought to be more frequent in males than in females regardless of age. Among children with ADHD, the ratio ranges from 2:1 to 9:1 depending on the subtype and whether the data come from a clinic referred sample (e.g., 6:1) or a random sample (e.g., 3.4:1) (APA, 2000; Angold et al., 2000; Barkley, 1998a). Compared to males diagnosed with ADHD, females diagnosed with ADHD manifested fewer symptoms of inattention, hyperactivity and impulsivity (Gershon, 2002).

ADHD subtypes were positively related to prediction of the ADHD behavior symptom scores only in the ADHD alone group (the variance explained was 12.9%). Specifically, ADHD-HI (Hyperactivity-Impulsivity) and ADHD-C (Combined) subtype accounted for ADHD behavior symptom scores in ADHD alone group, whereas Inattention subtype did not predict the symptom score in the ADHD alone group.

Group membership (the variance explained was 10.6%), ADHD subtypes (16.9%), race (4.4%), and age (2.8%) explained total scores of ADHD behavior symptoms. The finding indicates that group membership and subtypes generally predict ADHD behavior symptom scores. Thus, three groups can be differentiated from each other as a clinical entity on ADHD behavior functioning.

Implication of Findings

In comparison with pure forms of ADHD, relatively little is known about disruptive comorbid conditions of ADHD. In this study the presence of comorbid ODD or CD symptoms in children with ADHD altered the correlates of ADHD for emotional, psychosocial, and behavioral functioning. Additionally, the presence of comorbid ODD or CD symptoms contributed differently to the degree to which children's functioning is likely to be negatively affected.

Depression, psychosocial impairment, and ADHD behavior problems (Inattention, Hyperactivity-Impulsivity, and ODD symptoms) were more closely related to the comorbid condition of ADHD+CD. In contrast, psychosocial impairment and ADHD behavior problems (only for ODD symptoms) were closely related to the comorbid condition of ADHD+ODD. However, the presence of comorbid CD or ODD symptoms in children with ADHD was not be related to anxiety symptoms.

The ADHD+CD group had the poorest outcome on areas of depression, psychosocial impairment, and ADHD behavior functioning. The ADHD+ODD group had poorer outcome than those of the ADHD alone group, but not as poor as the ADHD+CD group on psychosocial impairment and ADHD behavior (only for ODD symptoms) functioning.

Demographic variables (age, gender, race, and SES) and ADHD subtypes generally did not explain significant differences found among groups for emotional, psychosocial, and ADHD behavior functioning, although some variables were closely associated with specific groups. Group membership (i.e., ADHD alone, ADHD+ODD, and ADHD+CD) predicted psychosocial functioning and ADHD behavior functioning while it did not explain emotional functioning (i.e., depression and anxiety both).

Although the identification of correlates (e.g., emotional, psychosocial, and behavioral adjustment variables) of ADHD cannot explain causation, the degree to which correlates in ADHD, ODD, and CD differ argues for their existence as separate clinical entities (Kuhne, Schachar, & Tannock, 1997). It is important to verify the degree to which ADHD, ODD, and CD are similar or different with regard to the conceptualization of their respective diagnostic categories (Kuhne, Schachar, & Tannock, 1997).

Findings support preliminary evidence for the notion that the ADHD+CD group may constitute a separate and distinct clinical entity for depression, psychosocial, and ADHD behavior functioning in school-aged children compared to the ADHD alone group. Additionally, the ADHD+ODD group may constitute a separate clinical entity for psychosocial functioning and ODD symptoms of ADHD behavior functioning compared to the ADHD alone group.

Findings also suggest that the three independent groups may be linearly related on a continuum for depression, psychosocial functioning, and ADHD behavior functioning given the ADHD+CD group displaying significantly increased mean scores for those areas of functioning compared to ADHD+ODD group.

The findings will expand counselors' understanding and knowledge of psychological and behavioral complications that ADHD children with comorbid ODD or CD symptoms are likely to experience as a result of impairment of the comorbidity. It will help counselors' programming better develop treatment programs for children with ADHD in schools, mental health clinics, and community counseling settings. In counseling practice, an intervention and treatment programs of children with ADHD should pay attention to the presence of comorbid ODD or CD symptoms because the presence of comorbid conditions altered correlates of ADHD and clinical aspects for their depression, psychosocial, and ADHD behavior functioning. In particular, children with ADHD and comorbid CD are more likely to be at increased risk for difficulties in those areas of functioning.

For ADHD children in ages 5 to 12, it is critical for counselors or clinicians to investigate the impact that symptoms of ADHD or comorbid ODD or CD conditions have

on emotional, psychosocial, and behavioral domains and how these problems eventually affect the child's quality of life. Based on an assessment of the child's assets and deficits, counselors or clinicians should employ various strategies that have been found to decrease the negative effects of ADHD and comorbid conditions on the child's development and adjustment.

Intervention programs for ADHD children with comorbid disorders should utilize not only interventions that address multiple areas of impairments in functioning but also intervention programs that utilize multiple strategies and techniques from different approaches, including behavioral (for parent training and classroom behavioral management), psychosocial and cognitive-behavioral (for emotional and social problems), and medical-pharmacological (for reducing hyperactivity and increasing attention) approaches (Teeter & Semrud-Clickman, 1995).

Additionally, interventions continue to focus on primary caregivers, including parents and teachers, in an effort to increase their management and coping skills. It is critical that adults who interact with children understand the important role they themselves play in developing appropriate expectations, using effective reinforcers and consequences for child behaviors, and adjusting the environment to increase social interaction skills of children with ADHD and comorbid conditions (Teeter, 1998).

Interventions also should focus directly on children with ADHD and comorbid conditions and be designed to facilitate the development of their social interaction, self-management, and emotional development skills. Helping students understand how their ADHD and comorbid disorders affects their life functioning may be one way for children with ADHD and comorbid disorders to begin to see themselves as having the capacity to

manage themselves in their environment (Goldstein & Goldstein, 1998). The intervention strategies should help them understand the effects of ADHD and comorbid disorders on their functioning and provide a repertoire of skills to enhance their functioning (Webb & Myrick, 2003).

Limitations and Future Directions

The results from the current study may be influenced by methodological issues, including whether self-reports or parent-reports are influenced by rater effects (e.g., gender role expectations, caregiver bias, halo effects). Additionally, the results may be influenced by sample selection (i.e., the use of community sample) and assessment methods (i.e., characteristics of psychometric measures used in this study).

Other limitations may involve difficulties in the investigation of internalizing symptoms (i.e., anxiety, depression). These do not lend themselves to easy quantification. Some internalizing symptoms are subjective and difficult to assess in children by the less objective nature than externalizing behaviors (i.e., fighting, temper outbursts, or stealing). Moreover, literature indicated the reliability of both parent and child reports is lower for internalizing symptoms than for externalizing symptoms. In addition, parent-child agreement is also low both on the presence or absence of depressive symptoms and anxiety symptoms.

