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ABSTRACT

THE EFFECTIVENESS OF RATING SCALES AND A SEMI-
STRUCTURED INTERVIEW IN DIAGNOSING ADULT
ATTENTION DEFICIT HYPERACTIVITY DISORDER

by

Carolyn Mae Cofrancesco

Chair: Elsie Jackson

ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

Andrews University

School of Education

Title: THE EFFECTIVENESS OF RATING SCALES AND A SEMI-STRUCTURED INTERVIEW IN DIAGNOSING ADULT ATTENTION DEFICIT HYPERACTIVITY DISORDER

Name of researcher: Carolyn Mae Cofrancesco

Name and degree of faculty chair: Elsie Jackson, Ph.D.

Date completed: October 2007

Problem and Purpose

There are few standardized tools for diagnosing ADHD in adults. The purpose of this study was to compare a standardized rating scale (CAARS) used by different observers, with a comprehensive diagnostic interview (CAADID) with respect to their ability to diagnose subtypes of ADHD.

Method

Subjects for this study came from baseline data of 98 patients (18 to 60 years of age) participating in a drug trial for adult ADHD. The CAADID interview results in a yes-no decision as to whether the patient meets *DSM-IV* criteria for the subtypes of

ADHD. A *t*-test was used to compare the CAADID-diagnosed and Not-Diagnosed subtypes with the CAARS scores as the dependent measures.

Results

The CAADID duplicates results from the CAARS, with one exception: Combined Subtype reported by an observer using the CAARS did not agree with the CAADID diagnosis.

Conclusions

In most cases different rating perspectives reveal the same picture of the patient, except by an outside observer. Data reveals that a childhood history and an extensive interview are needed to supplement ratings by an observer.

Andrews University

School of Education

THE EFFECTIVENESS OF RATING SCALES AND A SEMI-
STRUCTURED INTERVIEW IN DIAGNOSING ADULT
ATTENTION DEFICIT HYPERACTIVITY DISORDER

A Dissertation

Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Carolyn Mae Cofrancesco

October 2007

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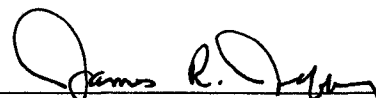
A dissertation
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Carolyn Mae Cofrancesco


APPROVAL BY THE COMMITTEE:


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CHAPTER I

OVERVIEW OF THE STUDY

Introduction

First, imagine as an adult that you have been diagnosed with a medical illness—cancer, depression, arthritis, diabetes, etc. Then, imagine that you go to the doctor and he/she tells you that although adults get this disorder, so far it has only been extensively researched in children and adolescents. The doctor is going to have to use child/adolescent criteria to make your diagnosis and medication management decisions. Then as a patient, understand that every time you go to see your doctor he/she will be “tweaking” research in order to try to help you. The doctor has no real clinical criteria of what the adult symptoms are; he/she can only make an educated guess as to what type of medical questions to ask; and research has not established what medication will best treat your disorder as an adult. You leave your doctor’s office knowing that you have a disorder that statistically puts you in a high-risk category for losing your job, family, and friendships. You also have a high likelihood of abusing drugs and alcohol. The disorder could result in problems with mood swings, depression, poor self-esteem, etc; and you may never reach your full potential as an adult. This is what an estimated growing population of adults with Attention Deficit Hyperactivity Disorder struggle with daily (Hechtman & Weiss, 1986)

These individuals have a disorder that historically has been seen only as a problem in children and adolescents. Only recently has adult ADHD begun to be aggressively researched (Epstein, Johnson, & Conners, 2001). Earlier formulations emphasized only hyperactive symptoms, and there was a long-standing belief that children who were diagnosed with ADHD outgrew it. Therefore, most research stopped with adolescence. This left many adults struggling with the question of why they are still having problems transitioning into adulthood successfully.

Background of the Problem

Though many clinicians encounter adults who appear to have ADHD, there are problems in making the diagnosis in adults. There are several limiting features with the current *Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV)* (American Psychiatric Association [APA], 1994) as it relates to adults with ADHD.

First, the presentations of adult ADHD symptoms are often dissimilar to the *DSM-IV* hyperactivity, impulsivity, and inattention symptoms found in children. For example, the term “hyperactive” takes quite a different form for many adults, being more a kind of inner restlessness than overt hyper-motility. They are not running around their workplace or home environment, but may feel strong urges to move about. When observed from the outside they might appear to be sitting quietly, but are in fact highly distracted by their need to be up and on the go.

Second, because they have passed through the age of risk for other disorders, adults often have symptoms that mimic ADHD, such as the poor concentration of the

anxious or depressed adult, or the impulsivity of the antisocial personality or bipolar patient. Therefore, comorbid psychological disorders need to be evaluated for adults.

Third, the *DSM-IV* fails to include some of the core symptoms of the “executive function” deficits that are typical of the kind of attentional problems found in adults (e.g., self-organization, planning, procrastination, and time management). The *DSM-IV* wording of some symptoms (e.g., “as if driven by a motor”) is inappropriate for adults. Phrases such as, “leaving the seat in classroom” suggest a form of hyperactivity that is seen much more in early childhood. Longitudinal and cross-sectional studies show that these symptoms decline rapidly by adolescence, but that the “attentional” symptoms either remain or transform into executive function deficits as subjects approach adulthood (Conners & Erhardt, 1998). Finally, the validity of subtyping ADHD into hyperactive, inattentive, and combined subtypes is unknown for adults (Epstein et al., 2001).

Currently there are very few adult ADHD assessment scales available (Dulcan & Benson, 1997; Weiss, Hechtman, & Weiss, 1999). According to Weiss et al. (1999), the following scales are some of the available adult assessment scales used by clinicians: The Brown Attention-Deficit Disorder Scale for Adults; Hallowell and Ratey’s 20-item list; and The Wender Utah Rating Scale (Ward, Wender, & Reimherr, 1993). Although these scales may have some validity in the assessment of adult ADHD symptoms, according to their manuals they are missing extensive psychometric analysis, incorporation of *DSM-IV* criteria, and major research studies to confirm validity and reliability of the measures.

It is not surprising that in the early stages of scientific research, informal and relatively unstandardized tests may be useful. It is from their use that clearer understanding of the content, scope, and practical utility emerges. But for clinicians to

have an evidence-based and scientific practice, tests and scales should conform to the scientific rules for validity, reliability, and standardization, as well as practical utility. It is vital that clinicians know if the measures they are using are valid for their intended purpose. Clinicians need to see a whole picture of the patient and the illness through their assessment instruments. If the tests are not able to do this, they trickle down to poor care, inadequate data for researchers, and inappropriate criteria for diagnosing adult ADHD. Test development should not be turned simply into a quick, ad hoc moneymaker for researchers or clinicians without credible background and experience. Accountability has to be a priority, so test development is taken seriously by the developers of the tests. Therefore, the research presented in this paper will be important to clinicians in that it compares the results from an established instrument for measuring symptoms, the Conners' Adult ADHD Rating Scales (CAARS), against a newly developed instrument, the Conners' Adult ADHD Diagnostic Interview for *DSM-IV* (CAADID), which is a more comprehensive assessment from interview, childhood history, adult history, risk factors, and differential diagnosis.

Statement of the Problem

Currently there are several limiting factors impacting clinicians who work with adult ADHD patients. Most available diagnostic tools are more appropriate for children; there are few assessment scales available for adult ADHD. Adult symptoms are not always characterized correctly. Adults also have a higher risk of having other disorders that can mimic ADHD; and finally the *DSM-IV* has limited criteria regarding adult patient's symptoms.

Purpose of the Study

The purpose of this study was to compare the results from two adult ADHD tools: a normed rating scale for assessing ADHD symptoms, and a diagnostic interview covering all of the formal criteria for the diagnosis of ADHD. I wish to determine to what extent the rating scales completed by the patient, a doctor, and an observer are able to duplicate the diagnostic results from an interview by a skilled clinician, using a detailed history as well as all of the formal criteria required of ADHD.

Research Questions

1. Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?
2. Is there a difference in the mean score on the CAARS as rated by the between doctor those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?
3. Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?
4. Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?
5. Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

6. Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Significance of the Study

This study showed the consistency of diagnosis from a new comprehensive interview with ratings by a: self-report (patient), doctor, and significant other using previously validated rating scales. Due to the positive results, the new interview (CAADID) could provide clinicians with a scientifically validated tool for clinical diagnosis, research, and for further studies of psychosocial and neurobiological aspects of ADHD. Conversely, the interview results can point to limitations in the use of the rating scales, or limitations of relying on a sole source such as an interview with the patients' significant other.

Second, if doctors have a scientifically validated tool for clinical diagnosis it means that more adult patients will be properly treated. This would have a direct impact on more adults contributing to society in positive endeavors through achievement in leadership roles, better parenting, employment success, and educational goals. Correct diagnosis also results in lower healthcare costs to society, lower budget costs for community agencies to provide adult patient care, and lower indirect cost for universities in having to provide assistance to misdiagnosed students.

Limitations of the Study

The study sample was taken from adults with suspected ADHD and/or varying degree of Anxiety and Depression, who live near the Children's Hospital in Montreal,

University of Toronto, the University of British Columbia, Yale University, and Duke University. Therefore, the findings from this study cannot be generalized to suspected ADHD adults not living near major academic centers.

Since there has not been an epidemiological study of ADHD, it is not known at this point whether the age, gender, comorbidities, and symptom profiles of patients in this study are representative of the general population of adults referred for ADHD.

Delimitations of the Study

There are several exclusionary factors for participation in this study. Therefore patients who met any of the following criteria were not allowed to enroll:

1. Participants in this study should not use any other medications (over-the-counter, herbal, prescription, or illegal) without approval from the study doctor.
2. If a participant was pregnant or thought she might be pregnant, she could not enter this study.
3. To be included in the study, the participant must have been between the ages of 18 and 60 years.
4. Participants could not be currently abusing alcohol or illegal drugs.
5. If a participant had an eating disorder (such as anorexia or bulimia), any brain or nerve-related diseases, was taking any other medications for psychiatric reasons, had thoughts of hurting oneself, did not understand the English language well enough to understand what needs to be done in the study, or knew he or she could not do the study for the next 5 months.

Leadership and Creating Change in the Diagnosis of Adult ADHD

There are many theories of how to create change. As with any research one hopes that research will have some influence or bring change to the field under study.

Therefore not only is the research itself important but also the theory the researcher picks to implement change. Selecting a theory also demonstrates a commitment to the process of leadership and accountability for one's research. Below are two very different theories on implementing change and, although there are many change theories, these two were selected because of the respected background of both theorists.

Duke University's Executive Education program has been ranked number one the past 4 years (Duke Corporate Education, 2005). Duke University also has a Leadership Roundtable every year that is open to leaders from various backgrounds. It is through this program that Duke has developed a series of leadership books on various topics. The book *Influencing and Collaborating for Results*, written in 2005 (Duke Corporate Education, 2005) details how to develop change after an idea has been developed. The foundation to this theory is the importance of communication within a collaborative team so that a sustainable relationship will develop with the goal of not only creating change for a particular project but for future projects as well.

The theory is broken down into the following two headings:

1. Collaboration: This book defines Collaboration as the act of working together, using united labor to work jointly with others or together, especially in an intellectual endeavor (Duke Corporate Education, 2005).

In order for change to take place, one must have collaboration. When trying to first make change happen, most forget that many projects have interactions and interdependencies across departments, and without the support and resource throughout an organization, change becomes difficult. This connectedness includes both the system and process and also the people associated with the change and their interests. This book (Duke Corporate Education, 2005) suggests the following ways to keep communication open so collaboration can develop. The following credibility principles should be followed when working in collaborative teams:

a. Keep good company: Make sure your team members are respected in their field, know their job, and will keep timelines.

b. Build goodwill: It takes time to develop goodwill but if you have a team that is respected in the community, it makes outsiders listen to you first when you call.

c. Engage: Joint activity increases our understanding of one another, builds a common identity through shared experiences, shared hardships, and ongoing interaction, which creates a sense of mutual obligation for future interaction.

d. Make the connections: Leadership within the project – know how to lead the project and the people.

2. Influence: This book (Duke Corporate Education, 2005) defines Influence as the power of producing an effect without apparent exertion of force of direct exercise or command; to affect or alter by indirect or intangible means (Duke Corporate Education, 2005).

Influence is not about promoting your own agenda. It is about connecting with people, building a common understanding, and working together to generate a desired outcome. Influence involves collaboration, and this means that you are taking your idea for change and asking others for their input and expertise. It is a back-and-forth relationship which involves building and nurturing the collaborative team. In order for Influencing to work, the following steps are involved: understanding your network (group), connecting with colleagues (individual), creating the invitation (relationship), developing a story (only 5% to 10% are persuaded by statistics – have a story), tailoring the message (make sure the story is short and easy to follow), create a shared story (incorporate experiences and expertise from others), and keep building credibility (keep the credibility principles).

The second theory is from John P. Kotter's theory about change found in his 1996 book entitled *Leading Change*. Kotter is Professor Emeritus at Harvard Business School and has developed an eight-stage process of creating major change.

Stage 1: Establish a Sense of Urgency. Decrease complacency, which often means taking risks. Create a crisis by allowing a financial loss, eliminate obvious examples of excess, set revenue income goals so high that they cannot be reached, stop measuring subunit performance based only on narrow functional goals, obtain more data about customer satisfaction, insist that people talk regularly to unsatisfied customers, use consultants, put more honest discussions of the firm's problems in company newspapers, and bombard people with information on future opportunities.

Stage 2: Create the Guiding Coalition. Create a team that has the following members: members in a position of power, people with expertise regarding the change, team members who have a credible reputation, and proven leaders.

Stage 3: Develop a Vision and Strategy. The vision should convey what the future will look like, appeals to long-term interests of employees, and is attainable, clear, flexible, and easy to communicate.

Stage 4: Communicate the Change Vision. Keep it simple, use a verbal picture (metaphors or analogy), use multiple forums to communicate, repeat the vision many times, people in power must lead this vision by example, address inconsistencies in the vision, and two-way communication.

Stage 5: Empower Broad-Based Action. Employees need to have a shared sense of purpose, make structures compatible with the vision, provide training to employees, align information and personnel systems to the vision, and confront supervisors who undercut needed change.

Stage 6: Generate Short-Term Wins. Provide evidence that sacrifices are worth it, reward change agents, fine-tune vision, clear improvement, make it difficult for cynics to block change, keep the bosses on-board, and build momentum.

Stage 7: Consolidate Gains and Producing More Change. Tackle additional and bigger change, bring in additional people, leadership from senior management, lower ranks in the hierarchy are brought in too, and reduction of unnecessary interdependencies.

Stage 8: Anchor New Approaches in the Culture. This step comes last; change sinks in only after it is clear that it will work, talk to people a lot, change may come by

changing out people, and if promotion processes are not changed to be compatible with the new practices, the old culture will reassert itself.

Kotter (1996) also has two side notes when using these eight-stage approaches. First, change is associated in multi-step process; therefore the steps cannot be changed or skipped. Second, the steps are not effective if they are not driven by high-quality leadership, not just management.

For this research the first theory on change was implemented (Duke University). It was chosen because it applied best to how the initial conception of this research was formed. Kotter's (1996) theory appears to work best in a setting in which the change takes place in a permanent infrastructure (such as IBM or a bank, etc.) and was therefore one reason why it was not appropriate for this study. The first stage of the Duke theory, collaboration, has been met (which is described below). The second stage of the Duke theory, influence, is in progress (which is also described below).

1. Collaboration: This research was a collaborative effort with the following universities: Children's Hospital in Montreal, University of Toronto, the University of British Columbia, Yale University, and Duke University. This research not only took into account the universities but also the people who would be a part of the team: Keith Conners, Thomas Brown, Lily Hechtman, Umesh Jain, Diane Johnson, Donald Quinlan, and Margaret D. Weiss. All of these researchers are well-known experts in the field of ADHD. Each team member is committed to making this research process be productive through their commitment of adopting and following standard codes of ethics in research protocol along with adopting their own research code as it applied to this data. In doing

this, the team has shown how important the credibility principles in this theory of change are when working in collaborative teams.

One of the key factors of the Duke change theory is that the team continues to work together on future projects because of the collaboration efforts they put forth in previous research projects. Many of these researchers on this project have worked together in the past and have spent years developing among themselves the credibility principles of keeping good company, building goodwill, keeping engaged, and making connections. The team also continues to work together on this project and other projects because of the respect they have established for each other through their collaborative work.

2. Influence: This collaborative team is now working on the final aspect of this research through writing a journal article submission. The team is still using the collaborative approach along with incorporating the steps already described involved in the process of influence. The team is also committed to presenting papers to various professional conferences.

Every scientific study or idea thus has the potential for being an agent of change in the way individual patients are eventually understood and treated. Ultimately, scientific study of any disorder, such as adult ADHD in this study, must exert its effects through individual practitioners. In this study, I have tried to give evidence that a certain approach to diagnosis, the use of a comprehensive interview, has validity for diagnosing ADHD. It is my expectation that data from the study will prompt some practitioners to use this approach. If data continue to confirm the value of these tools and result in a

wider acceptance, then I may expect initial changes in the form of compliance to result in a period of identification with the approach.

Definitions of Terms

The terms used in this study are defined as follows:

Attention Deficit Hyperactivity Disorder (ADHD): Those diagnosed with ADHD will typically present with symptoms that are grouped into inattentive, hyperactivity/impulsivity symptoms, or a combination of both. The symptoms for adults are generally supposed to include similar, though modified versions, of the childhood symptoms. In addition to these symptomatic criteria, *DSM-IV* specifies that the disorder must have begun in early childhood (age/onset criterion); is chronic and sustained for at least 6 months (chronicity criterion); is present in two or more settings (pervasiveness criterion); has symptoms which create impairment (impairment criterion); and cannot be better explained by other diagnoses (differential diagnosis criterion). A patient must meet all five criteria in order to be diagnosed with ADHD (American Psychiatric Association, 1994).

Inattentive Symptoms: One of the three subtypes of ADHD. Patients typically make careless mistakes, are disorganized, have difficulty listening to others, following instructions and trouble following tasks, avoiding tasks that require prolonged attention, are forgetful, and can be easily distracted.

Hyperactive/Impulsive Symptoms: One of the three subtypes of ADHD. Hyperactivity suggests a deficit in regulating activity levels in different settings or task demands. Features range from excessive talking, making noise, inability to remain seated, fidgets or manipulates objects when seated, restless, fidgety, intrudes on others,

tends to speak out of turn, blurts out comments inappropriately, has trouble being patient or playing quietly, and moves constantly as if driven by a motor (American Psychiatric Association, 1994).

Combined: Both Inattentive and Hyperactive/Impulsive Symptoms.

Adult: Males or females between the ages of 18 and 60 years of age.

Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV): The official diagnostic manual of the American Psychiatric Association. It was originally published in order to classify mental disorders, provide symptoms of mental disorders, establish research and statistical summaries of mental disorders, and assist in the diagnosis of mental disorders. The *DSM* is periodically revised to meet changes in the mental health field.

Standardized Test: A measurement that is typically developed by an expert researcher in a particular field of academic study. Individual test items are analyzed and revised to insure validity and reliability. Usually, the test will have been normed and have specific standards of administration, scoring, and interpretation.

Comorbidity: When other psychiatric disorders may be present along with ADHD. These need not meet formal criteria for another disorder, but can be significant symptoms which complicate the diagnosis and treatment of ADHD.

Attention: Usually described as a process involving arousal or alertness, selective or focused attention (the ability to attend to particular stimuli while ignoring competing stimuli).

Attentional Capacity: The amount of information one can attend to at one time. Like IQ scores, one either has the ability to focus on numerous things at one time with

good control (like an air traffic controller) or lacks the mental energy to focus at all (Sergeant, Geurts, Huijbregts, Scheres, & Oosterlaan, 2003).

Sustained Attention: Persistence of focus over time. Most humans who are required to focus for a long time (such as a radar watcher or airline pilot) show decline in their attention and loss of vigilance, which can be overcome when conditions favor high arousal as in a life-threatening situation (Sergeant et al., 2003).

Conners' Adult ADHD Diagnostic Interview for *DSM-IV* (CAADID): This interview is a diagnostic interview, based on the *DSM-IV* criteria, used to determine if adults have ADHD. It provides a comprehensive medical, social, and developmental history, as well as assessing the symptomatic criteria for ADHD during both adulthood and childhood (Epstein et al., 2001).

Conners' Adult ADHD Rating Scales (CAARS): The CAARS used in this research consists of three forms: Self-Report: Long Version; Observer-Report: Long Version; and Observer-Report: Screening Version. These measures provide an assessment of the same *DSM-IV* adult ADHD behaviors and problems, while also containing factor-based scales and indexes (Conners, Erhardt, Sparrow, & MHS Staff, 1998).

CAARS Observer-Report: Long Version and the CAARS Observer-Report, Screening Version: Typically in quick screening the investigator uses the CAARS Observer-Report: Screening Version. The CAARS Observer-Report: Long Version is completed by the patient's significant other and the CAARS Observer-Report: Screening Version is completed by the investigator.

Organization of the Study

This study is organized into five chapters.

Chapter 1 consists of the Introduction, Background of the Problem, Statement of the Problem, Purpose of the Study, Research Questions, Significance of the Study, Delimitations of the Study, Limitations of the Study, Leadership and Creating Change in the Diagnosis of Adult ADHD, Definition of Terms, and the Organization of the Study.

Chapter 2 presents a survey of literature pertaining to the following topics: Overview and Prevalence of Attention Deficit Hyperactivity Disorder (ADHD); Impairments from ADHD; Factors That Influence an ADHD Diagnosis; History of ADHD Research; Manifestation of ADHD Symptoms; The *DSM-IV* Criteria for ADHD; ADHD and Comorbidity; Assessing Adults for ADHD; Current Status of Treatments for ADHD and a Summary.

Chapter 3 provides an Introduction; Patient Sample; Procedures; Instrumentation; Conners' Adult ADHD Diagnostic Interview for *DSM-IV*; Conners' Adult ADHD Rating Scales; Research Questions; Null Hypotheses, and Data Analysis.

Chapter 4 reviews the Purpose; Characteristics of the Sample; Findings; and the Summary.

Chapter 5 presents the Introduction; Problem; Purpose; Literature Review; When Change Occurs, Methodology; Data Analysis, Findings, Discussion of Findings; Conclusion, and Recommendations for Further Study.

CHAPTER II

REVIEW OF THE LITERATURE

Overview and Prevalence of Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder is considered one of the most commonly diagnosed psychiatric disorders of children and adolescence (Dulcan & Benson, 1997). The *DSM-IV* reports that 3% to 5% of school-aged children have Attention Deficit Hyperactivity and 10% to 60% of these children will have symptoms into adulthood (American Psychiatric Association, 1994; Milberger, Biederman, Faraone, Murphy, & Tsuang, 1995). It is also believed that 1% to 2% of all adults have ADHD (Shekim, Asarnow, Hess, Zaucha, & Wheeler, 1990). Estimates of how often the disorder occurs (overall prevalence) depend upon how the disorder is defined. Past estimates of childhood ADHD have ranged between 1% and 20% of the general population. Newer studies using formal criteria average between 1% and 4% of the population. Very similar rates of childhood ADHD appear in China, Japan, Europe, India, and Latin America (Barkley, 1998; Conners & Jett, 2006). ADHD typically refers to a developmental disorder of childhood characterized by persistent patterns of inattention and/or hyperactivity-impulsivity. These patterns usually occur at higher frequency and severity than typically observed in individuals of the same age and development (American Psychiatric Association, 1994; Conners & Jett, 2006).

The symptoms must be present before the age of 7 years and should be seen across two different settings (e.g., home or school/work) for at least 6 months. It is also not enough to say that the symptoms are present, but there also must be evidence of a marked interference in the person's social, academic, or occupational functioning. These "impairments" should not be better explained by other disorders, such as Pervasive Developmental Disorders, Schizophrenia, or any other Psychotic condition (American Psychiatric Association, 1994).

There are three different subtypes of the symptomatic presentation in a patient. About 78% of boys and 63% of girls will be diagnosed with one or the other of these subtypes of ADHD (Barkley, 1990). Attention Deficit Hyperactivity Disorder, Combined Type, is the most common manifestation of ADHD in children. In this type the child will display both the hyperactive/impulsive symptoms and the inattentive symptoms. The next two subtypes are the inattentive and the hyperactive/impulsive subtypes. In each of these subtypes the patient will display at least six of the nine hyperactivity/impulsivity symptoms, or six of nine inattentive symptoms (American Psychiatric Association, 1994).

The *DSM-IV* provides an outline of behaviors typically seen in a person who has problems in the area(s) of inattention, hyperactivity, or impulsivity. Usually, if a person has problems with attention they often do not give close attention to details, appear disorganized, daydreaming, and making careless mistakes. They move from task to task, seldom completing their work; or when they do complete the work it is often messy. The person often avoids work that requires sustained attention, resulting in being labeled as underachievers. Hyperactivity is usually expressed through the patient being fidgety

when seated or even standing. Depending on the age and development of the person, they will run or climb in inappropriate situations. They will have an energy level that is excessive compared to most of their peers. They may fidget with objects, their body always seeming to be in motion (tapping hands or shaking feet). They tend to be noisier than their peers, and may have problems staying seated in such situations as watching movies or eating dinner.

Patients who are impulsive will be impatient, blurt out answers, have problems waiting their turn, interrupt others, be poor at following directions, and tend to grab or touch things excessively. Symptoms of ADHD are sometimes not observed when the patient is in a highly structured setting, engaged in an interesting activity, receiving one-on-one help, or in a setting in which rewards for appropriate behavior are given. Symptoms usually worsen in situations that are unstructured, boring, or require sustained attention or mental effort (Dulcan & Benson, 1997).

One epidemiological team (Szatmari, Offord, & Boyle, 1989) reported that it was more common to find children 6 to 11 years of age diagnosed with the hyperactive subtype. However, the hyperactive subtype seems to decline as children enter adolescence (Barkley, 1990). The hyperactive subtype is much more common in boys than girls. Boys appear to have ADHD anywhere from 10 times to 2 times more often than girls (Rowland, Lesesne, & Abramowitz, 2002; Scahill & Schwab-Stone, 2000). It appears that even though girls have a lower risk of the hyperactive subtype the girls are just as prone to develop conduct disorders as the boys (Manuzza et al., 1991).

Impairments From ADHD

ADHD is a chronic, lifetime disorder that takes a considerable toll on those

suffering from it as well as the families and communities who care for these individuals. It is believed that 80% of children will continue to have symptoms into adolescence and 66% will have symptoms in adulthood (Barkley, 1997). One third of adults continue to exhibit all of the symptoms of ADHD, in a somewhat altered form, and as many as 60% of adults continue to have at least one significant impairing symptom (March, Wells, & Conners, 1995).

Significant proportions of those with ADHD end up with serious social, emotional, interpersonal, and economic limitations. Ninety percent carry a high risk for school failure, 35% to 50% will be retained in a grade level, 36% will not graduate from high school, and 50% will be underachieving in their employment (Barkley, 1997). Those diagnosed can have greater risk of death by misadventure; driving accidents; teenage pregnancy; sexually transmitted diseases; alcohol and other substance abuse; academic underachievement; and profound impairment of self-esteem (Conners & Erhardt, 1998).

In a classic study, Satterfield, Swanson, Schell, and Lee (1994) found, after reviewing court records, that hyperactive youths (ages 14 to 21) were four to five times more likely to have been arrested and had 25 % higher rates of being incarcerated. Despite criticisms that such findings represent the comorbidity of ADHD with Conduct Disorder (Earll, 1995), rebuttals seem convincing (Satterfield, 1995). Satterfield et al. (1994) reported that in a follow-up study of 66 subjects ages 15 to 26, 30% of the subjects had problems with the police (as cited in Hechtman & Weiss, 1986).

Executive functioning skills are also decreased in ADHD patients. Executive functioning includes cognitive characteristics such as: being disorganized, being

forgetful (e.g., making lists, then forgetting to use them), losing things, failing to plan ahead, depending on others for maintaining order, not being able to keep track of several things at once, not finishing projects or tasks, needing an absolute deadline in order to get things done, not being able to get started on tasks, changing plans/jobs in midstream, misjudging available time. Tests that measure frontal lobe functions are more likely to reveal these executive weaknesses in ADHD patients. Frontal lobes are the last parts of the brain to mature, and they are responsible for the control of attention as well as control over motor activity (Alexander & Stuss, 2000). Magnetic resonance imaging (MRI) has shown the frontal lobes of ADHD children and adults to be less mature than normal children (Giedd, Blumenthal, Molloy, & Castellanos, 2001). The Conners' Scales also have a factor that includes all the executive functioning characteristics (Conners et al., 1998).

Factors That Influence an ADHD Diagnosis

Currently no single cause of ADHD has been discovered. However, it is known that ADHD has strong genetic links. Studies on adults with ADHD have shown that children of ADHD parents have twofold to eightfold increases for the risk of developing ADHD (Biederman & Faraone, 2002). Other researchers (Manshadi, Lippmann, O'Daniel, & Blackman, 1983) examined siblings of ADHD adults and found a higher rate of ADHD among the siblings, consistent with the high rates of children of parents who have ADHD. These family genetic links provide evidence for the validity of Adult ADHD. Paul Wender, one of the pioneers in recognizing adult ADHD, also carried out family genetic studies showing increased rates of ADHD and ADHD characteristics in relatives of children who are hyperactive (Wender, 1995).