Another limitation may be the lack of procedures for diagnosing internalizing comorbid disorders for samples in this study. The comorbid diagnosis for study samples was implemented only for screening externalizing disorders (i.e., ODD, CD), not for affective disorders (i.e., anxiety, depression). Thus, some children may be diagnosed having a comorbid mood disorder or anxiety disorder symptoms.

Additionally, the current study is limited in its generalizability to both black and white children. Additional studies on children from different racial and ethnic groups are needed. Additional studies that include large clinical samples also are needed.

Future studies are needed to investigate whether any impairment in functioning relates to the core subtype of ADHD as opposed to comorbid conditions that may accompany ADHD. Future studies need to control for both ADHD subtypes and comorbidity to examine the correlates of ADHD to emotional, psychosocial, and behavior functioning. Finally, future studies need to examine children's academic functioning and behavior functioning in school setting (e.g., academic achievement scores and grade, discipline records, attendance and absence, consequences of referral, repeating of grades and drop-out, etc.). These data obtainable from school and teachers will provide more information about life functioning of children with ADHD and comorbid disruptive behavior disorders.

Summary

This chapter discussed the result of the study. It was determined that the presence of comorbid ODD or CD symptoms in children with ADHD altered the correlates of ADHD for emotional, psychosocial, and behavioral functioning. Demographic variables (age, gender, race, and SES) and ADHD subtypes generally did not explain significant differences found among groups for emotional, psychosocial, and ADHD behavior functioning. Group membership predicted psychosocial functioning and ADHD behavior functioning while it did not explain emotional functioning (i.e., depression and anxiety both). Implications for research and practice were emphasized, including a need for increased focus on arenas for functioning. Limitations were described, including screening procedures for internalizing comorbid disorders, assessment methods, and rater

effects. Finally, future directions for the effect of ADHD and comorbid disorder on

child's adjustment and development were discussed.

APPENDIX A

CORRELATIONS AMONG VARIABLES ON DEPRESSION, PSYCHOSOCIAL
IMPAIRMENT, AND ADHD BEHAVIOR SYMPTOM SCORE

Depression symptom	1	2	3	4	5	6	7
1. Symptom mean score	1.000						
2. Gender	-0.148	1.000					
3. Race	0.141	-0.054	1.000				
4. Age	-0.018	-0.097	-0.003	1.000			
5. SES	-0.188	0.062	-0.417	-0.008	1.000		
6. ADHD subtype	0.103	0.169	0.131	-0.149	-0.247	1.000	
7. Group membership	0.165	-0.040	0.178	0.162	-0.127	0.184	1.000

Psychosocial impairment symptom	1	2	3	4	5	6	7
1.Symptom mean score	1.000						
2. Gender	-0.013	1.000					
3. Race	0.102	-0.119	1.000				
4. Age	0.010	-0.106	0.003	1.000			
5. SES	-0.066	0.070	-0.420	-0.053	1.000		
6. ADHD subtype	0.253	0.177	0.135	-0.208	-0.244	1.000	
7. Group membership	0.471	0.021	0.181	0.108	-0.136	0.173	1.000

Behavior symptom	1	2	3	4	5	6	7
1. Symptom mean score	1.000						
2. Gender	0.079	1.000					
3. Race	0.313	-0.119	1.000				
4. Age	-0.199	-0.106	0.003	1.000			
5. SES	-0.066	0.070	-0.420	-0.053	1.000		
6. ADHD subtype	-0.175	0.177	0.135	-0.208	-0.244	1.000	
7. Group membership	0.392	0.021	0.181	0.108	-0.136	0.173	1.000

BRIEF DATA USE AGREEMENT FORM

This Data Use Agreement is made and entered into by and between the Program for ADHD Detection and Service Use (ADSU, Principal Investigator, Dr. Regina Bussing) and Data Recipient (Dong Hun Lee) for purposes of defining the terms and conditions of the use of ADHD research data.

I, Dong Hun Lee, acknowledge that access to the information from the ADSU described below and provided by the ADSU is granted solely upon the condition that I agree to abide by the terms set forth in this Release Assurances Form.

I agree to comply with the following conditions:

Confidentiality

A. The confidentiality of the ADSU data described above will be maintained by requirements specified by the Institutional Review Board of the University of Florida for the protection of human subjects.

B. No information from the ADSU data described above will be published or disseminated in a form that might permit identification of an individual participant.

Data Recipient's Signature_____ Date_____

Data Recipient's Adviser:
Dr. James Archer, Ph.D. Counselor Education & Psychology

Approved by:
Dr. Regina Bussing,
Principal Investigator for Study ADHD: Detection and Service Use

LIST OF REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1968). *Diagnostic and statistical manual of mental disorders* (2nd ed.). Washington, DC: American Psychiatric Association.

Abikoff, H. B. (2002). Matching patients to treatments. In P.S. Jensen & J.R. Cooper (Eds.), *Attention deficit hyperactivity disorder: State of science/best practices* (pp.15:1-15:14). Kingston, NJ: Civic Research Institute.

Abikoff, H. B., Jensen, P. S., Arnold, L. L. E., Hoza, B., Hechtman, L., Pollack, S., Martin, D., et al., (2002). Observed classroom behavior of children with ADHD: Relationship to gender and comorbidity. *Journal of Abnormal Child Psychology, 30*(4), 349-359.

Abikoff, H., & Klein, R. G. (1992). Attention-deficit hyperactivity and conduct disorder: Comorbidity and implications for treatment. *Journal of Consulting & Clinical Psychology, 60*(6), 881-892.

Anderson, J. (1996). Is childhood hyperactivity the product of western culture? *The Lancet, 348*, 73-74.

Anderson, C. A., Hinshaw, S. P., & Simmel, C. (1994). Mother-child interactions in ADHD and comparison boys: Relationships with overt and covert externalizing behavior. *Journal of Abnormal Child Psychology, 22*(2), 247-265.

Angold, A. (1988). Childhood and adolescent depression: II. Research in clinical populations. *British Journal Psychiatry, 141*(8), 1195-1202.

Angold, A., & Costello, E. J. (1993). Depressive comorbidity in children and adolescents. *American Journal of Psychiatry, 40,* 57-87.

Angold, A., Erkanli, A., & Egger, H. L. (2000). Stimulant treatment for children: A community perspective. *Journal of the American Academy of Child & Adolescent Psychiatry, 39*(8), 975-984.

Applegate, B., Lahey, B., Hart, E., Biederman, J., Hynd, G. W., Barkley, R. A., Ollendick, T., et al., (1997). Validity of the age-of-onset criterion for ADHD: A report from the DSM-IV field trials. *Journal of the American Academy of Child & Adolescent Psychiatry, 36*(9), 1211-1221.

Arbus, K. R. (2003). Examining children diagnosed with ADHD and ODD for symptoms of major depression. *Doctoral dissertation manuscript.* Chicago School of Professional Psychology, Illinois.