Twin studies provide further powerful support for genetic contributions to ADHD. Differences between twins and siblings in behavior problems were investigated in a sample of 1,938 families with children ages 4-12 years. Families were sent a questionnaire for Attention Deficit Hyperactivity Disorder (ADHD). The questionnaire also included measures of speech and reading problems. There were significant differences between twins and siblings for ADHD symptoms, but not for symptoms of other disorders. There was a strong association between ADHD symptoms and speech and reading problems (Levy, Hay, McLaughlin, Wood, & Waldman, 1996). In another study 81% of identical twins had ADHD, compared with 29% of the fraternal twins (Weiss et al., 1999). Faraone et al. (2000) found that 57% of adults with ADHD would have children who also have ADHD (Faraone et al., 2000). Early studies by Safer in 1973 looked at full and half siblings that had been removed from their homes. He found that 50% of the full siblings (versus 10% of the half siblings) were diagnosed with ADHD (Wender, 1995). Family patterns of ADHD in girls appear to be very similar or even stronger than those of boys (Arcia & Conners, 1998; Biederman et al., 1994; Gaub & Carlson, 1997).

Another study made psychiatric and intellectual assessments of 140 children with ADHD, 120 normal controls, and their 303 siblings. ADHD children were more likely to have had learning disabilities, repeated grades, been placed in special classes, and received academic tutoring than their siblings or normal controls. Intellectual impairment was increased among siblings of ADHD children. This provides converging evidence that the ADHD syndrome is familial (Faraone et al., 1993).

Recent developments in molecular biology have led to several studies of genetic influences in ADHD through molecular gene isolation. These studies complement the multi-generational studies and clarify the specific nature of the genetic link to this condition. There are two approaches being pursued. The first is a genome scan in which the locations of all the chromosomal patterns are found in order to find the genes that may be related to ADHD behaviors. Second, is the study of certain candidate genes theorized as linked to ADHD (Biederman & Faraone, 2002). There appears to be strong genetic evidence involving the D4 dopamine receptor gene (DRD4). This gene regulates the post-synaptic receptors for the neurotransmitter dopamine (Faraone et al., 2000). The gene-regulating transporter re-uptake of dopamine into the pre-synaptic neuron (DAT1) has also been found to be defective in samples of ADHD. In this case, the abnormal gene creates a more efficient re-uptake of dopamine, thus lowering the availability of the neurotransmitter in the synaptic cleft. It is not accidental that drugs that work best with ADHD, such as methylphenidate, act to block re-uptake of dopamine, thus increasing the amount of available dopamine to the post-synaptic receptors. Figure 1 gives a good visual overview of this process (Conners, 2003).

Functional magnetic resonance imaging (fMRI) of ADHD patients is currently being studied. These studies will give a more precise visualization of different areas of the brain and provide a more accurate understanding of the areas of the brain that are affected by ADHD. The one drawback has been that nearly all adolescent studies have used structural imaging whereas adult studies use functional imaging, which makes it difficult to compare the results between children and adolescents (Faraone et al., 2000).

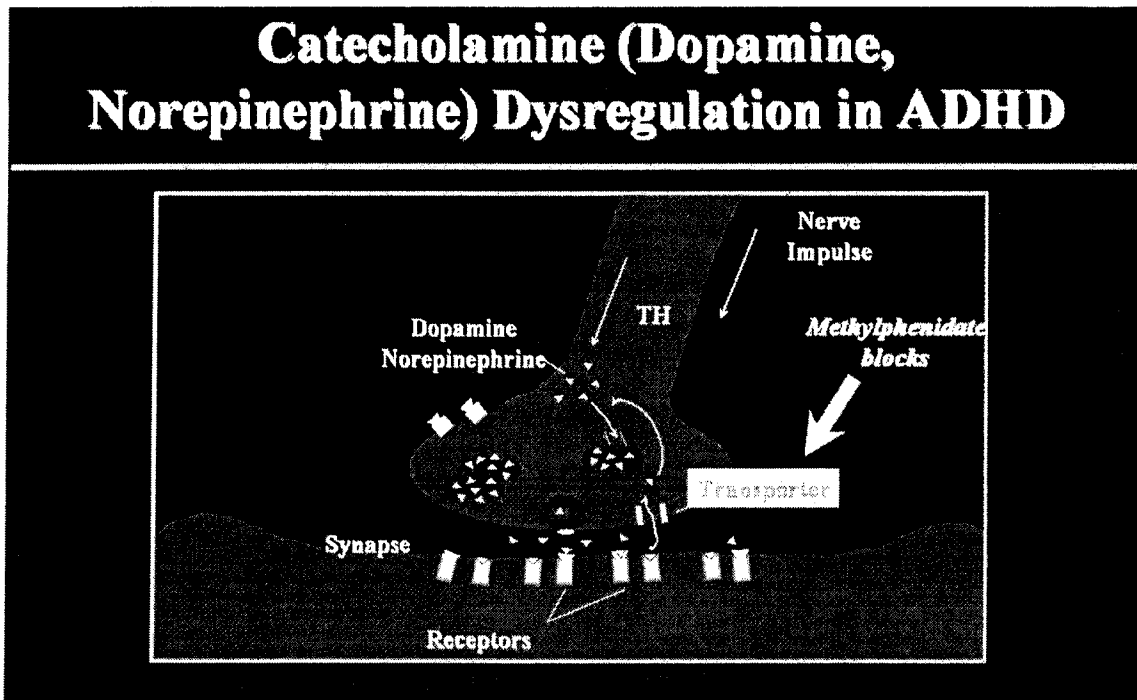


Figure 1. Catecholamine dysregulation in ADHD.

One MRI study found that 57 boys with ADHD showed significant anatomic differences in their brain structure when compared to children who did not have ADHD (Weiss et al., 1999). So far, structural neuroimaging studies involving ADHD juveniles have indicated alterations in the brain involving the prefrontal cortex, the striatum, cerebellum, and the corpus callosum (Faraone et al., 2000). Currently, Dr. Nora D. Volkow, of the Medical Department of Brookhaven National Laboratory, is studying the use of Positron Emission Tomography (PET) to determine the effects of methylphenidate (MPH) in the human brain. Some of the brain imaging results from these studies show that it takes about 60-90 minutes for MPH to reach its peak levels in the brain and that

MPH blocks more than 50% of the dopamine transporters (Volkow, Fowler, Wang, Ding, & Gatlely, 2002).

Some researchers hold strongly that there is no single cause of ADHD, and that it can be traced to a variety of genetic, medical, temperament, social, and environmental risks (March et al., 1995). It is felt that along with medical factors, psychosocial variables are also important as causes of ADHD. These multiple factors, sometimes in combination, include fetal alcohol syndrome, fetal or prenatal traumas, narcotics, temperament risks, and children at risk due to poverty, abuse, psychosocial trauma, or parental psychopathology. National samples of ADHD and related problem behaviors show little or no differences in racial or ethnic background (Achenbach, Howell, Quay, & Conners, 1991). Such studies show that social issues play a significant role in the development of ADHD, with no major differences accounted for by race or ethnicity once social class and education are taken into account (Conners, 2003). These findings make sense in that the brain itself is markedly shaped by the environment and not just neurobiological influences. In the area of education, further studies need to be done to understand how to increase children and adult success in school and the impact ADHD has on learning (Weiss et al., 1999).

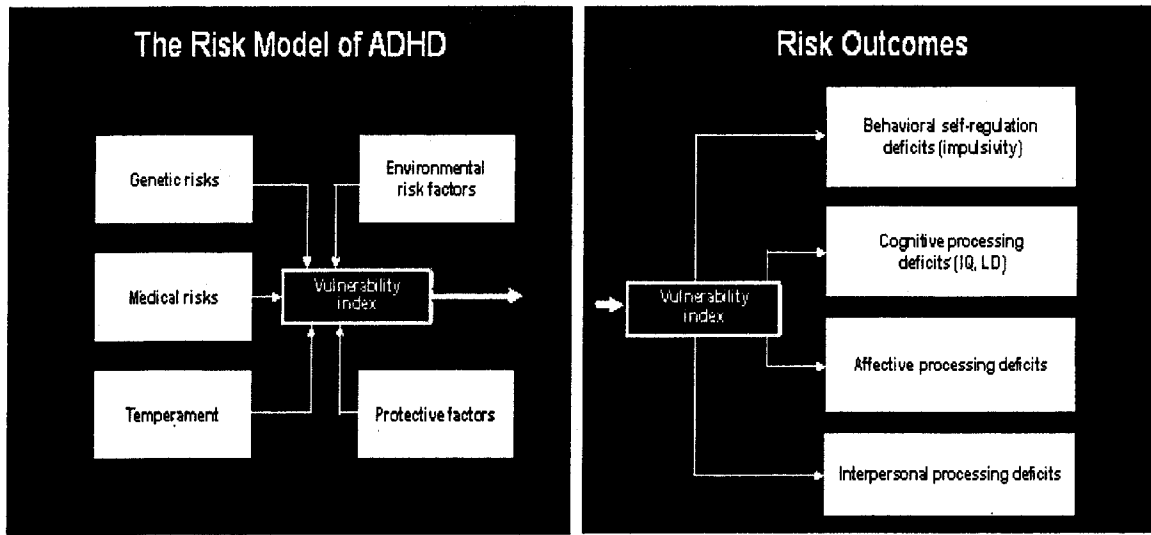
A number of risk factors have been identified, particularly those affecting early development of the fetal brain, such as maternal alcohol and tobacco use, environmental toxins (lead), and lack of crucial nutrients such as iron and calcium (Nichols & Chen, 1981). Animal studies show that pregnant mice chronically exposed to nicotine have hyperactive offspring (Biederman & Faraone, 2002). It has also been found that nicotine

exposure results in dopamine disruption, which, as already stated, is one of the target areas considered as a cause of ADHD (Biederman & Faraone, 2002).

It has also been suggested that hyperactivity in infancy, conduct disorders, antisocial behavior in first-degree relatives, problems in delivery or prenatal functioning, developmental delays, neglect, abuse, and severe early trauma are all possible risk factors (Linnet et al., 2003). These risk factors become more significant as the risk outweighs protective factors, which mitigate the disorder (March et al., 1995). Some of the factors that are considered as ADHD “protective factors” are a positive family environment, access to educational resources, a healthy lifestyle, and high intelligence. Figure 2 gives a good visual overview of this global theory of the causes of ADHD.

Note that the risk factors are common to a number of different types of childhood dysfunction. Thus, the problems of self-regulation typical of ADHD might also be complicated by cognitive, mood, or social dysfunctions.

At various times it appears that research is driven more by popular misconception of ADHD than by facts. For instance, it was thought that ADHD was caused by sugar intake, food allergies, food additives, florescent lights, or folic acid deficiency. Studies on the Feingold diet (elimination of food additives) and reductions of sugar intake found that none of these theories are empirically valid (Biederman & Faraone, 2002). Many of the so-called theories were simply schemes to make money with expensive treatment plans for patients (Weiss et al., 1999). The Feingold diet was, however, an honest theory put forward on the basis of clinical experience in an allergy setting. The fact that it was discredited by research does not impugn the integrity of Dr. Feingold, who was a sincere advocate of this approach.



"Functional Impairments in ADHD: The Therapeutic Target," by C. Keith Conners, 2003, *Contemporary Pediatrics*, 5. Copyright 2003. Reprinted with permission.

Figure 2. The risk model of ADHD.

One popular theory, which did help in the understanding of ADHD, was the thought that a chemical imbalance was the cause of ADHD. It has been found through empirically based research that dysregulation of dopamine, norepinephrine, and serotonin may in fact play a role in ADHD (DiMaio, Grizenko, & Joobar, 2003; Solanto, 2002). Stimulant drugs such as methylphenidate or dextro-amphetamine appear to stabilize and reverse this chemical imbalance by facilitating the release of catecholamines (dopamine and norepinephrine), and by blocking their re-uptake.

History of ADHD Research

Russell Barkley's book (1990), *Attention Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment*, provides a detailed historical perspective on

ADHD. According to Barkley's book, ADHD symptoms in children were first written about in the early 1900s. These early papers by the pediatrician George Still presented ADHD in medical terms and described the cognitive and behavioral effect of this disorder as if it was an injury such as a trauma or infection. George Still and Alfred Tredgold are noted as being the first researchers to give serious focus to the attention and behavioral conditions of children who appeared to have symptoms of what we would consider today as ADHD (Still, 1902; Tredgold, 1908).

Still (1902) noted that these children were often more aggressive, defiant, and resistant to discipline. He was the first to define the symptoms of the disorder as being a medical concern compared with the normal behavior of children the same age, suggesting that an age-reference criterion was important in the diagnosis of ADHD. He also wrote that children who came from homes that had poor child-rearing practices should not be included in the category of this disorder. He proposed that there was some biological predisposition to the behavior. He suggested possible hereditary or prenatal or postnatal injury played a role. He felt improvement in the condition could come by means of a special education environment or medication.

In 1917-1918, North American researchers became interested in the disorder after an encephalitis epidemic. Clinicians were asked to treat many children who had survived the epidemic but appeared to be left with significant behavioral problems in the areas of attention, regulation of activity level, cognitive impairment, socially disruptiveness, and poor impulse control. The children were diagnosed with "Postencephalitic Behavior Disorder" as a result of central nervous system damage. It was recommended that the children receive alternative educational placement and/or outside home placements.

After modifications were put into place, the researchers noted that the children showed significant strides in their behavior (Barkley, 1990).

As the research of the “disorder” started to take form so did finding a name for it. Some researchers referred to it as Organic Driveness Disorder (Kahn & Cohen, 1934), Minimal Brain Damage (Tredgold, 1908), or the Restlessness Syndrome (Childers, 1935). It appears that by the 1950s and 60s the term MBD, Minimal Brain Dysfunction (Clements, 1966), became the standard name used by clinicians to describe these symptoms in children. Towards the end of the 1960s the name started to change again. This time clinicians used more specific terms such as Dyslexia, Language Disorder, Learning Disabilities, and hyperactivity. But the criteria were so broad that they included virtually the whole range of childhood psychiatric impairments.

A paper written by Stella Chess (1940) brought the research of the disorder into modern times. In her paper she defined the features of the disorder, the need for objective evidence of the symptoms, removal of blame from the parents, and separating the concept of the syndrome of hyperactivity from the concept of a Brain Damage Syndrome. She defined the hyperactive child as “one who carries out activities at a higher than normal rate of speed than the average child, or who is constantly in motion, or both.” After her publication, the *DSM-II* created the category of Hyperkinetic Reaction of Childhood Disorder. However, the diagnostic manual provided only a brief description of the disorder and gave few useful details on how to diagnose it (Barkley, 1990).