Arnold, L. E. (1996). Sex differences in ADHD: Conference summary. *Journal of Abnormal Child Psychology, 24*(5), 555-569.

August G. J., & Garfinkel, B. D., (1993). The nosology of attention-deficit hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 32*, 155-165.

Barkley, R. A. (1996a). Attention-deficit hyperactivity disorder. In E. J. Mash & R. A. Barkley (Eds.), *Child psychopathology* (pp. 63-112). New York: The Guilford Press.

Barkley, R. A. (1996b). Critical issues in research on attention. In G. R. Lyon & N. A. Krasnegor (Eds.), *Attention, memory and executive function* (pp. 45-56). New York: The Guilford Press.

Barkley, R. A. (1998a). Critical issues in research on attention. In G. R. Lyon & N. A. Krasnegor (Eds.), *Attention, memory and executive function* (pp. 45-56). Baltimore: Brookes.

Barkley, R. A. (1998b). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (2nd ed.). New York: The Guilford Press.

Barkley, R. A. (1998c). The prevalence of ADHD, Is it just a U.S. disorder? *The ADHD Report, 6*(2), 1-6.

Barkley, R. A. (2002). ADHD-long term course, adult outcome, and comorbid disorders. In P.S. Jensen & J.R. Cooper (Eds.), *Attention deficit hyperactivity disorder: state of science/best practices.* Kingston, NJ: Civic Research Institute.

Barkley, R. A., Anastopoulos, A. D., Guevremont, D. C., & Fletcher, K. F. (1992). Adolescents with attention deficit hyperactivity disorder: Mother-adolescent interactions, family beliefs and conflicts, and maternal psychopathology. *Journal of Abnormal Child Psychology, 20*(3), 263-288.

Barkley, R. A., DuPaul, G. J., & McMurray, M. B. (1990). Comprehensive evaluation of attention deficit disorder with and without hyperactivity as defined by research criteria. *Journal of Consulting & Clinical Psychology, 58*(6), 775-789.

Barkley, R. A., Fischer, M., Edelbrock, C. S., Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. An 8-year prospective follow-up study. *Journal of the American Academy of Child & Adolescent Psychiatry, 29*(4), 546-557.

Barkley, R. A., Guevremont, D. C., Anastopoulos, A. D., DuPaul, G. J., & Shelton, T. L. (1993). Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: A 3-to 5-year follow-up survey. *Pediatrics, 92,* 212-218.

Barkley, R. A., Murphy, K., & Kwasnik, D. (1996a). Motor vehicle driving competencies and risks in teens and young adults with attention deficit hyperactivity disorder. *Pediatrics, 98,* 1089-1095.

Barkley, R. A., Murphy, K., & Kwasnik, D. (1996b). Psychological adjustment and adaptive impairments in young adults with ADHD. *Journal of Attention Disorders, 1*(1), 41-54.

Baumgaertel, A., Wolraich, M. L., & Dietrich, M. (1995). Comparison of diagnostic criteria for attention deficit disorders in a Germany elementary school sample. *Journal of the American Academy of Child & Adolescent Psychiatry, 34*, 629-638.

Biederman, J., Faraone, S., Doyle, A., Lehman, B. K., Kraus, I., Perrin, J., Tsuang, M.T. (1993). Convergence of the Child Behavior Checklist with structured interview-based psychiatric diagnoses of ADHD children with and without comorbidity. *Journal of Child Psychology & Psychiatry, 34*(7), 1241-1251.

Biederman, J., Faraone, S. V., Keenan, K., Benjamin, J., Krifcher, B., Moore, C., et al., (1992). Further evidence for family-genetic risk factors in attention deficit hyperactivity disorder: Patterns of comorbidity in probands and relatives in psychiatrically and pediatrically referred samples. *Archives of General Psychiatry, 49*(9), 728-738.

Biederman, J., Faraone, S. V., Keenan, K., & Knee, D. (1990). Family-genetic and psychosocial risk factors in DSM-III attention deficit disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 29*(4), 526-533.

Biederman, J., Faraone, S. V., Keenan, K., Steingard, R., & Tsung,M. T. (1991). Familial association between attention deficit disorder and anxiety disorders. *American Journal of Psychiatry, 148*(2), 251-256.

Biederman, J., Faraone, S., & Lapey, K. A. (1992). Comorbidity of diagnosis in attention-deficit disorder, In G. Weiss (Eds.), *Attention-deficit hyperactivity disorders (pp. 335-360).* Philadelphia, PA:WB Sanduers.

Biederman, J., Faraone, S., Mick, E., Spencer, T., Wilens, T., Kiely, K., et al. (1995). High risk for attention deficit hyperactivity disorder among children of parents with childhood onset of the disorder. *American Journal of Psychiatry, 152*, 431-435.

Biederman, J., Faraone, S., & Milberger, S. (1996). A prospective 4-year follow-up study of attention-deficit hyperactivity and related disorders. *Archives of General Psychiatry, 53*(5), 437-446.

Biederman, J., Faraone, S., Milberger, S., Jetton, J. G. (1996). Is childhood oppositional defiant disorder a precursor to adolescent conduct disorder? Findings from a four-year follow-up study of children with ADHD. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*(9), 1193-1204.

Biederman, J., Faraone, S., Spencer, T., Wilens, T., Norman, D., Lapey, K. A., et al. (1993). Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with attention deficit hyperactivity disorder. *American Journal of Psychiatry, 150*(12), 1792-1798.

Biederman, J., Munir, K., & Knee, D. (1987). Counduct and oppositional disorder in clinically referred children with attention deficit disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 26*, 724-727.

Biederman, J., Newcorn, J., & Sprich, S. (1991). Comorbidity of attention deficit hyperactivity disorder with conduct, depressive, anxiety, and other disorders. *American Journal of Psychiatry*, 148, 564-577.

Bird, H. (2002). The diagnostic classification, epidemiology, and cross-cultural validity of ADHD. In P.S. Jensen & J.R. Cooper (Eds.), *Attention deficit hyperactivity disorder: state of science/best practices.* Kingston, NJ: Civic Research Institute.

Bird, H., Gould, M., Staghezza, B. (1992). Aggregating data from multiple informants in child psychiatry epidemiological research. *Journal of Academy Child and Adolescents Psychiatry, 31*(1), 78-85.

Bird, H., Shaffer, D., Fisher, P., Gould, M., Staghezza, B., Chen, J., et al. (1993). The Columbia Impairment Scale (CIS): Pilot findings on a measure of global impairment for children and adolescents. *International Journal of Methods in Psychiatry Research, 3,* 167-176.

Boyle, M. H., Offord, D. R., Racine, Y., & Sanford, M. (1993). Evaluation of the Diagnostic Interview for Children and Adolescents for use in general population samples. *Journal of Abnormal Child Psychology, 21*(6), 663-681.

Brown, T.E. (2000). Emerging understandings of attention-deficit disorders and comorbidities, In T.E. Brown (Eds.), *Attention-deficit disorders and comorbidities in children, adolescents, and adults* (pp.3-56). Washington, DC: American Psychiatric Press.