By the 1970s the study of Hyperkinetic Reaction of Childhood Disorder was taking off with over 2,000 published studies, numerous clinical and scientific textbooks,

scholarly reviews of literature, scientific gatherings, and journal issues devoted to the topic. The disorder started to take on more definition, and researchers started to question what causes this disorder, including the possibility that these children's brains develop differently. Researchers such as Virginia Douglas, at McGill University, Susan Campell, and Gabrielle Weiss were the leaders in asking and researching these questions. It is believed that Virginia Douglas's research was the major reason why the disorder was renamed as Attention Deficit Disorder (ADD) in 1980 by the *DSM-III*. The *DSM-III* took a different stance on what ADD is by including in the definition that sustained attention and impulse control were a greater significance in the diagnoses than the symptoms of hyperactivity. In his review of the history of medication treatment for ADHD, Barkley (1990) points out that Keith Conners, Leon Eisenberg, Robert Sprague, Virginia Douglas, and John Werry were among the early researchers examining how to treat the disorder with medication. With the advent of drug studies, it also became necessary to delineate criteria for the disorder as well as to find ways to measure changes. The early development of teacher and parent rating scales by Conners and others contributed to making the disorder among the well-studied areas in child psychiatry (Barkley, 1990).

Currently, methylphenidate is the most commonly used stimulant in the treatment of ADHD. Over 1,500 of the current ADHD studies use methylphenidate. Charles Bradley (1937) was one of the first researchers to use stimulants. He originally used Bensedrine (a form of amphetamine), hoping it would cure headaches. Instead it was found that the patients had a markedly improved attention span. The stimulant was soon referred to as the "math pill" because students were able to sit long enough to finish their

math work (Conners, 2002). Maurice Laufer was Bradley's successor as medical director of the Bradley Home for Children. Laufer continued Bradley's work, but added to the research by defining the symptoms of the disorder, including both hyperactivity and inattention in the criteria (Conners, 2002).

In 1957 the FDA approved Ritalin® for the treatment of hyperactivity, impulsivity, and inattention. However, it was not until the 1960s that the first controlled trials of Ritalin® were researched by Dr. Conners and Dr. Eisenberg. Several meta-analyses of the drug studies have consistently shown that the stimulant methylphenidate and the amphetamines improve symptoms of ADHD in about 70% to 80% of the children being treated (Kavale, 1982; Ottenbacher & Cooper, 1983; Thurber & Walker, 1983).

As more research on ADHD emerged, the definition and name changed again. The *DSM-III-R* changed the name to Attention Deficit Hyperactivity Disorder along with redefining the criteria. Some of the changes included the following: a single list of symptoms and a single cut-off score; the item list was now based on empirically based dimensions of a child's behavior; and the need to establish the symptoms as being developmentally inappropriate for the child's mental age. The 1980s and 90s brought improved research, neurological studies, development of assessment tools, new approaches to treatment, and public awareness of this disorder as a disability. One of the positive changes came with the 1994 release of the *DSM-IV*, in which some guidelines were also included to facilitate helping in diagnosing adults.

Manifestation of ADHD Symptoms

Adults and children manifest symptoms of ADHD very differently. Therefore it is important for families and the patient to understand how their symptoms change over developmental stages. Not only are the children affected by the disorder, but the entire family suffers. Families who have children with ADHD have higher levels of marital discord, sub-optimal parenting practices, and parenting distress (Lambert, Hartsough, Sassone, & Sandoval, 1987). Consequently, understanding the patient can lead to a better understanding of the family's dynamics and how it can be negatively impacted through the disorder. In Barkley's (1990) study it was found that hyperactive children were less compliant, more negative, more off task, and less able to sustain compliance to their mom's redirections compared to non-ADHD children. The mothers were more commanding and negative, and less responsive to positive or neutral communications from their children, compared to mothers who had children without ADHD. Studies also indicate that even when there are improvements in ADHD behavior, parent-child conflicts seem to be more of a problem within ADHD households compared to non-ADHD households (Barkley, 1990).

Typically, parents and schools see higher rates of ADHD symptoms in children between the ages of 6 and 12 (Conners & Jett, 2006). Usually the child will have a marked impairment in one or more of the following domains: family relationships, peer status, social skills, academic achievement, self-esteem/self-perception, and accidental injury (National Institute of Mental Health [NIMH], 1998).

In the social domain, children with ADHD are usually not welcomed into their peer groups. This rejection by their peers can lead to school dropout, delinquency,

behavior problems in school, poor motivation in school, poor self-esteem, depression, and attendance problems (Lambert et al., 1987). These behaviors coupled with the ADHD symptoms can result in the vast majority of ADHD children and adolescents not working up to their educational potential. Within a school setting the teachers may see some of the following ADHD symptoms: easily distracted, engaged in off-task activities, unable to sustain attention, impulsive behaviors, displays of aggression, acts like the “class clown,” has increasing difficulties with peer relations, poor organizational skills, and does not finish tasks, etc. (Conners & Jett, 2006).

As noted previously, these symptoms in childhood have generally been broken down into two categories of either inattention or hyperactivity. Inattention symptoms include failing to give close attention to details or making careless mistakes, having difficulty sustaining attention, not listening, not following through, having difficulty organizing, avoidance or dislike of sustained mental effort, losing things, being easily distracted, and forgetfulness. Hyperactivity symptoms include fidgeting, being out of seat, running or climbing excessively, having difficulty playing quietly, being “on the go” or as if “driven by a motor,” talking excessively, blurting out answers, having difficulty awaiting turn, and often interrupting or intruding on others (Dulcan & Benson, 1997).

Adults may demonstrate symptoms in failure to achieve academically or occupationally, difficulty keeping jobs, an inability to sustain relationships, somatic complaints, violent behaviors, poor stress tolerance, and drug/alcohol abuse. Manuzza et al. (1991) undertook a 13- to 19-year follow-up study of 91 males who had been diagnosed with ADHD with a final mean age of 26 years. Eleven percent of the males in the study continued to have clinically impairing symptoms into adulthood. The study

also found that the men ranked lower in social class, had lower academic achievement, and completed 2.5 fewer years of school. In addition, 25% of them dropped out of school by the 11th grade. Twelve percent achieved a bachelor's degree or higher, had an increased risk of incarceration, a higher incidence of mental disorders, were 10 times more likely to have antisocial personality disorders, and 5 times more likely to have substance abuse problems.

Adults with ADHD often compensate for their disorder in the following ways (Manuzza et al., 1991):

1. Either withdrawing or participating in high-stimulus activities
2. Obsessive-compulsive type behaviors, such as making lists or charts often overwhelming adults leaving them still disorganized and unproductive
3. Fail to live up to occupational potential and work in jobs they are overqualified
4. Relationships fail, are avoided all together, or become very intense where the adult overvalues relationships with others or becomes submissive.

The following breakdown gives a realistic view of some symptoms and struggles that an adult with ADHD can sometimes deal with on a day-to-day basis (Hallowell & Ratey, 1994b).

1. Hyperactivity-Related Symptoms
 - a. Inability to relax
 - b. Restless sleep
 - c. Excessively active lifestyle
 - d. Constant purposeless motion of extremities
 - e. Obsessive-compulsive, stimulus-seeking, or antisocial behaviors

2. Impulsivity-Related Symptoms

- a. Disinhibition
- b. Alcohol or other drug (especially caffeine) abuse
- c. Family violence
- d. Speaking or making decisions without considering consequences

3. Inattention-Related Symptoms

- a. Disorganization and inefficiency
- b. Procrastination
- c. Failure to plan ahead
- d. Forgetfulness
- e. Difficulty in multitasking
- f. Misjudging how long it takes to perform tasks
- g. Inability to complete tasks
- h. Distractibility
- i. Poor ability to follow long explanations

4. Other Symptoms

- a. Rapid, brief mood shifts or over-excitability
- b. Hot temper
- c. Low self-esteem; feelings of inadequacy
- d. Stress-intolerance; feeling chronically overwhelmed
- e. Stubbornness
- f. Driving infractions
- g. Difficulty in keeping jobs or sustaining relationships

h. Failure to live up to occupational potential

Not all adults with ADHD have learning problems or other psychological and social difficulties. They can be creative, gifted, and intelligent people. At a second glance, many of the characteristics of ADHD could be seen as advantageous: a high energy level, talkativeness, an orientation to action, daring, stubbornness, hands-on, and curious, etc. Benjamin Franklin (among others) is considered to have had ADHD. It is sometimes thought that Benjamin Franklin's ADHD-like characteristics may have been the reason for his success (Burd & Kerbeshian, 1988).

The *DSM-IV* Criteria for ADHD

When clinicians make a diagnosis of a patient they usually follow the standards set by the most current edition of the *Diagnostic and Statistical Manual of Mental Disorders - IV (DSM-IV)*. The following is a detailed outline taken directly from the *DSM-IV* of the diagnostic criteria for Attention-Deficit/Hyperactivity Disorder:

A. Either (1) or (2)

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

Inattention

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

- (h) is often easily distracted by extraneous stimuli
- (i) is often forgetful in daily activities

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

Hyperactivity

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

Impulsivity

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

- B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years
- C. Some impairment from the symptoms is present in two or more settings (e.g., at school or work) and at home)
- D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning
- E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder) (APA, 1994, pp. 84-85)

Most research on diagnosing adult ADHD indicates that there is a serious need for research on how best to gather patient information in order to make a diagnosis and to determine what instruments are most useful. Adler and Cohen (2004), Riccio et al. (2005), and Liu and Stein (2004) emphasize reminding clinicians to use sound practices when diagnosing, and treating adult ADHD patients. These authors emphasize that adult ADHD is a clinical diagnosis and a clinician-administered interview remains the

cornerstone of the diagnostic evaluation. Adler (2004) emphasizes in case study reports that the use of retrospective reporting and rating scales are not only vital in determining an ADHD diagnosis but these tools also assist in discovering comorbidities and family histories of ADHD. The importance of having a correct diagnosis in psychiatry is demonstrated in Faraone et al.'s (2004) research. They reviewed over 800 medical records of adults diagnosed as having ADHD. Only 25% of the adults with ADHD had been first diagnosed as having the disorder in childhood or adolescence. They found that a diagnosis of ADHD was the initial cause for referral in 80% of the psychiatric patients, and 60% of the patients seen by their primary care physician. Fifty-six percent of the patients had complained about ADHD symptoms to other health care professionals but were never diagnosed. Primary care physicians were the least aggressive in diagnosing ADHD. This article also emphasizes the importance for clinicians of knowing how to diagnose ADHD correctly so patients can be treated appropriately.

Current research demonstrates that there are several tools for assessing adults that are available but their ability to diagnose ADHD accurately is poorly understood, making it even more vital that clinicians know what tools they should or should not use when working with patients. McCann and Roy-Byrne (2004) researched three ADHD scales: Adult Rating Scales (ARS), Attention Deficit Scales for Adults (ADSA), and the Symptom Inventory for ADHD. This research found that all three instruments were sensitive to the presence of symptoms in adults (correctly identifying patients) but they also had a high proportion of individuals with non-ADHD diagnoses who were screened positive, incorrectly identifying between 36% to 67% as ADHD. Murphy and Adler (2004) reviewed numerous scales and again point out the lack of research establishing the

usefulness of self-administered rating scales compared with investigator-administered scales in the assessment and diagnosis of adult ADHD. One study (Oncu et al., 2004) examined the Achenbach (Child Behavior Checklist [CBCL]) and Teacher Report Form (TRF). He found that these scales under diagnose and may cause an emerging problem as these large numbers of misdiagnosed children get older. Rosler et al. (2004) completed research on a German adult self-rating questionnaire (ADHD-SR) and a diagnostic checklist (ADHD-DC). This research found that these two tools correlated well, and had a high correlation with another adult-rating scale, the Wender Utah Scale.

ADHD and Comorbidity

A variety of other disorders can be mistaken for ADHD. Impaired vision or hearing, seizures, early onset of Bipolar Disorder, Mental Retardation, Learning Disabilities, difficult temperament, head trauma, acute or chronic medical illness, poor nutrition, insufficient sleep, Anxiety Disorders, Depression, abuse or neglect, and Tourette's Disorder can mimic symptoms of ADHD. Drugs such as phenobarbital, alcohol, illicit drugs, and perhaps some asthma drugs can also give the patient the appearance of having symptoms of ADHD (Dulcan & Benson, 1997). Comorbidity of ADHD with other psychiatric disorders can be as high as 77% (Weiss et al., 1999). It is therefore not enough for the clinician to know the criteria for the diagnosis of ADHD; the clinician must also be able to distinguish its symptoms from other conditions that may resemble ADHD. Montano (2004) found that the majority of adults with ADHD have not been properly diagnosed or treated because of comorbidity and lack of diagnostic information. Most adults exhibit at least one comorbid symptom from one of the following psychiatric disorders: major depressive disorder, anxiety disorder, personality

disorder, substance abuse disorder, or bipolar disorder. Comorbidities compound the difficulty in making an adult diagnosis, therefore making it important to look for established early (childhood) symptoms and persistent (lifelong) history. Montano's research emphasizes the lack of current data on rating scales and other diagnostic tools and how important this research is in the field of adult ADHD.

Biederman et al. (1993) studied 84 adults referred with and without ADHD and a group of children with ADHD. Seventy-seven percent of the adults referred for ADHD met the criteria for comorbidity. The difficulties included oppositional, problems with aggression, depression, anxiety, learning, or hypomania. They also found that there was no difference in patterns of comorbidity in diagnosed children and adults, suggesting that the pattern of presentation of adult ADHD is similar to childhood ADHD, and that a higher level of comorbidity is to be expected with adult patients. Symptoms of ADHD overlap with other disorders, such as Depression with agitation, Generalized Anxiety Disorder, Primitive Personality Disorders, Thought Disorders, Cyclothymia, and Organic Disorders. Depression and ADHD have overlapping symptoms in the *DSM-IV*. Of the nine categories listed in the *DSM-IV* for Depression, six of them are also associated with ADHD. Here again, following the developmental course of the symptoms is important. In ADHD, the demoralization and sadness are constant features, dating from very early failure experiences, as opposed to the late onset of true depressive syndromes. Biederman et al. (1993) found that 31% of adults referred with ADHD meet the full diagnostic criteria for a Major Depressive Disorder. They also found that about 30% of adults with ADHD reported problems with depression in childhood.

A variety of hypotheses have been developed to explain the comorbidity between ADHD, Mood Disorders, and Depression. Possibly, ADHD could be a variant of Mood Disorders or Mood Disorders could be an outcome of ADHD. It could also be that the two disorders are genetically linked (Faraone & Biederman, 1997). Depression could also be secondary to living with ADHD (Weiss et al., 1999). At present there is disagreement among psychiatrists about the relationship between Mania/Bipolar and ADHD. Some of the disagreement reflects the vagueness of the Bipolar definition. Research on the comorbidity of this disorder is still on-going. Biederman and associates have found that children with ADHD and Bipolar are more ill than children with just ADHD, and the children with both disorders have much higher rates of multiple hospitalizations. Controlled clinical trials of mood stabilizers in this population are not out yet. It has been found that the treatment regimes for these disorders can exacerbate each other. For instance, stimulants might increase mania whereas lithium can result in toxicity and need for close monitoring. The relationship between Bipolar and ADHD remains confusing and will require more time to determine whether there is any link between these two disorders.

Biederman and associates (1993) found that 53% of adults referred with ADHD met the criteria for at least two major Anxiety Disorders (Obsessive-Compulsive Disorder, Separation Disorder, Panic Disorder, Agoraphobia, Social Phobia, and Generalized Anxiety). When anxiety is present with ADHD, it intensifies the patient's difficulties with self-esteem, adaptive functioning, working memory, and stress tolerance. Assessment of patients with ADHD and anxiety disorders can be complicated. It is common that both disorders have been present the entire life of the patient, therefore

becoming embedded in a patient's self-concept. As a result, anxiety is usually not self-reported unless the patient is specifically questioned in such a way that the anxiety becomes recognizable to the observer or clinician (Weiss et al., 1999).

Oppositional-Defiant Disorder (ODD), Conduct Disorder (CD), and Learning Disorders (LD) are also common with patients who have ADHD. ODD is defined as having problems with being stubborn, defiant, and angry whereas CD describes problems with getting into trouble, with such difficulties as fighting, stealing, breaking rules or fire setting. Learning disorders are often associated with higher rates of repeated grades, tutoring, placement in special classes, and reading disabilities. It is often thought that treatment of ADHD will place these other disorders into remission, which often is not the case. While some patients and families feel that the diagnosis of ADHD means that their child will be ODD, CD, or LD, this is by no means the case. Clinicians need to explain these other disorders to the patient so that they have realistic treatment outcomes.

Biederman et al. (1997) found that 52% of adults with ADHD had a lifetime history of substance abuse. Adults with ADHD are at three times the risk of smoking, but do not appear to be at a greater risk for alcohol abuse. Treatment of ADHD patients with substance abuse problems is a concern due to harmful effects that can occur if patients mix stimulant medication with street drugs. There is considerable interest in developing better treatment for this population. Right now it is recommended that clinicians take a conservative approach when treating these patients.

Borderline Personality Disorder (BPD) is defined by feelings of emptiness, rage, mood instability, intense reactivity, self-destructive impulsivity, frantic efforts to avoid abandonment, unstable and intense interpersonal relationships, identity disturbances,

intense anger and difficulty controlling anger, and paranoia. As in both BPD and ADHD, the patient's behavior is puzzling to others because the patient functions so poorly. Again, families and patients often think that treatment of one of these disorders will cure the other. Currently there are no published papers on the differential diagnosis between BPD and ADHD. Usually it is recommended that the BPD is treated as the primary disorder (Weiss et al., 1999).

Researchers have different views on the relationship of Tourette Syndrome (TS) and ADHD. Some believe that ADHD and TS may be one disorder. Others believe that they are not related. They feel that when the patient has to focus on suppressing the tics, it is the tics themselves which cause distractions for the patients and not necessarily the results of ADHD. There is currently only one unpublished adult ADHD/tic study done by Spencer, Coffey, and Biederman (described by Weiss et al., 1999). They looked at 309 adults with ADHD and found that 11% have reported the presence of tics. According to the reports by the patients, they believed that their ADHD started at about the age of 3 and the symptoms of tics started at average age of 12. Over 90% had experienced an onset of tics in childhood. This indicates that if a person has not had any tics by the age of 20 the likelihood of developing them as adults is very small. Most patients are taken off stimulants when tics appear due to the exacerbation of tics caused by the stimulants. It therefore is important for clinicians to get a good history especially from adults who may have had these types of side effects from medication when they were children (Weiss et al., 1999).

Further research is clearly necessary regarding the overlap with ADHD and other disorders. Differential diagnosis and comorbidity are the current frontiers of research in

adult ADHD (Jensen, Martin, & Cantwell, 1997). These two areas are also the most difficult aspects of assessment and treatment of adult ADHD, because adults come to clinicians with a lifetime of untreated problems, making it even more complex to treat them compared to children. As many as one third of children with ADHD have one or more coexisting conditions. Children with ADHD should be assessed for coexisting conditions. A review of all coexisting conditions such as motor disabilities, problems with parent-child interaction, family violence, Conduct Disorder, Oppositional Defiant Disorder, Mood Disorders, Anxiety Disorders, and Learning Disorders should be included in the assessment. There are several screening tests available that can detect areas of concern for many of the mental health disorders that coexist with ADHD. Along with measures, the clinicians should also look at school performance for indicators of other coexisting problems.

Assessing Adults for ADHD

An outline that is considered the standard of care for adults who have or may have ADHD was recommended by The American Academy of Child and Adolescent Psychiatry (AACAP) in October of 1997 (Dulcan & Benson, 1997). This group of experts recognized that ADHD is a disorder beginning in childhood. These are the current recommended guidelines and mostly likely will not be replaced until the *DSM-V* is published. Therefore, the following procedures are necessary in diagnosing the adult manifestations of the disorder:

This outline is as follows:

I. Initial evaluation (a complete psychiatric assessment is indicated; see American Psychiatric Association Work Group on Psychiatric Evaluation of Adults [1995]).

A. Interview with patient.

1. Developmental history.
 2. Present and past *DSM-IV* symptoms of ADHD (may use symptoms or criterion checklist or self-report form).
 3. History of development and context of symptoms and resulting past and present impairment.
 - a. School (learning, academic productivity, and behavior).
 - b. Work.
 - c. Family.
 - d. Peers.
 4. History of other psychiatric disorders.
 5. History of psychiatric treatment.
 6. *DSM-IV* symptoms of possible alternate or comorbid psychiatric diagnoses, especially:
 - a. Personality disorder.
 - b. Mood disorders –depression or mania.
 - c. Anxiety disorders.
 - d. Dissociative disorder.
 - e. Tic disorder (including Tourette’s disorder).
 - f. Substance use disorder.
 - g. Learning disorders.
 7. Strengths (e.g., talents and abilities).
 8. Mental status examination.
- B. Standardized rating scales completed by the patient’s parents.
- C. Medical History.
1. Medical or neurological primary diagnosis (e.g., thyroid disease, seizure disorder, migraine, head trauma).
 2. Medications that could be causing symptoms (e.g., phenobarbital, antihistamines, theophylline, sympathomimetics, steroids).
- D. Family history.
1. Developmental and learning disorders.
 2. Family coping style, level of organization, and resources.
 3. Family stressors.
 4. Abuse or neglect (as victim or perpetrator).
- E. Interview with significant other or parent, if available.
- F. Physical evaluation.
1. Examination within 12 months or more recently if clinical condition has changed.
 2. Further medical or neurological evaluation as indicated.
- G. School information.
1. Standardized rating scales if completed during childhood.
 2. Narrative childhood reports regarding learning, academic productivity, and behavior.
 3. Reports of testing (e.g., standardized group achievement tests and individual evaluations).
 4. Grades and attendance records.
- H. Referral for additional evaluations if indicated.

1. Psychoeducational evaluation.
2. IQ.
3. Academic achievement.
4. Learning disorders evaluation.
5. Neuropsychological testing.
6. Vocational evaluation.

II. Treatment planning.

- A. Establish target symptoms of ADHD and baseline levels of impairment.
- B. Consider treatment for comorbid conditions (monitor possible drug-seeking behavior).
- C. Prioritize modalities to fit target symptoms and available resources.
- D. Monitor multiple domains of functioning.
 1. Academic or vocational.
 2. Daily living skills.
 3. Emotional adjustment.
 4. Family interactions.
 5. Social relationships.
 6. Medication response.
- E. Periodically reevaluate the efficacy of and need for additional interventions.
- F. Maintain long-term supportive contact with the patient and family to ensure compliance with treatment and to address new problems that arise.

III. Treatment.

- A. Education for patient, spouse, or other significant persons.
- B. Consideration of vocational, counseling, or training.
- C. Medication.
 1. Stimulants.
 2. Tricyclic antidepressants.
 3. Other antidepressants.
 4. Other drugs (buspirone, propranolol).
- D. Psychosocial interventions. Individual cognitive therapy; "coaching."
- E. Family psychotherapy if family dysfunction is present.
- F. Referral to support group, such as CHADD.
- G. Other treatments are outside the realm of the usual practice of psychiatry (The American Academy of Child and Adolescent Psychiatry [ACAP], 1997, pp. 111-112)

The American Academy of Child and Adolescent Psychiatry (AACAP) also recommends that a complete psychiatric evaluation be completed with particular attention to the core symptoms of ADHD (Dulcan & Benson, 1997). This evaluation will be helpful in determining if symptoms were present before the age of 7 years. Therefore, a

childhood history is essential in making a diagnosis in an adult. Medical history and a recent physical examination with laboratory studies are necessary in order to rule out conditions that could be mistaken for ADHD.

There are several pre-printed guides clinicians can follow when taking history from an adult with ADHD. Russell Barkley (1990) has developed a four-page self-report form, which documents the patient's development, employment, health, and social history. There is also an Adult Interview that provides a record of the patient's family history, school history, and family psychiatric history. The Conners' Adult ADHD history form was designed to be completed by the patient. This form is much more involved and is usually used as a guide for the clinician when interviewing patients. Tom Brown has designed the ADD Diagnostic Form. This form guides the clinician through all the components of an ADHD assessment including the interview, rating scales, psychological testing, review of the *DSM-IV* symptoms of ADHD, screening for comorbidity, and summarizing all of the information for the patient. Neuropsychological testing may be indicated to evaluate possible traumatic brain injury or a degenerative process (Dulcan & Benson, 1997).

Current Status of Treatments for ADHD

Despite the high media profile of the disorder in children, adult access to treatment remains quite limited. Previous beliefs were that children outgrew the disorder as they approached adulthood. Clinical training and research is now focusing on this disorder as aggressively as with children and adolescents (Shaffer, 1994).

Previous studies demonstrate that 76% of adults with ADHD will respond to treatment with stimulant medication, when treated with adequate doses (Spencer et al.,

1995; Wilens, Biederman, Spencer, & Prince, 1995). Surveys suggest that 166,416 new prescriptions for psychostimulants for individuals over 21 years of age were written in 1992 and 227,367 in 1993. This represents a 37% increase in new prescriptions for adults. Even though there appears to be a clear predominance of adolescent males receiving prescriptions for ADHD, once a patient is older than 21 years, nearly as many women are treated with psychostimulants for ADHD.

Medication treatment has the same therapeutic effects, regardless of age. In the presence of comorbid substance use adults should be able to show abstinence for 1 month before starting medication treatment for ADHD. Target symptoms should be identified with clear baselines and repeated reevaluation to assess progress. Structured instruments are usually used to identify progress. Adults and children experience similar side effects, although adults seem to be more sensitive than children to stimulants (Spencer, Biederman, Wilens, & Faraone, 1994).

The common dosing range for methylphenidate is 20 to 80 mg a day, usually starting at 10 milligrams three times a day (Dulcan & Benson, 1997). For adults who need more frequent dosing, doctors are turning to the long-acting stimulants to alleviate a patient's need to take numerous pills throughout the day and for a better effect of the medication. The long acting stimulants are usually dosed at 10 to 40 milligrams a day. Some adults have problems tolerating these medications due to the initial rapid absorption, which results in excessive side effects and can cause insomnia.

The empirically based benefits of psychosocial interventions are still unknown. Some clinicians feel that psychotherapy is not successful without pharmacotherapy. Others believe that therapy should first identify the deficits as a result of the ADHD and

then make efforts to reduce self-blame and devise coping strategies. Cognitive remediation teaches techniques to enhance attention, memory, problem-solving, and family relationships. Coaching is sometimes used as this adjunctive treatment provides daily encouragement. Adults who have gone undiagnosed until late adulthood may need specific help in education, vocational skills, family therapy, or social skills (Dulcan & Benson, 1997).

Education about ADHD should be a core feature of the treatment plan. AACAP (Dulcan & Benson, 1997) recommends the following books and newsletters for adults to read: B. Ingersoll and S. Goldstein (1993), *Attention Deficit Disorder and Learning Disabilities: Realities, Myths and Controversial Treatments*; E.M. Hallowell and J.J. Ratey (1994), *Driven to Distraction: Recognizing and Coping with Attention Deficit Disorder from Childhood Through Adulthood*; E. M. Hallowell and J. J. Ratey (1994), *Answers to Distraction, Attention! The Magazine of Children and Adults with Attention Deficit Disorder; The ADHD Report; and Challenge: The First National Newsletter on Attention Deficit Disorder*.

Support groups are also an important option to consider. Support groups can be a vital tool in providing information about ADHD, obtaining feedback to the patient about their treatment, and learning about updates in treatment. The advocacy group, Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD), is often a good resource to start with when looking for a local support group.

Summary

Chapter 2 is divided into the following nine subheading: Overview and Prevalence of Attention Deficit Hyperactivity Disorder (ADHD), Impairments From

ADHD, Factors That Influence an ADHD Diagnosis, History of ADHD Research, Manifestation of ADHD Symptoms, The *DSM-IV* Criteria for ADHD, ADHD and Comorbidity, Assessing Adults for ADHD, and Current Status of Treatments for ADHD. Each of the individual sections was designed to give the reader a global understanding of what is ADHD, what is currently known about it, the symptoms of ADHD, and how clinicians diagnose and treat this disorder.

Attention Deficit Hyperactivity Disorder is considered one of the most commonly diagnosed psychiatric disorders of children and adolescence (Dulcan & Benson, 1997). It is also believed that 1% to 2% of all adults have ADHD (Shekim et al., 1990). Adults and children manifest symptoms of ADHD very differently. ADHD typically refers to a developmental disorder of childhood characterized by persistent patterns of inattention and/or hyperactivity-impulsivity. These patterns usually occur at higher frequency and severity than typically observed in individuals of the same age and development (American Psychiatric Association, 1994; Conners & Jett, 2006). The symptoms must be present before the age of 7 years and should be seen across two different settings (e.g., home or school/work) for at least 6 months. It is also not enough to say that the symptoms are present, but there also must be evidence of a marked interference in the person's social, academic, or occupational functioning. These "impairments" should not be better explained by other disorders, such as Pervasive Developmental Disorders, Schizophrenia, or any other Psychotic condition (American Psychiatric Association, 1994).