Brumback, R. A. (1988). Childhood depression and medically treatable learning disabilities, In D. L. Molfese, & S. J. Segalowitz (Eds.). Brain lateralization in children (pp. 463-505). New York: The Guilford Press.

Bussing, R., Gary, F., & Garvan, C., Mason, D., Leon, C., Sinha, K., & Garvan, C. (2003a). Child temperament, ADHD, and caregiver strain: Exploring relationships in an epidemiological sample. *Journal of Academy Child and Adolescents Psychiatry*, *42*(2), 184-192.

Bussing, R., Zima, B., Gary, F., & Garvan, C. (2003b). Barriers to detection, help-seeking, and service use for children with ADHD symptoms. *The Journal of Behavioral Health Sciences & Research*, *30*(2), 176-189.

Bussing, R., Mason, D. M., Leon, C. F., & Sinha, K. (2003c). Agreement between CASA parent reports and provider records of children's ADHD services. *The Journal of Behavioral Health Sciences & Research*, *30*(4), 462-470.

Capaldi, D. M. (1991). Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: I. Familial factors and general adjustment at grade 6. *Development & Psychopathology, 3*(3), 277-300.

Capaldi, D. M. (1992). The co-occurrence of conduct problems and depressive symptoms in early adolescent boys: II. A 2-year follow-up at grade 8. *Development & Psychopathology, 4*, 125-144.

Carey, W. B. (2002). Is ADHD a valid disorder? In P.S. Jensen & J.R. Cooper (Eds.), *Attention deficit hyperactivity disorder: state of science/best practices*. Kingston, NJ: Civic Research Institute.

Carlson, C. L., Lahey, B. B., & Frame, C. L. (1987). Sociometric status of clinic-referred children with attention deficit disorders with and without hyperactivity. *Journal of Abnormal Child Psychology, 15*(4), 537-547.

Cohen, P., Velez, C. N., Brook, J., & Smith, J. (1989). Mechanisms of the relation between perinatal problems, early childhood illness, and psychopathology in late childhood and adolescence. *Child Development, 60*(3) 701-709.

Conners, K. (2002). Preface: attention deficit hyperactivity disorder – where have we come, where are we going. In P.S. Jensen & J.R. Cooper (Eds.), *Attention deficit hyperactivity disorder: state of science/best practices.* Kingston, NJ: Civic Research Institute.

Conners, C. K., Sitarenios, G., & Parker, J. D. A. (1998a). The revised Conners' Parent Rating Scale (CPRS-R): Factor structure, reliability, and criterion validity. *Journal of Abnormal Child Psychology, 26*(4), 257-268.

Conners, C. K., Sitarenios, G., & Parker, J. D. A. (1998b). The revised Conners' Parent Rating Scale (CPRS-R): Factor structure, reliability, and criterion validity. *Journal of Abnormal Child Psychology, 26*(4), 279-291.

Costello, E. J. & Janiszewski, S. (1990). Who gets treated? Factors associated with referral in children with psychiatric disorders. *Acta Psychiatrica Scandinavica, 81*(6), 523-529.

Cunningham, C. E., Benness, B. B., & Siegel, L. S. (1988). Family functioning, time allocation, and parental depression in the families of normal and ADDH children. *Journal of Clinical Child Psychology, 17*(2), 169-177.

Donenberg, G., & Baker, B. L. (1994). The impact of young children with externalizing behaviors on their families. *Journal of Abnormal Child Psychology, 21, 179-198.*

DuPaul, G. J. (1991). Parent and teacher ratings of ADHD symptoms: Psychometric properties in a community-based sample. *Journal of Clinical Child Psychology, 20*(3), 245-253.

DuPaul, G. J., Anastopoulos, A. D., & Power, T. J. (1998). Parent ratings of attention-deficit/hyperactivity disorder symptoms: Factor structure and normative data. *Journal of Psychopathology & Behavioral Assessment, 20*(1), 83-102.

DuPaul, G. J., Power, T. J., & Anastopoulos, A. D. (1997). Teacher ratings of attention deficit hyperactivity disorder symptoms: Factor structure and normative data. *Psychological Assessment, 9*(4), 436-444.

DuPaul, G. J., Power, T. J., Anastopoulos, A. D., Reid, R., McGoey, K. E., & Ikeda, M. J. (1997). Teacher ratings of attention deficit hyperactivity disorder symptoms: Factor structure and normative data. *Psychological Assessment, 9*(4), 436-444.

Eiraldi, R. B., Power, T. J., & Karustis, J. L. (2000). Assessing ADHD and comorbid disorders in children: The Child Behavior Checklist and the Devereux Scales of Mental Disorders. *Journal of Clinical Child Psychology, 29*(1), 3-16.

Eiraldi, R., Power, T., & Maguth Nezu, C. (1997). Patterns of comorbidity associated with subtypes of attention deficit hyperactivity disorder among 6 to 12 year-old children. *Journal of American Academy of Child and Adolescent Psychiatry, 36(4),* 503-514.

Erhardt, D., & Hinshaw, S. P. (1994). Initial sociometric impressions of attention-deficit hyperactivity disorder and comparison boys: Predictions from social behaviors and from nonbehavioral variables. *Journal of Consulting & Clinical Psychology, 62*(4), 833-842.

Faraone, S., Biederman, J., Chen, W., Milberger, R., & Tsuang, M. (1995). Genetic hetero geneity in attention-deficit hyperactivity disorder (ADHD): Gender, psychiatric comorbidity, and maternal ADHD. *Journal of the Abnormal Psychology, 104*, 334-345.

Faraone S. V., Biederman, J., Weber, W., & Russell, R. (1998). Psychitric, neuropsychological, and psychosocial features of DSM-IV subtypes of attention-deficit/hyperactivity disorder: Results from a clinically referred sample. *Journal of the American Academy of Child and Adolescent Psychiatry*, 37, 185-193.

Farmer, J. E., & Peterson, L. (1995). Injury risk factors in children with attention deficit hyperactivity disorder. *Health Psychology, 14*(4), 325-332

Farrington, D. P. (1991a). Childhood aggression and adult violence: Early precursors and later-life outcomes, In D. J. Pepler & K. H. Rubin (Eds.), *Development and treatment of childhood aggression* (pp. 5-29). England: Lawrence Erlbaum Associates, Inc.

Farrington, D. P. (1991b). Psychological contributions to the explanation of offending. *Issues in Criminological & Legal Psychology, 1*(17), 7-19.

Fergusson, D. M., & Horwood, L. J. (1995). Predictive validity of categorically and dimensionally scored measures of disruptive childhood behaviors. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34, 477-496.

Fergusson, D. M., & Horwood, L. J., & Lynskey, M. T. (1993). The effects of conduct disorder and attention deficit in middle childhood on offending and scholastic ability at age 13. *Journal of Child Psychology & Psychiatry, 34*(6), 899-916.