ADHD is a chronic, lifetime disorder that takes a considerable toll on those suffering from it as well as the families and communities who care for these individuals.

Significant proportions of those with ADHD end up with serious social, emotional, interpersonal, and economic limitations. Currently no single cause of ADHD has been discovered. However, it is known that ADHD has strong genetic links, temperamental factors, neuropsychological factors, social and environmental risk factors, psychosocial variables (fetal alcohol syndrome, fetal or prenatal traumas, and narcotics), along with risks due to poverty, abuse, psychosocial trauma, or parental psychopathology.

Russell Barkley's book (1990) *Attention Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment* provides a detailed historical perspective on ADHD along with existing research. According to Barkley's book, ADHD symptoms in children were first written about in the 1900s. Currently, methylphenidate is the most commonly used stimulant in the treatment of ADHD. In 1957 the FDA approved Ritalin® for the treatment of hyperactivity, impulsivity, and inattention.

When clinicians make a diagnosis of a patient they usually follow the standards set by the most current edition of the *Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV)*. In October of 1997 The American Academy of Child and Adolescent Psychiatry (AACAP) published their standard of care for adults who have or may have ADHD (Dulcan & Benson, 1997). The American Academy of Child and Adolescent Psychiatry (AACAP) also recommends that a complete psychiatric evaluation be completed with particular attention to the core symptoms of ADHD because comorbidity of ADHD with other psychiatric disorders can be as high as 77% (Weiss et al., 1999). It is therefore not enough for the clinician to know the criteria for the diagnosis of ADHD, the clinician must also be able to distinguish its symptoms from other conditions that may resemble ADHD. AACAP recommends that adult patients

CHAPTER III

METHODOLOGY

Introduction

When a clinician uses a comprehensive diagnostic tool such as the CAADID to assess whether a patient has ADHD, he or she will be gathering information about the symptoms, the natural course, the past history, extent and degree of impairment of function, and response to previous treatments. When the patient himself or herself fills out rating scales regarding their symptoms, they are giving their own subjective report of their illness, without the filters provided by the expert clinician's perspective. One would expect that the clinician and the patient should agree substantially regarding the symptomatic status, though plausibly not entirely to the same extent, since the clinician will be able to evaluate the symptoms in the context of much more experience. Both the patient's subjective symptom report and the clinician's fuller evaluation are important tools in the diagnosis.

Although verification of the diagnosis through the presence of symptoms is only one of the criteria to be fulfilled in making a diagnosis, it is obvious that the interview with an expert must show some congruence with the patient's own subjective evaluation. Treatment planning also depends upon a good level of agreement between the clinician's and patient's view of the disorder. The symptoms are one of the markers to be assessed

read books and newsletters about ADHD. They also advocate patients to attend support groups. Support groups can be a vital tool in providing information about ADHD, obtaining feedback to the patients about their treatment, and learning about updates in treatment.

in determining whether a treatment is actually working (along with measures of functional impairment). Most clinicians acquire baseline information, from both the patient and an observer, regarding the severity of the patient's symptoms. These baseline data are even more important if medication is being prescribed, so that doctors are better able to evaluate the effectiveness of the medication. If the patient and observer have significantly different rankings of the drug effect, not only is the baseline information misleading, but more importantly there is no substantial way to determine if the medication is having an effect on the symptoms. Therefore, this study will examine the correlation between the results of the CAARS (a self- and observer-rating scale) and the CAADID (a clinician comprehensive diagnostic interview).

Patient Sample

The sample for this research consists of adults between the ages of 18 and 60 years of age. Clinical samples consistently show a 1:1 ratio of males to females among adult ADHD patients; this ratio is also present in this sample. The sample is from the United States and Canada. The following universities recruited patients from referrals to the ADHD clinics at each site: Yale University, New Haven, Connecticut; Duke University, Durham, NC; Children's Hospital in Montreal, Montreal, Quebec, Canada; University of Toronto, Toronto, Ontario, Canada; and the University of British Columbia, Vancouver, British Columbia, Canada.

One hundred and forty participants attended the initial baseline screening visit. Fifteen participants did not meet inclusion criteria, 18 withdrew consent, and 9 were lost to follow-up. The final sample consisted of 98 adults with ADHD, of whom 64 remained enrolled for the entire 20 weeks. Of the 34 non-completers, 18 discontinued due to

adverse events. Other reasons given for discontinuation included lack of treatment efficacy, protocol deviation, treatment non-compliance, lost to follow-up, and unknown reasons. Of the 98 patients, 59 were diagnosed with the Combined subtype and 39 were not. Fifty-nine were diagnosed with ADHD-Hyperactivity/Impulsive subtype and 39 were not. Thus, the Hyperactive/Impulsive subtype group was compared against a group not diagnosed with that subtype; and the Combined subtype was compared with a group not diagnosed as Combined.

The participants in this study met the full *DSM-IV* criteria for at least one of the three subtypes of ADHD in adulthood as measured by a semi-structured clinical interview (CAADID) and self-report rating scales (CAARS). All patients had a good working knowledge of English and the capacity to comply with the demands of a 5-month treatment research project. Most patients had an observer rater (significant other) for the duration of the study. Current substance or alcohol abuse (i.e., in the last 3 months), to a degree that significantly impairs function, or sufficient to contraindicate use of psychotropic medication, is one exclusion criteria for participation in the study. Patients with current eating disorders, organic brain syndromes (or other significant neurological diseases), or who are currently receiving treatment with other psychotropic medication were excluded. Those who have used an investigational drug within 30 days or 5 half-lives (a half-life is the point at which the drug reaches 50% of its peak concentration) were not enrolled in the study. Patients with a well-documented history of bipolar I, schizophrenic disorder, required hospitalization, or who are suicidal do not meet inclusion criteria.

Procedures

Permission was obtained from the Ethics Review Committee (ERC)/Institutional Review Board (IRB) from Yale University, Duke University, Children's Hospital in Montreal, University of Toronto, and the University of British Columbia. The protocol and all other materials related to the study (informed consent, advertising, etc.) were submitted to the appropriate committees or boards. These committees or boards then gave written unconditional approval before the commencement of the study. Permission was obtained from the Human Subjects Review Board, Office of Scholarly Research, at Andrews University (see Appendix A). Each patient received both oral and written informed consent as deemed appropriate by the ERC/IRB. Consent forms were in a language fully comprehensible to the prospective subject (see Appendix B).

The study was conducted according to Good Clinical Practice Guidelines and the Declaration of Helsinki (International Committee of Helsinki, n.d.). Good Clinical Practice (GCP) is an international ethical and scientific standard for designing, conducting, recording, and reporting trials that involve the participation of human subjects. The Declaration of Helsinki was developed by The World Medical Association as a statement of ethical principles to guide medical research involving human subjects. The guidelines were adopted in Helsinki, Finland.

Instrumentation

For this research project, only data from two of the instruments or scales were utilized, the Conners' Adult ADHD Diagnostic Interview for *DSM-IV* (CAADID) and the Conners' Adult ADHD Rating (CAARS) (see Appendix C, D, E, F, and G). The CAADID and CAARS were used in this study exactly as they were published. No

modifications were made to the scales' response range, categories, or scoring criteria. Permission to copy the scales for this research was received from Dr. Conners, the author of the scales (see Appendix H). Each university had either their M.D. or Ph.D. administer the CAADID to the patient. To assure that each university was able to provide uniformity of the administration of the CAADID, each university had to have a well-established ADHD clinic, had previous research experience with established active clinical trial projects, and long patient waiting lists. The authors of the CAADID provided overall supervision either through site visits or conference calls. Each site had to provide in-house supervision from experts in the field of ADHD (Thomas Brown, Ph.D.; Lily Hectman, M.D.; Umesh Jain, M.D.; Diane Johnson, Ph.D.; Keith Conners, Ph.D.; Donald Quinlan, Ph.D.; and Margaret D. Weiss, M.D., Ph.D.). This assured uniformity across sites regarding the administration of the CAADID. All of the sites were given the CAADID manual which contains instruction on the administration. In addition to this, pre-study pilot rehearsals were completed with each site.

Conners' Adult ADHD Diagnostic Interview for *DSM-IV*

The Conners' Adult ADHD Diagnostic Interview for *DSM-IV* (CAADID) was published in 2001 by Multi-Health Systems (MHS) in order to provide clinicians both a current and past history of ADHD symptoms and diagnostic information based on the *DSM-IV*. CAADID is divided into Part I and Part II. Each part takes about 1.5 hours to complete. The CAADID was developed by the following three researchers who are experts in the field of ADHD: Diane E. Johnson, Ph.D.; C. Keith Conners, Ph.D.; and Jeff Epstein, Ph.D. The researchers addressed current problems regarding the assessment of adult ADHD through the development of this scale.

There is a potential for over-diagnosis and misclassification when assessing adults for ADHD. In adults, behaviors can mimic ADHD symptoms due to the aging process. Throughout the CAADID interview a reminder is embedded so the clinician has guidelines to determine if the patient's behaviors occur to a greater degree than the patient's peers. Each time a patient endorses a symptom, the clinician also is to gather individual patient information about the behavior in order to make a clinical judgment as to whether the symptom is really present.

ADHD adults often have a higher rate of comorbid disorders than children with ADHD. Some comorbid disorders have symptoms quite similar to those of ADHD. Therefore, the CAADID's comprehensive interview assesses other disorders so an accurate diagnosis can be made. The following is an abbreviated list of other conditions that are examined: Schizophrenia, Bipolar Disorder, Cyclothymia, Depression (with agitation), Anxiety Disorders, Antisocial Personality Disorder, Borderline Personality Disorder, alcoholic intoxication or withdrawal, other substance abuse disorders, Intermittent Explosive Disorder, Dissociative Disorder, Posttraumatic Stress Disorder, Conduct Disorder, Learning Disorders, age-appropriate high activity, Mental Retardation, stress/environment, head injury, Dementia, Delirium, Tumors, Tourette's Disorder, Stroke, Hyperthyroidism, Renal Insufficiency, Hepatic Insufficiency, Anoxic Encephalopathy, vitamin deficiency state, Chronic Obstructive Pulmonary Disease, Multiple Sclerosis, Seizures/Epilepsy, sensory deficits, drug side effects, and neurological disorders of vigilance.

ADHD symptoms can also be a result of an adverse environment. Part I of the CAADID assesses psychosocial stressors and their impact on the adult's life. This is

particularly helpful to the clinician in tracking the symptoms over time as treatment progresses. The last two issues in assessment involve the limits of the adult ADHD assessment as it relates to the *DSM-IV*.

The *DSM-IV* lists ADHD behaviors as they relate to childhood ADHD symptoms. The CAADID has been translated from the childhood behaviors into terms more appropriate to adulthood. Besides just listing the translated list of behaviors, the CAADID also contains a list of the original child symptoms, thus helping clinicians to judge whether current behaviors are consistent with the intent of the childhood versions of the symptoms. The last issue is getting a retrospective symptomatic history, which can be difficult, since the onset of the symptoms must be present by the age of 7. The CAADID has been developed so that simultaneous diagnoses of ADHD in adulthood and childhood can be made. If symptoms are present the interview then establishes the age of onset of these symptoms. The patient usually completes Part I on his or her own, prior to meeting with the clinician. Part I provides the clinician with a comprehensive demographic and developmental history. Many of the questions in Part I will require follow-up interviews by the clinician. It is recommended that Part I not be used with patients who are disoriented, severely impaired, or who have poor reading abilities in order to assure the accuracy of the information.

Part I is divided into Demographic information and several risk factors, including: (a) Gestation (b) Delivery; (c) Temperament; (d) Developmental; (e) Environmental; (f) Medical; and (g) Academic. Psychiatric, Family, Educational, Occupational, Social/Interpersonal, Health, Adult Psychological/psychiatric, and Comorbidity Screening Questions are also included. Because ADHD does not have a single cause of

its pathology, the different risk factors are usually examined when assessing for ADHD. If a patient screens positive for other comorbidities, then it is suggested that an additional comprehensive psychopathology interview (the SCID) be completed to assess significant comorbid conditions.

Part II focuses on the *DSM-IV* criteria across age spans. Part II is completed by the clinician with the patient present. A trained interviewer with an advanced degree in psychology, psychiatry, or social work administers Part II. Part II is divided into three sections. The first section assesses the presence of Inattention symptoms per the *DSM-IV*, followed by questions of the onset of these symptoms. The second section assesses the hyperactive-Impulsive symptoms and their onset and the level of impairment created by each symptom. The third section is a summary sheet and scoring algorithm that enables the clinician to synthesize all the information for Part II to make a *DSM-IV* diagnosis. Items in Part I of the CAADID have been numbered to facilitate cross referencing of information. In Part II, instead of numbers, an alphabetical code is used. An algorithm is then used to chart the answers from Part I and II in order for the clinician to make a diagnosis based on clinical judgment. In other words the CAADID simplifies and organizes a wealth of patient information which is then used by the clinician to make his/her diagnoses. This ensures that the same information and diagnostic criteria are used across different clinicians.

The CAADID was chosen for use in this study due to its very recent development. There is no statistical information in the manual regarding validity of the CAADID. In fact, the manual states that the researchers would be appreciative of having additional data on CAADID in order to further the psychometric development of this measure. This

study utilizes data from the assessment phase of a carefully conducted clinical trial to further this aim.

Conners' Adult ADHD Rating Scales

The Conners' Adult ADHD Rating Scales (CAARS) was published in 1999 by Multi-Health Systems (MHS) (Conners, Erhardt, Sparrow, et al., 1998). The scale draws information on the patient's symptoms from three sources, either the patient's self-report; or a report completed by a family member or coworker who has been in recent observable contact with the patient; or a short screening version filled out by a doctor. There are several versions of the CAARS. For this study the CAARS Self-Report Long Version, Observer Report Long Version, and the Observer Report: Screening Version were used. The authors of the CAARS are Keith Conners, Ph.D., Drew Erhardt, Ph.D., and Elizabeth P. Sparrow, M.A. (Conners, Erhardt, Sparrow, et al., 1998; Conners et al., 1999).

The authors indicated that there were several reasons why the development of these scales came about. While there are many scales for assessing childhood ADHD, there was a paucity of carefully developed scales for adults. There was no symptom list validated against norms collected from adults. It is more difficult to assess adults, as contrasted with children, because of the accumulated "emotional baggage" experienced by adults. The expression of the disorder in adults appears to be different from what clinicians see in children with ADHD. For example, adults may no longer be hyperactive, but they often feel an inner restlessness. In addition, the cognitive limitations of the adult patient are more complex, revealing the primary deficits of

“executive function” that may have been masked in a protective and structured childhood environment.