Fischer, M., Barkley, R. A., Fletcher, K., & Smallish, L. (2002). Young adult follow-up of hyperactive children: Self-reported psychiatric disorders, comorbidity, and the role of childhood conduct problems and teen CD, *Journal of Abnormal Child Psychology*, 30(5), 463-475

Fisher, P., Shaffer, D., & Piacentini, J. (1993). Sensitivity of the diagnostic interview schedule for children, 2nd edition (DISC-2.1) for specific diagnoses of children and adolescents. *Journal of Academy Child and Adolescent Psychiatry*, 32, 666-673.

Fletcher, K. E., Fischer, M., Barkley, R. A., & Smallish, L. (1996). A sequential analysis of the mother-adolescent interactions of ADHD, ADHD/ODD, and normal teenagers during neutral and conflict discussions. *Journal of Abnormal Child Psychology, 24*(3), 271-297.

Flisher, A., Kramer, R., Hoven, C., Greenwald, S., Alegria, M., Bird, H., et al. (1997). Psychosocial characteristics of physically abused children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 36(1),* 123-131.

Forehand, R. L., Wierson, M., Frame, C., & Kemptom, T. (1991). Juvenile delinquency entry and persistence: Do attention problems contribute to conduct problems? *Journal of Behavior Therapy & Experimental Psychiatry, 22*(4), 261-264.

Frick, P. J., Lahey, B. B., & Applegate, B. (1994). DSM-IV field trials for the disruptive behavior disorders: Symptom utility estimates. *Journal of the American Academy of Child & Adolescent Psychiatry, 33*(4), 529-539.

Frick, P. J., Lahey, B. B., Loeber, R., & Stouthamer-Loeber, M. (1992). Familial risk factors to oppositional defiant disorder and conduct disorder: Parental psychopathology and maternal parenting. *Journal of Consulting & Clinical Psychology, 60*(1), 49-55.

Gadow, K. D., & Nolan, E. E. (2002). Differences between preschool children with ODD, ADHD and ODD+ADHD symptoms. *Journal of Child Psychology & Psychiatry, 43*(2), 191-201.

Gaub, M. & Carlson, C. L. (1997). Behavioral characteristics of DSM-IV ADHD subtypes in a school-based population. *Journal of Abnormal Child Psychology, 25*(2), 103-111.

Gershon, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of Attention Disorders, 5*(3), 143-154.

Gillis, J., Gilger, J., Pennington, B., & DeFries, J. (1992). Attention-deficit disorder in reading-disabled twins: Evidence for a genetic etiology. *Journal of the Abnormal Child Psychology, 20*, 303-315.

Goldstein, S., & Goldstein, M. (1998). *Managing attention-deficit hyperactivity disorder in children; A guide for practitioners* (2nd edition). New York: Wiley.

Goldstein, S. (1998). Foreword, In P. A. Teeter. *Interventions for ADHD: Treatment in developmental context* (pp. xi-xv). New York: Guilford Press.

Goodman, R., & Stevenson, J. (1989). A twin study of hyperactivity: II. The aetiological role of genes, family relationships, and perinatal adversity. *Journal of Child Psychology and Psychiatry, 30*, 691-709.

Grilo, C. M., Becker, D. F., & Walker, M. L. (1995). Psychiatric comorbidity in adolescent inpatients with substance use disorders. *Journal of the American Academy of Child & Adolescent Psychiatry, 34*(8), 1085-1091.

Harada, Y., Yamazaki, T., & Saitoh, K. (2002). Psychosocial problems in attention-deficit hyperactivity disorder with oppositional defiant disorder. *Psychiatry & Clinical Neurosciences, 56*(4), 365-369.

Hart, E. L., Lahey, B. B., Loeber, R., Applegate, B., & Frick, P. J. (1995). Developmental change in attention-deficit hyperactivity disorder in boys: A four-year longitudinal study. *Journal of Abnormal Child Psychology, 23*(6), 729-749.

Hartup, W. W. (1996). The company they keep: Friendships and their developmental significance. *Child Development, 67*(1), 1-13.

Hinshaw, S. P. (1987). On the distinction between attentional deficits/hyperactivity and conduct problems/aggression in child psychopathology. *Psychological Bulletin, 101*(3), 443-463.

Hinshaw, S. P. (2002). Is ADHD an impairing condition in childhood and adolescence? In P.S. Jensen & J.R. Cooper (Eds.), *Attention deficit hyperactivity disorder: State of science/best practices.* Kingston, NJ: Civic Research Institute.

Hinshaw, S. P., & Melnick, S. M. (1995). Peer relationships in boys with attention-deficit hyperactivity disorder with and without comorbid aggression. *Development & Psychopathology, 7*(4), *Special issue: Developmental processes in peer relations and psychopathology*. 627-647.

Ho, T., Leung, P. W., Luk, S. L., Taylor, E. (1996). Establishing the constructs of childhood behavioral disturbances in a Chinese population: A questionnaire study. *Journal of Abnormal Child Psychology, 24*(4), 417-431.

Hunt, N., & Marshall, K. (1994). Exceptional children and youth. Boston: Houghton Mifflin.

Jarvinen, D. W., & Sprague, R. L. (1995). Using ACTeRS to screen minority children for ADHD: An examination of item bias. *Journal of Psychoeducational Assessment, 13,* 172-184.

Jensen, P. S., Hinshaw, S. P., Kraemer, H. C. Lenora, N., Newcorn, J. H. Abikoff, H. B., et al. (2001). ADHD comorbidity findings from the MTA study: Comparing comorbid subgroups. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 147-158.

Jensen, P. S., Martin, D., & Cantwell, D.P. (1997). Comorbidity in ADHD: Implications for research, practice, and DSM-V. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 1065-1079.

Jensen, P., Roper, M., Fisher, P., & Piacentini, J. (1995). Test-retest reliability of the Diagnostic Interview Schedule for Children (DISC 2.1): Parent, child, and combined algorithms. *Archives of General Psychiatry, 52*(1), 61-71.

Jensen, P. S., Shervette, R. E. III, Xenakis, S. N., & Richters, J. (1993). Anxiety and depressive disorders in attention deficit disorders with hyperactivity: New findings. *American Journal of Psychiatry, 150*(8), 1203-1209.

Johnson, R. C., & Rosén, L. A. (2000). Sports behavior of ADHD children. *Journal of Attention Disorders, 4*(3), 150-160.

Johnston, C., & Pelham, W. E. (1986). Teacher ratings predict peer ratings of aggression at 3-year follow-up in boys with attention deficit disorders with hyperactivity. *Journal of Consulting and Clinical Psychology. 54,* 571-572.

Kadesjo, B., & Gillberg, C. (2001). The comorbidity of ADHD in the general population of Swedish school-age children. *Journal of Child Psychology and Psychiatry, 42(4),* 487-492.

Katz, L. J., Goldstein, G., & Geckle, M. (1998). Neuropsychological and personality differences between men and women with ADHD. *Journal of Attention Disorders, 2*(4), 239-247.

Klein, R. G., & Manuzza, S. (1991). Long-term outcome of hyperactive children: A review. *Journal of the American Academy of Child and Adolescent Psychiatry, 30*(3), 383-387.

Klorman, R., Brumaghim, J. T., & Salzman, L. (1988). Effects of methylphenidate on attention-deficit hyperactivity disorder with and without aggressive/noncompliant features. *Journal of Abnormal Psychology, 97*(4), 413-422.

Knapp, P. A., & Deluty, R. H. (1989). Relative effectiveness of two behavioral parent training programs. *Journal of Clinical Child Psychology, 18*(4), 314-322.

Kovacs, M. (1998). *The Children's Depression Inventory: CDI manual*. North Tonawanda, New York: Multi-health Systems, Inc.

Kuhne, M., Schachar, R., & Tannock, R. (1997). Impact of comorbid oppositional or conduct problems on attention-deficit hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 36*(12), 1715-1725.

Lahey, B. B., Applegate, B., Barkley, R., Garfinkel, B., Kerdyk, L. (1994b). DSM-IV field trials for oppositional defiant disorder and conduct disorder in children and adolescents. *American Journal of Psychiatry*, 151(8), 1663-1171.

Lahey, B. B., Applegate, B., McBurnett, K., Biederman, J., Greenhill, L., Hynd, G. W., et al. (1994a). DSM-IV field trials for attention deficit hyperactivity disorder in children and adolescents. *American Journal of Psychiatry*, 151, 1673-1685.

Lahey, B. B., Loeber, R., & Burke, J. (2002). Adolescent outcomes of childhood conduct disorder among clinic-referred boys: Predictors of improvement. *Journal of Abnormal Child Psychology, 30*(4), 333-348.

Lahey, B. B., Loeber, R., Quay, H. C., & Frick, P. J. (1992). Oppositional defiant and conduct disorders: Issues to be resolved for DSM-IV. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*(3), 539-546.

Lahey, B. B., McBurnett, K., & Loeber, R. A. (2000). Are attention-deficit hyperactivity disorder and oppositional defiant disorder developmental precursors to conduct disorders? In M. Lewis & A. Sameroff (Eds.), *Handbook of developmental psychopathology* (pp.431-446). New York: Plenum Press.

Lahey, B. B., Miller, T.L. Gordon, R.A., & Riley, A. (1999). Developmental epidemiology of the disruptive behavior disorders. In H. Quay & A. Hogan (Eds.), *Handbook of disruptive behavior disorders (*pp.23-48). New York: Kluwers Academic.

Lahey, B., Pelham, W., Stein, M., Loney, J., Trapani, C., Nugent, K., Kipp, H., Schmidt, E., Lee, S., Cale, M., Gold, E., Hartung, C., & Willcutt, E. (1998). Validity of DSM-IV attention-deficit/hyperactivity disorder for young children. *Journal of American Academy of Child and Adolescent Psychiatry, 37(7),* 695-702.

Lahey, B., Waldman, I. D., & McBurnett, K. (1999). The development of antisocial behavior: An integrative causal model. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 40*(5), 669-682.

Lahey, B.B. & Willcutt, E. G. (2002). Validity of the diagnosis and dimensions of attention deficit hyperactivity disorder (Eds.), *Attention deficit hyperactivity disorder: State of science/best practices.* Kingston, NJ: Civic Research Institute.

Last, C. G., Phillips, J. E., & Statfeld, A. (1987). Childhood anxiety disorders in mothers and their children. *Child Psychiatry & Human Development, 18*(2), 103-112.

Levy, F., Hay, D.A., McStephen, M., Wood, C., & Waldman, I. (1997). Attention-deficit hyperactivity disorder: A category of a continuum? Genetic analysis of a large scale twin study. *Journal of the American Academy of Child and Adolescent Psychiatry, 36,* 737-744.

Lindsay, R. L., & Whitman, B. Y. (2000). Social skill development in children with attentional problems, In P.J. Accardo, T.A. Blondis, B.Y. Whitman, & M. A. Stein (Ed.), *Attention deficit hyperactivity in children and adolescents: Diagnosis, treatment, and management.(*pp.535-549). Basel, NY: Marcel Dekker, Inc.

Loeber, R., Burke, J.D., Lahey, B. B., Winters, A., & Zera, M. (2000). Oppositional defiant and conduct disorder: A review of the past 10 Years, part I. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(12), 1468-1484.

Loney, J., & Milich, R. (1982). Hyperactivity, inattention, andagression in clinical practice. In M.Wolraich & D.K. Routh (Eds.), *Advances in developmental behavioral pediatrics* (Vol.2.pp. 113-147), Greenwich, CT: JAI Press.

Mannuzza, S., Gittleman-Klein, R., Bessler, A., Malloy, P., & LaPadula, M. (1993). Adult outcome of hyperactive boys: Educational achievement, occupational rank, and psychiatric status. *Archives of General Psychiatry, 50*, 565-576.

Martin, C. S., Earleywine, M. Blackson, T. C., & Vanyukov, M. M. (1994). Aggressivity, inattention, hyperactivity, and impulsivity in boys at high and low risk for substance abuse. *Journal of Abnormal Child Psychology, 22*(2), 177-203.

Matthews, D. (2002). *Attention deficit disorder source book* Detroit, MI: Omnigraphics, Inc.

McBurnett, K., Pfiffner, L., & Ottolini, Y., (2000). Types of ADHD in DSM-IV, In P.J. Accardo, T.A. Blondis, B.Y. Whitman, & M. A. Stein, *Attention deficit hyperactivity in children and adolescents: Diagnosis, treatment, and management (2nd edition).* Basel, NY: Marcel Dekker, Inc.

McGee, R., Williams, S., & Silva, P. A. (1984). Behavioral and developmental characteristics of aggressive, hyperactive and aggressive-hyperactive boys. *Journal of the American Academy of Child Psychiatry, 23*(3), 270-279.

Milich R., & Dodge, K. A. (1984). Social information processing in child psychiatric populations. *Journal of Abnormal Child Psychology, 12*, 471-490.

Milich, R., & Landau, S. (1989). The role of social status variables in differentiating subgroups of hyperactive children, In L. M. Bloomingdale & J. M. Swanson (Eds.), *Attention deficit disorder* (Vol. 4, pp. 1-16). Oxford: Pergamon Press.

Millstein, R B., Wilens, T. E. Biederman, J., & Spencer, T. J. (1997). Presenting ADHD symptoms and subtypes in clinically referred adults with ADHD. *Journal of Attention Disorders, 2,* 159-166.

Mitsis, E. M., McKay, K. E., Schulz, K. P. (2000). Parent-teacher concordance for DSM-IV attention-deficit/hyperactivity disorder in a clinic-referred sample. *Journal of the American Academy of Child & Adolescent Psychiatry, 39*(3), 308-313.