As outlined in the technical manual, the main features of the CAARS are as follows:

1. A large normative database ($N = 2,000$)
2. Scales that assess ADHD and related symptoms and behaviors
3. Matching forms for self-report and observer ratings
4. Clinical and diagnostic relevance
5. Long and short versions
6. ADHD Index, containing the items that best distinguish individuals with ADHD from non-clinical individuals
7. Scales match the *DSM-IV* criteria for ADHD
8. Easy administration, scoring, and profiling of results
9. Graphs to monitor progress
10. Excellent reliability and validity
11. Applicable in managed-care situations.

The CAARS was also developed out of the need for standardized self-ratings from adults undergoing evaluation for ADHD. The authors of the CAARS first started with the creation of an item pool that tapped a cross-section of symptoms related to adult ADHD. Ninety-three items were derived from the *DSM-IV* symptom criteria for ADHD, the Conners' Rating Scales-Revised for Children and Adolescents, and current conceptions for adult ADHD. These 93 items were then used to develop the following nine hypothesized ADHD domains on the CAARS: (a) inattention/problems with

concentration; (b) hyperactivity/restlessness; (c) impulsivity/problems with self-control; (d) problems with executive functioning (tapping difficulties with self-regulation, organization, prioritization, time awareness, and planning that interferes with the ability to accomplish higher level tasks in an efficient manner); (e) problems with memory; (f) problems with self-concept; (g) interpersonal problems; (h) problems with learning; and (i) problems with mood (including poor frustration tolerance, irritability, and emotional lability) (Conners, Erhardt, Sparrow, et al., 1998).

The 93 items were administered to 839 non-clinical adults (444 males, 394 females) ranging in age from 18 to 81 years. The mean age for the men was 39.6 and 38.8 for the women. A series of factor analyses was conducted to determine which items should be retained on the final version, thus creating the four factor-derived scales that are used on the CAARS: Inattention/Memory Problems, Hyperactivity/Restlessness, Impulsivity/Emotional Lability, and Problems with Self-Concept. The ADHD Index was developed to provide a method of identifying those adults who are likely to be diagnosed with ADHD. A sample of 39 adults (23 males and 16 females) who met the *DSM-IV* criteria of ADHD and 39 non-clinical adults were used to determine this Index. On the basis of a series of *t*-test analyses, 30 items from the item-pool were originally identified as items that discriminate between the ADHD and non-clinical groups. After a series of analyses, 12 items remained that were found to be the best predictor of adult ADHD and were therefore selected to be used as the ADHD Index on the CAARS.

As noted in the manual, the CAARS Self-Report and Observer forms were developed over several years. Norms were taken from a large sample of non-clinical adults from several locations in the United States and Canada. A large pool of items

assessed a cross-section of symptoms relevant to adult ADHD. The results were then normed and analyzed further for validity and reliability, as outlined in several chapters of the manual and in publications (Conners, Erhardt, Epstein, et al., 1998). The CAARS Self-Report Form can be administered to adults 18 years of age and older. The CAARS Observer-Report: Long & Screening Form can basically be given to anyone who has regular contact with the patient such as a family member, teacher, coworker, or clinician. Both self-report and observer forms use a 4-point Likert-style format (0=Not at all, never; 1=just a little, once in a while; 2=Pretty much, often; 3 = Very much, very frequently). Respondents are asked to rate items pertaining to behavior problems. Each of the short scales takes about 10 minutes to administer, and the long scales take less than 30 minutes. The CAARS can be administered individually or in groups. An administrator should almost always be present when the respondent is completing the form. The manual does an excellent job going over nine steps that the authors recommend should be followed when administering the CAARS. Scoring each scale will rarely require more than 10 minutes by hand and only a few seconds with the computer program. The CAARS comes with a profile form that allows for the visual display of scores and comparisons with an appropriate normative group. Raw scores are converted to *T*-scores and no templates are needed to score individual forms.

Both the CAARS Self-Report: Long Version and the CAARS Observer-Report: Long Version have 66 items and nine subscales. These two scales have four factor-derived scales that assess a cross-section of ADHD-related symptoms and behaviors as listed as follows: a 12-item Inattention/Memory Problems subscale, a 12-item Hyperactivity/Restlessness subscale, a 12-item Impulsivity/Emotional Lability subscale,

and a 6-item Problems with Self-Concept subscale. The scales contain three *DSM-IV* ADHD symptom measures that assess ADHD symptoms according to the criteria listed in the *DSM-IV*. A 12-item ADHD Index is also included on the long forms. This index contains the best set of items for distinguishing ADHD adults from patients who are not symptomatic. Another scale contained in the CAARS long forms is the Inconsistency Index, for identifying random or careless responding.

In order to interpret the CAARS, one should have a general understanding of ADHD as well as knowledge of administering standardized tests. The manual goes over “faking bad” and “faking good.” Indicators are given to the clinician if they suspect that the responders are not reliable and valid. CAARS raw scores are transformed into *T*-scores. *T*-scores have a mean of 50 and a standard deviation of 10.

When interpreting the CAARS, the clinician will want to examine the pattern of elevated scale scores in addition to considering individual *T*-scores. If there are no *T*-scores above 65, it is indicative that the patient is not displaying any clinically elevated symptoms of ADHD. When one *T*-score is above 65, the pattern is marginal. The greater the number of scales that show clinically relevant elevations (*T*-score above 65), the greater the likelihood that the patient is indicating moderate to severe problems with ADHD (Conners, Erhardt, Sparrow, et al., 1998).

The technical manual recommends six steps when interpreting the CAARS.

1. Review the scale to make sure that the results are valid. Inspect the CAARS Inconsistency Index to estimate whether the pattern of item responses is internally consistent. Also make sure it is consistent with the response patterns shown by other individuals of the same age and gender.

2. Review the individual items. Make notes using the items by subscale in Appendix B in the manual. This is helpful in both tracking elevated scores and making a treatment plan.

3. Review the ADHD Index (the ADHD index represents a measure of the overall level of ADHD-related symptoms), the three *DSM-IV* ADHD symptom subscales, and the four factor-derived subscales. Norms are given for population samples on this Index so patients' symptoms can be scored. The *DSM-IV* ADHD scales on the long and screening forms can also be used to identify adults experiencing clinically significant levels of ADHD. The four factor-derived subscales are as follows:

- a. Inattention/Memory Problems: Learn more slowly, have problems organizing and completing tasks, and have trouble concentrating.
- b. Hyperactivity/Restlessness: Have difficulty working at the same task for very long and feel more restless and "on the go" than others.
- c. Impulsivity/Emotional Lability: Engage in more impulsive acts than others, moods change quickly and often and are more easily angered and irritated by people.
- d. Problems with Self-Concept: Have poor social relationships, low self-esteem, and low self-confidence.

The third interpretation guideline recommends a comprehensive review of all the information so a plan can be developed to help the patient.

4. The guideline recommends integrating the information from the self-report and observer forms.

5. Use other clinical information gathered during the patient's intake interview.

6. After considering all of the information, make an individualized treatment plan (Conners, Erhardt, Sparrow, et al., 1998).

The main difference between the CAARS scales described above and the CAARS Observer-Report: Screening Version is that that screening version has 30 items, uses the *DSM-IV* items, and does not include the factor scores. Table 1 outlines the differences between the three versions of the CAARS (all of which were also all used for this study).

Research Questions

Research Questions 1: Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Research Questions 2: Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Research Questions 3: Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Research Questions 4: Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Research Questions 5: Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Research Questions 6: Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Table 1

CAARS Versions: Number of Items and Factors

Name of Scale	Abbreviation	Number of Items	Factors Measured
CAARS Self-Report: Long Version	CAARS-S:L	66	<i>Factor Derived Subscales:</i> Inattention/Memory Problems Hyperactivity/Restlessness Impulsivity Emotional Lability Problems with Self Concept <i>DSM-IV ADHD Symptom Subscales:</i> Inattentive Symptoms Hyperactive-Impulsive Symptoms Total ADHD Symptoms
CAARS Observer-Report: Long Version	CAARS-O:L	66	<i>Factor Derived Subscales:</i> Inattention/Memory Problems Hyperactivity/Restlessness Impulsivity Emotional Lability Problems with Self Concept <i>DSM-IV ADHD Symptom Subscales:</i> Inattentive Symptoms Hyperactive-Impulsive Symptoms Total ADHD Symptoms
CAARS Observer-Report: Screening Version	CAARS-O:S	30	<i>DSM-IV ADHD Symptom Subscales:</i> Inattentive Symptoms Hyperactive-Impulsive Symptoms Total ADHD Symptoms

The following statements are hypotheses that have emerged from the research questions.

Null Hypotheses

1. There will be no difference between the mean CAARS ratings by the patient for Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.
2. There will be no difference between the mean CAARS ratings by the doctor of ADHD Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.
3. There will be no difference between the mean CAARS ratings by the observer for Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.
4. There will be no difference between the mean CAARS ratings by the patient for Combined symptoms for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.
5. There will be no difference between the mean CAARS ratings by the doctor for Combined symptoms for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

6. There will be no difference between the mean CAARS ratings by the observer for Combined symptoms for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

Data Analysis

Patients were diagnosed by the CAADID as having either a sub-type of ADHD or not having it. Qualitative methods were used via the CAADID, in which a series of questions was asked in order to separate the sample into two groups: those with a CAADID diagnosis of Combined or Hyperactive/Impulsive subtype and those without a CAADID diagnosis of Combined or Hyperactive/Impulsive subtype. The rating scales (CAARS) are quantitative, that is, the scores vary along a continuum of numbers from 0 to 100. The difference between the diagnosed groups and not diagnosed groups on each of the CAARS Rating Scales was examined by *t*-test, a statistical test of difference between two means. The difference is expressed as a probability. For this study, probability is considered significant when it is less than 0.05.

CHAPTER IV

DATA ANALYSIS

Purpose

The purpose of this study was to compare the results from two different adult ADHD tools: the CAARS, a normed instrument for assessing symptoms of ADHD; and the CAADID, a diagnostic interview covering the formal criteria for diagnosis of ADHD.

Characteristics of the Sample

The overall study, of which this study is a part, was sponsored by an educational grant from Smith-Kline Beecham, entitled *Treatment of Adults With Attention Deficit Hyperactivity Disorder and Varying Degrees of Anxiety and Depressive Symptoms*. One hundred and eight patients between the ages of 18 and 60 years of age were initially recruited for the study. Out of the 108 patients, 98 enrolled in the study and completed the baseline data.

Table 2 shows the gender, age, and ethnicity makeup of the total sample. The oldest participants in the study were African American females with a mean age of 49 years, while Asian men were the youngest with a mean age of 26 years. The total sample of both males and females had a mean age of 37 years. On average, African American females were 49 years of age, Caucasian females were 39 years of age, and the Asian female was 37 years of age. The mean age of Hispanic men was 43 years, Caucasian

males were 37 years, unspecified ethnic males were 29 years, and Asian males were 26 years.

There were a total of 83 Caucasians, 8 Others (Arabic, South Pacific, etc.), 1 Hispanic, 3 Asians, and 3 African Americans in the study population. Caucasian males comprised the majority of the study sample with a size of 52. Hispanic males and Asian females had the smallest sample size of 1 each. There were 3 African American females in the study and no African American males. Only 1 Hispanic male enrolled, with no Hispanic female enrollment taking place in the study. Fifty-two Caucasian males and 31 Caucasian females were in the study. Two Asian males and 1 Asian female participated in the study. There were 8 participants of other ethnic backgrounds. All 8 were males with no female study patients.

Findings

Research Question 1. Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Null Hypothesis 1. There will be no difference between the mean CAARS ratings by the patient for Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Inattentive subtype.

Table 2

Ethnicity Demographics

Ethnicity	Gender	Patient Number	Mean Age in Years
African American	Male	0	
African American	Female	3	49
Hispanic	Male	1	43
Hispanic	Female	0	
Other	Male	8	29
Other	Female	0	
Caucasian	Male	52	37
Caucasian	Female	31	39
Asian	Male	2	26
Asian	Female	1	37
Total Sample	Male & Female	98	37

Interpretation of Table 3

Table 3 presents data from two groups of patients. One group was adult patients diagnosed with ADHD Hyperactive/Impulsive Subtype using the CAADID. The other group of patients had been diagnosed with ADHD but not the subtype of Hyperactive/Impulsive. The data compare the mean scores of the two diagnostic groups using the CAARS self-report of symptoms from the patient. The data indicate that the mean score of the Hyperactive/Impulsive subtype is significantly higher than the mean score of the non-Hyperactive/Impulsive group. The significantly higher mean (average) score indicates that the Hyperactive/Impulsive patients rate themselves higher (have more symptoms) than the other group. The two groups have a mean difference in scores that

would occur by chance less than one time in ten thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Table 3

CAADID Diagnosis of Hyperactive/Impulsive Subtype and CAARS Ratings of Hyperactivity/Impulsivity for the Self Rater

CAARS RATER	ADHD PT's DX by the CAADID as Hyperactive/Impulsive Sub-Type (<i>N</i> = 59)		ADHD PT's not DX by the CAADID as having Hyperactive/Impulsive Sub-Type (<i>N</i> = 36)		<i>t</i> -test	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Self	68.30	11.4	56.5	13.2	4.61	.000

Note. Dx = Diagnosis. Two-tail *t*-test of mean differences considered Non Significant (NS) if the probability is greater than 0.05.

Research Question 2. Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Null Hypothesis 2. There will be no difference between the mean CAARS ratings by the doctor of ADHD Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.

Interpretation of Table 4

Table 4 presents data from two groups of patients. One group was adult patients diagnosed with ADHD Hyperactive/Impulsive Subtype using the CAADID. The other

group of patients had been diagnosed with ADHD but not the subtype of Hyperactive/Impulsive. The study doctor was asked to complete the CAARS regarding his/her observation of the patient's symptoms by the doctor. The data compare the mean scores of the two diagnostic groups using the CAARS screening report of symptoms. The data indicate that the mean score of the Hyperactive/Impulsive subtype is significantly higher than the mean score of the non-Hyperactive/Impulsive group. The significantly higher mean (average) score indicates that the Hyperactive/Impulsive patients had more symptoms than the other group. The two groups have a mean difference in scores that would occur by chance less than one time in ten thousand. Therefore the null hypothesis that the two means are the same was rejected.

Table 4

CAADID Diagnosis of Hyperactive/Impulsive Subtype and CAARS Ratings of Hyperactivity/Impulsivity for the Screening (doctor) Rater

CAARS RATER	ADHD PT's DX by the CAADID as Hyperactive/Impulsive Sub-Type (N = 60)		ADHD PT's not DX by the CAADID as having Hyperactive/Impulsive Sub-Type (N = 35)		t-test	p
	Mean	SD	Mean	SD		
Doctor (Screener Version)	53.55	8.9	43.81	8.9	5.13	.000

Note. Dx = Diagnosis. Two-tail t-test of mean differences considered Non Significant (NS) if the probability is greater than 0.05.