Murphy, K. & Barkley, R. A. (1996). Prevalence of DSM-IV symptoms in adult licensed drivers: Implications for clinical diagnosis. *Journal of Attention Disorders, 1*(3), 147-161.

Nagin, D. S., & Tremblay, R. E. (2001). Parental and early childhood predictors of persistent physical aggression in boys from kindergarten to high school. *Archives of General Psychiatry, 58*(4), 389-394.

Newcorn, J. H., & Halperin, J. M. (2000). Attention-deficit disorders with oppositionality and aggression, In T.E. Brown (Eds.), *Attention-deficit disorders and comorbidities in children, adolescents, and adults* (pp.3-56). Washington, DC: American Psychiatric Press.

Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological Bulletin, 102*(3), 357-389.

Paternite, C., Loney, J., & Roberts, M. (1996). A preliminary validation of subtypes of DSM-IV attention-deficit/hyperactivity disorder. *Journal of Attention Disorders, 1.* 70-86.

Pelham, W. E., Evans, S. W., Gnagy, E. M., & Greenslade, K. E. (1992). Teacher ratings of DSM-III-R symptoms for the disruptive behavior disorders: Prevalence, factor analyses, and conditional probabilities in a special education sample. *School Psychology Review, 21,* 285-299.

Pelham, W.E., Wheeler, T., & Chronis, A. (1998). Empirically supported psychosocial treatments for attention deficit hyperactivity disorder. *Journal of Clinical Chill Psychology, 27,* 190-205.

Perrin, S. & Last, C. G. (1996). Relationship between ADHD and anxiety in boys: Results from a family study. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*(8), 988-996.

Pevalin, D. J., Wade, T. J., & Brannigan, A. (2003). Precursors, consequences and implications for stability and change in preadolescent antisocial behaviors. *Prevention Science, 4*(2), 123-136.

Piacentini, J., Shaffer, D., Fisher, P. W. & Schwab-Stone, M. (1993). The Diagnostic Interview Schedule for Children-Revised Version (DISC--R): III. Concurrent criterion validity. *Journal of the American Academy of Child & Adolescent Psychiatry, 32*(3), 658-665.

Pliszka, S. R (1989). Effect of anxiety on cognition, behavior, and stimulant response in ADHD. *Journal of the American Academy of Child & Adolescent Psychiatry, 28*(6), 882-887.

Pliszka, S. R (1992). Comorbidity of attention-deficit hyperactivity disorder and overanxious disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*(2), 197-203.

Pliszka, S. R., Carlson, C. L., & Swanson, J. M. (1999). *ADHD with comorbid disorders: Clinical assessment and management*. New York: The Guilford Press.

Pope, H. G. Jr., & Yurgelun-Todd, D. (1996). The residual cognitive effects of heavy marijuana use in college students. *Journal of the American Medical Association, 275*(7), 521-527.

Quinn, P. O., & Nadeau, K. G. (2000). Gender issues and attention deficit disorder, In P.J. Accardo, T.A. Blondis, B.Y. Whitman, & M. A. Stein (Ed.), *Attention deficit hyperactivity in children and adolescents: Diagnosis, treatment, and management (*pp.215-228)*. Basel, NY: Marcel Dekker, Inc.

Rapoport, J., & Ismond, D. (1996). *DSM-IV training guide for diagnosis of childhood disorders.* Levittown, PA: Bruner/Mazel.

Ratey, J. J., Miller, A. C., & Nadeau, K. G. (1995). Special diagnostic and treatment considerations in women with attention deficit disorder. In K. G. Nadeau (Ed.), *A comprehensive guide to attention deficit disorders in adults: Research, diagnosis,and treatment* (pp. 260-283). New York: Brunner/Mazel.

Robin, A. L. (1998). *ADHD in adolescents: Diagnosis and treatment*. New York: The Guilford Press.

Reid, R., DuPaul, G. J., Power, T. J., Anastopoulos, A. D., Rogers-Adkinson, D., Noll, M., & Ricco, C. (1998). Assessing culturally different students for attention deficit hyperactivity disorder using behavior rating scales. *Journal of Abnormal Child Psychology*, *26*(3), 187-198.

Reynolds, C., & Richmond, B. (1997). *Revised Children's Manifest Anxiety Scale (RCMAS) manual*. Los Angeles: Western Psychological Service.

Reynolds, C.R., & Richmond, B. (1985). *Tests: A comprehensive reference for assessments in psychology, education, and business.* Texas: PRO-ED. Inc.

Richards, T. L., Deffenbacher, J. L. & Rosén, L. A. (2002). Driving anger and other driving-related behaviors in high and low ADHD symptom college students. *Journal of Attention Disorders*, *6*(1), 25-38.

Samuel, V. J., George, P., & Thornell, A. (1999). A pilot controlled family study of DSM-III-R and DSM-IV ADHD in African-American children. *Journal of the American Academy of Child & Adolescent Psychiatry, 38*(1), 34-39.

Sarkis, S. A. (2002). Self-regulation and inhibition in children with comorbid attention deficit hyperactivity disorder (ADHD): An evaluation of executive functions. *Doctoral dissertation manuscript.* University of Florida, Gainesville.

Schachar R., Rutter, M., Smith, A. The characteristics of situationally and pervasively hyperactive children: Implications of syndrome definition. *Journal of Child Psychology and Psychiatry, 22,* 375-392.

Schachar, R., & Tannock, R. (1993) Childhood hyperactivity and psychostimulants: A review of extended treatment studies. *Journal of Child & Adolescent Psychopharmacology, 3*(2), 81-97.

Schachar, R., & Tannock, R. (1995) Test of four hypotheses for the comorbidity of attention-deficit hyperactivity disorder and conduct disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 34*(5), 639-648.

Schachar, R. J., Tannock, R., Marriott, M., & Logan, G. (1995). Defiant inhibitory control in attention deficit hyperactivity disorder. *Journal of Abnormal Child Psychology, 23*(4), 411-438.

Schwab-Stone, M., Fallon, T., Briggs, M., Crowther, B. (1994). Reliability of diagnostic reporting for children aged 6-11 years: A test-retest study of the Diagnostic Interview Schedule for Children-Revised. *American Journal of Psychiatry, 151,* 1048-1054.

Schwab-Stone, M., Fisher, P. W., Piacentini, J., & Shaffer, D. (1993). The Diagnostic Interview Schedule for Children-Revised version (DISC-R): II. Test-retest reliability. *Journal of the American Academy of Child & Adolescent Psychiatry, 32*(3), 651-657.

Seidman, L. J., Biederman, J., Weber, W., Hatch, M., & Faraone, S. (1998). Neuropsychological function in adults with attention-deficit hyperactivity disorder. *Biological Psychiatry, 44*(4), 260-268.

Shaffer, D., Fisher, P., Lucas, C., & Comer, J. (2003). *Scoring manual: Diagnostic Interview Schedule for Children (DISC-IV)*. New York: Columbia University.

Shaffer, D., Fisher, P., Lucas, C., Dulcan, M., Schwab-Stone, M. (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMHDISC-IV): description, differences from previous versions, and reliability of some common diagnoses. *Journal of Academy Child and Adolescents Psychiatry, 39,* 28-38.

Shaffer, D., Gould, M., Brasic, J., Ambrosini, P., Fisher, P., Bird, H., et al. (1983). A Children's Global Assessment Scale (CGAS). *Archives of General Psychiatry, 40,* 1228-1231.

Sher, K. J., Martin, E. D., & Wood, P. K. (1997). Alcohol use disorders and neuropsychological functioning in first-year undergraduates. *Experimental & Clinical Psychopharmacology, 5*(3), 304-315.

Silver, L. (2004). *Attention deficit hyperactivity disorder: A clinical guide to diagnosis and treatment for health and mental health professionals* (3rd ed.).Washington, DC: American Psychiatric Publishing, Inc.

Slomkowski, C., Klein, R. G., & Mannuzza, S. (1995). Is self-esteem an important outcome in hyperactive children? *Journal of Abnormal Child Psychology, 23*(3), 303-315.

Smucker, M. Craighead, W., Craighead, L., & Green B. (1986). Normative and reliability data for the Children's Depression Inventory. *Journal of Abnormal Child Psychology, 14,* 25-39.

Spencer, T., Wilens, T., Biederman, J., Wozniak, J., & Harding-Crawford, M. (2000). Attention-deficit/hyperactivity disorder with mood disorders, In T. E. Brown, *Attention-deficit disorders and comorbidities in children, adolescents, and adults* (pp. 79-124). Washington, DC: American Psychiatric Publishing, Inc.

Stattin, H., & Trost, K. (2000) .When do preschool conduct problems link to future social adjustment problems and when do they not? In: L. R. Bergman, & R. B. Cairns, *Developmental science and the holistic approach* (pp. 349-375). Mahwah, NJ: Lawrence Erlbaum Associates.

Strauss, C. C., Lease, C. A., Last, C. G. (1988). Overanxious disorder: An examination of developmental differences. *Journal of Abnormal Child Psychology, 16*(4), 433-443.

Swanson, J. (1992). *School-based assessments and interventions for ADD students.* Irvine, CA: KC Publishing.

Swanson J. M., Lerner M. A., March J., & Gresham F. M. (1999), Assessment and intervention for attention-deficit/hyperactivity disorder in the schools: Lessons from the MTA study. *Pediatric Clinical North American, 46,* 993-1009.

Szatmari, P., Offord, D. R., & Boyle, M. H. (1989). Correlates, associated impairments, and patterns of service utilization of children with attention deficit disorders: Findings from the Ontario Child Health Study. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 30*(2), 205-217.

Tannock, R. (2000). Attention-deficit/hyperactivity disorder with anxiety disorders, In T. E. Brown, *Attention-deficit disorders and comorbidities in children, adolescents, and adults* (pp. 125-170). Washington, DC: American Psychiatric Publishing, Inc.

Teeter, P. A. (1998). *Interventions for ADHD: Treatment in developmental context.* New York: The Guilford Press.

Teeter, P., & Semrud-Clikeman, M. (1995). Integrating neurobiological, psychosocial, and behavioral paradigms: A transactional model for ADHD. *Archives of Clinical Neuropsychology, 10,* 433-461.

Thompson, L. L., Riggs, P. D., & Mikulich, S. K. (1996). Contribution of ADHD symptoms to substance problems and delinquency in conduct-disordered adolescents. *Journal of Abnormal Child Psychology, 24*(3), 325-347.

Treadwell, K. R., & Trapani, C. (2000). Disruptive behavior disorders, In P.J. Accardo, T.A. Blondis, B.Y. Whitman, & M. A. Stein (Ed.), ADHD *in children and adolescents: Diagnosis, treatment, and management (*pp.289-313). Basel, NY: Marcel Dekker, Inc.

Waldman, I. D., Lilienfeld, S. O., & Lahey, B. B. (1995). Toward construct validity in the childhood disruptive behavior disorders: Classification and diagnosis in DSM-IV and beyond. *Advances in Clinical Child Psychology, 17,* 323-363.

Walker, J. L., Lahey, B. B., Hynd, G. W. & Frame, C. L. (1987). Comparison of specific patterns of antisocial behavior in children with conduct disorder with or without coexisting hyperactivity. *Journal of Consulting & Clinical Psychology, 55*(6), 910-913.

Wasserman, R. C., Kelleher, K. J., Bocian, A., Baker, A., Childs, G. E. Indacochea, F., et al., (1999). Identification of attentional and hyperactivity problems in primary care: A report from pediatric research in office settings and ambulatory sentinel practice network. *Pediatrics, 103*, E38.

Webb, L. B., & Myrick, R. D. (2003). A group counseling interventions for children with attention deficit hyperactivity disorder. *Professional School Counseling, 7*(2), 108-115.

Webster-Stratton, C., & Hammond, M. (1990). Predictors of treatment outcome in parent training for families with conduct problem children. *Behavior Therapy, 21*(3), 319-337.

Weiss, G., & Hechtman, L. (1993). *Hyperactive children grown up* (2nd ed.). New York: Guilford Press.

Wender, P. H., Wolf, L. E., & Wasserstein, J. (2001). Adults with ADHD. An overview [Electronic version]. *Annals of the New York Academy of Sciences, 931*, 1-16.

Whalen, C. K., & Henker, B. (1992). The social profiles of worlds of attention deficit hyperactivity disorder: Five fundamental facets. *Child and Adolescent Psychiatric Clinics of North America, 1,* 395-410.

Wheeler, J., & Carlson, C. L. (1994).The social functioning of children with ADD with hyperactivity and ADD without hyperactivity: A comparison of their peer relations and social deficits. *Journal of Emotional & Behavioral Disorders, 2*(1), 2-12.

Zito, J. M., Safer, D. J., & dosReis, S. (1997). Methylphenidate patterns among Medicaid youths. *Psychopharmacology Bulletin, 33*(1), 143-147.

BIOGRAPHICAL SKETCH

Dong Hun Lee was born in Korea. He received his Bachelor of Arts degree in Education, with highest honors, from Chonnam National University (1992), Korea. In 1994, D.H. Lee was accepted into the graduate program in educational psychology at the Chonnam National University, Korea. After completing his Master of Arts degree, D.H. Lee worked for more than 5 years in the Department of Human Resource Development and Change Management of a private company. He found out individuals' psychological and counseling needs at organizational settings and decided to go back to school for further study. D.H. Lee entered the doctoral program in the Department of Counselor Education at the University of Florida (2001). He completed his Master of Education and Specialist in Education degrees in school counseling program in 2004. He served his internship as a counselor with VISTA South (Crisis Stabilization Unit for Children & Adolescents) at the University of Florida SHANDS Hospital in Gainesville, Florida. And he earned the Doctor of Philosophy degree in mental health counseling in December 2005.