Research Question 3. Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Null Hypothesis 3. There will be no difference between the mean CAARS ratings by the observer for Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.

Interpretation of Table 5

Table 5 presents data from two groups of patients. One group was adult patients diagnosed with ADHD Hyperactive/Impulsive Subtype using the CAADID. The other group of patients had been diagnosed with ADHD but not the subtype of Hyperactive/Impulsive. The observer (the patient's significant other) was asked to complete the CAARS regarding his/her observation of the patient's symptoms. The data compare the mean scores of the two diagnostic groups using the CAARS screening report of symptoms. The data indicate that the mean score of the Hyperactive/Impulsive subtype is significantly higher than the mean score of the non-Hyperactive/Impulsive group. The significantly higher mean (average) score indicates that the Hyperactive/Impulsive patients had more symptoms than the other group. The two groups have a mean difference in scores that would occur by chance less than eight times in a thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Table 5

CAADID Diagnosis of Hyperactive/Impulsive Subtype and CAARS Ratings of Hyperactivity/Impulsivity for the Observer Rater

CAARS RATER	ADHD PT's DX by the CAADID as Hyperactive/Impulsive Sub-Type (N = 58)		ADHD PT's not DX by the CAADID as having Hyperactive/Impulsive Sub-Type (N = 31)		t-test	p
	Mean	SD	Mean	SD		
Observer	60.29	12.68	52.52	12.95	2.74	.008

Note. Dx = Diagnosis. Two-tail *t*-test of mean differences considered Non Significant (NS) if the probability is greater than 0.05.

Research Question 4. Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Null Hypothesis 4. There will be no difference between the mean CAARS ratings of the ADHD Combined subtype by the patient for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

Interpretation of Table 6

Table 6 presents data from two groups of patients. One group was adult patients diagnosed with ADHD Combined Subtype using the CAADID. The other group of patients had been diagnosed with ADHD but not the subtype of Combined. The data compare the mean scores of the two diagnostic groups using the CAARS self-report of symptoms. The data indicate that the mean score of the Combined subtype is significantly higher than the mean score of the non-Combined subtype group. The significantly higher mean (average) score indicates that the Combined subtype patients

rate themselves higher (have more symptoms) than the other group. The two groups have a mean difference in scores that would occur by chance less than three times in a thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Table 6

CAADID Diagnosis of Combined Subtype and CAARS Ratings of the Combined Subtype for the Self Rater

CAARS RATER	ADHD PT's DX by the CAADID as Combined Sub-Type (N = 59)		ADHD PT's not DX by the CAADID as Combined Sub-Type (N = 39)		t-test	p
	Mean	SD	Mean	SD		
Self	78.93	10.78	71.68	12.13	3.05	.003

Note. Dx = Diagnosis. Two-tail *t*-test of mean differences considered Non Significant (NS) if the probability is greater than 0.05.

Research Question 5. Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Null Hypothesis 5. There will be no difference between the mean CAARS ratings of the ADHD Combined subtype by the doctor for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

Interpretation of Table 7

Table 7 presents data from two groups of patients. One group was adult patients diagnosed with ADHD Combined Subtype using the CAADID. The other group of

patients had been diagnosed with ADHD but not the subtype of Combined. The study doctor was asked to complete the CAARS regarding his/her observation of the patient's symptoms. The data compare the mean scores of the two diagnostic groups using the CAARS screening report of symptoms. The data indicate that the mean score of the Combined subtype is significantly higher than the mean score of the non-Combined subtype group. The significantly higher mean (average) score indicates that the Combined subtype patients had more symptoms than the other group. The two groups have a mean difference in scores that would occur by chance less than one time in a thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Table 7

CAADID Diagnosis of Combined Subtype and CAARS Ratings of the Combined Subtype for the Screening (doctor) Rater

CAARS RATER	ADHD PT's DX by the CAADID as Combined Sub-Type (<i>N</i> = 58)		ADHD PT's not DX by the CAADID as Combined Sub- Type (<i>N</i> = 39)		<i>t</i> -test	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Doctor (Screeener Version)	52.64	9.91	45.69	8.78	3.48	0.001

Note. Dx = Diagnosis. Two-tail *t*-test of mean differences considered Non Significant (NS) if the probability is greater than 0.05.

Research Question 6. Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Null Hypothesis 6. There will be no difference between the mean CAARS ratings of the ADHD Combined subtype by the observer for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

Interpretation of Table 8

Table 8 presents data from two groups of patients. One group was adult patients diagnosed with ADHD Combined Subtype using the CAADID. The other group of patients had been diagnosed with ADHD but not the Combined subtype. The study observer (the patient's significant other) was asked to complete the CAARS regarding his/her observation of the patient's symptoms. The data compare the mean scores of the two diagnostic groups using the CAARS screening report of symptoms. The data indicate that the mean score of the Combined subtype is not significantly higher than the mean score of the non-Combined subtype group. The non-significantly higher mean (average) score indicates that the Combined subtype patients did not have more symptoms than the Non-Combined subtypes. The two groups have a mean difference in scores that is well below the critical value for the *t*-test, and is therefore non-significant. Therefore the null hypothesis that the two means would not differ was accepted.

Summary

The purpose of this study was to compare the results from two different adult ADHD tools: the CAARS, a normed instrument for assessing symptoms of ADHD; and the CAADID, a diagnostic interview covering the formal criteria for diagnosis of ADHD, including confirmation of a childhood diagnosis of ADHD.

Table 8

CAADID Diagnosis of Combined Subtype and CAARS Ratings of the Combined Subtype for the Observer Rater

CAARS RATER	ADHD PT's DX by the CAADID as Combined Sub-Type (<i>N</i> = 59)		ADHD PT's not DX by the CAADID as Combined Sub- Type (<i>N</i> = 39)		<i>t</i> -test	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Observer	64.14	12.23	62.61	10.64	0.60	NS

Note. Dx = Diagnosis. Two-tail *t*-test of mean differences considered Non Significant (NS) if the probability is greater than 0.05.

The following is a summary of the results:

1. CAADID and the CAARS are in good agreement on ADHD Hyperactive/Impulsivity subtype for the CAARS Self-Report, Screening-Report (doctor), and Observer-Report.

2. CAADID and CAARS are in good agreement for Combined Subtype for the CAARS Self-Report and Screener (doctor), but not for the Observer report.

These results demonstrate two main conclusions. First, on the whole, the CAARS symptom measures of the *DSM-IV* Hyperactive/Impulsivity subtype are in substantial agreement: whether reported by self, an observer, or the investigator using the screening version. Mean scores of pathology ratings on the CAARS are significantly higher for the group diagnosed by the CAADID compared to the group not diagnosed with Hyperactive/Impulsivity subtype.

Second, the CAADID diagnostic tool duplicates results from the CAARS symptom measures for the Combined Subtype with one exception: ratings by the

observer. These results point to the desirability of a full diagnostic workup when only ratings from an observer are available.

Effect size (ES) is a measure of how large an effect is when expressed in standard deviation units (Cohen, 1988). This allows comparison of experimental effects with varying sample sizes or different units of measurement. ES may be calculated in several different ways, but is calculated here by Cohen's (1988) method, from the difference between the means of the experimental and control samples, divided by the pooled standard deviation: $\text{Mean 1} - \text{Mean 2} / \sigma_{\text{pooled}}$. Cohen (1988) considered ES of 0.2 or less to be "small"; 0.5 or less to be "medium"; and 0.8 or larger to be "large." The ESes in this study for Tables 3-8 were 0.957, 1.098, 0.606, 0.632, 0.742, and 0.133.

Thus, all of the ESes are large or medium with the exception of the Observer's ratings of the Combined Subtype, which is in the "small" range. The rather large ES for both Self and Screening Doctor rating of Hyperactivity/Impulsivity (H/I) implies that a trained professional and his or her patient will be in close agreement regarding diagnosis of H/I. However, the Observer's ratings are not likely to be reliable in picking out the Combined subtype diagnosis, which involves recognizing both H/I and Inattention.

CHAPTER V
IMPLICATIONS OF FINDINGS, CONCLUSIONS,
AND RECOMMENDATIONS

Introduction

This chapter summarizes this study's intent, as well as the findings and implications for further research. The summary of the study's intent consists of the study's problem, purpose, and methodology.

Problem

Currently there are several limiting factors regarding measures used to diagnose and assess adult ADHD. Most ADHD research studies have been child based, resulting in a limited understanding of the manifestation and diagnostic issues surrounding adults. Furthermore, current or newly developed adult tests lack psychometric analysis, incorporation of the *DSM-IV*, and use in major research studies that confirm validity and reliability.

Purpose

The purpose of this study was to compare the results from two different adult ADHD tools: the CAARS, a normed instrument for assessing symptoms of ADHD; and the CAADID, a diagnostic interview covering the formal criteria for diagnosis of ADHD.

Literature Review

Attention Deficit Hyperactivity Disorder is considered one of the most commonly diagnosed psychiatric disorders of children and adolescence (Dulcan & Benson, 1997). It is also believed that 1% to 2% of all adults have ADHD (Shekim et al., 1990). Adults and children manifest symptoms of ADHD very differently. ADHD typically refers to a developmental disorder of childhood characterized by persistent patterns of inattention and/or hyperactivity-impulsivity. It is also not enough to say that the symptoms are present, but there must also be evidence of a marked interference in the person's social, academic, or occupational functioning. These "impairments" should not be better explained by other disorders, such as Pervasive Developmental Disorders, Schizophrenia, or any other Psychotic condition (American Psychiatric Association, 1994).

ADHD is a chronic, lifetime disorder that takes a considerable toll on those suffering from it as well as the families and communities who care for these individuals. Significant proportions of those with ADHD end up with serious social, emotional, interpersonal, and economic limitations.

Currently no single cause of ADHD has been discovered. However, it is known that ADHD has strong genetic temperamental, neuropsychological, social, and environmental risk factors. Fetal alcohol syndrome, perinatal traumas, narcotics, poverty, abuse, psychosocial trauma, or parental psychopathology are other risk factors of ADHD. When clinicians make a diagnosis of a patient they usually follow the standards set by the most current edition of the *Diagnostic and Statistical Manual of Mental Disorders-IV* (*DSM-IV*) (APA, 1994). These standards are outlined as follows:

A. Either (1) or (2)

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

Inattention

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

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

Hyperactivity

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

Impulsivity

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

B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years

C. Some impairment from the symptoms is present in two or more settings (e.g., at school or work) and at home)

- D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning
- E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder) (APA, 1994, pp. 84-85)

In October of 1997 The American Academy of Child and Adolescent Psychiatry (AACAP) published their standard of care for adults who have or may have ADHD (Dulcan & Benson, 1997).

The outline that follows is the standard of care recommended by AACAP:

- I. Initial evaluation (a complete psychiatric assessment is indicated; see American Psychiatric Association Work Group on Psychiatric Evaluation of Adults [1995]).
 - A. Interview with patient.
 - 1. Developmental history.
 - 2. Present and past *DSM-IV* symptoms of ADHD (may use symptoms or criterion checklist or self-report form).
 - 3. History of development and context of symptoms and resulting past and present impairment.
 - a. School (learning, academic productivity, and behavior).
 - b. Work.
 - c. Family.
 - d. Peers.
 - 4. History of other psychiatric disorders.
 - 5. History of psychiatric treatment.
 - 6. *DSM-IV* symptoms of possible alternate or comorbid psychiatric diagnoses, especially:
 - a. Personality disorder.
 - b. Mood disorders –depression or mania.
 - c. Anxiety disorders.
 - d. Dissociative disorder.
 - e. Tic disorder (including Tourette’s disorder).
 - f. Substance use disorder.
 - g. Learning disorders.
 - 7. Strengths (e.g., talents and abilities).
 - 8. Mental status examination.
 - B. Standardized rating scales completed by the patient’s parents.
 - C. Medical History.
 - 1. Medical or neurological primary diagnosis (e.g., thyroid disease, seizure disorder, migraine, head trauma).

2. Medications that could be causing symptoms (e.g., phenobarbital, antihistamines, theophylline, sympathomimetics, steroids).

D. Family history.

1. Developmental and learning disorders.
2. Family coping style, level of organization, and resources.
3. Family stressors.
4. Abuse or neglect (as victim or perpetrator).

E. Interview with significant other or parent, if available.

F. Physical evaluation.

1. Examination within 12 months or more recently if clinical condition has changed.
2. Further medical or neurological evaluation as indicated.

G. School information.

1. Standardized rating scales if completed during childhood.
2. Narrative childhood reports regarding learning, academic productivity, and behavior.
3. Reports of testing (e.g., standardized group achievement tests and individual evaluations).
4. Grades and attendance records.

H. Referral for additional evaluations if indicated.

1. Psychoeducational evaluation.
2. IQ.
3. Academic achievement.
4. Learning disorders evaluation.
5. Neuropsychological testing.
6. Vocational evaluation.

II. Treatment planning.

A. Establish target symptoms of ADHD and baseline levels of impairment.

B. Consider treatment for comorbid conditions (monitor possible drug-seeking behavior).

C. Prioritize modalities to fit target symptoms and available resources.

D. Monitor multiple domains of functioning.

1. Academic or vocational.
2. Daily living skills.
3. Emotional adjustment.
4. Family interactions.
5. Social relationships.
6. Medication response.

E. Periodically reevaluate the efficacy of and need for additional interventions.

F. Maintain long-term supportive contact with the patient and family to ensure compliance with treatment and to address new problems that arise.

III. Treatment.

A. Education for patient, spouse, or other significant persons.

B. Consideration of vocational, counseling, or training.

- C. Medication.
 - 1. Stimulants.
 - 2. Tricyclic antidepressants.
 - 3. Other antidepressants.
 - 4. Other drugs (buspirone, propranolol).
- D. Psychosocial interventions. Individual cognitive therapy; “coaching.”
- E. Family psychotherapy if family dysfunction is present.
- F. Referral to support group, such as CHADD.
- G. Other treatments are outside the realm of the usual practice of psychiatry (The American Academy of Child and Adolescent Psychiatry (Dulcan & Benson, 1997, pp. 111-112).

The American Academy of Child and Adolescent Psychiatry (AACAP) also recommends that a complete psychiatric evaluation be completed, with particular attention to the core symptoms of ADHD. This evaluation should determine if symptoms were present before the age of 7 years. A childhood history is considered essential in making a diagnosis in an adult. Medical history and a recent physical examination with laboratory studies are necessary in order to rule out conditions that could be mistaken for ADHD (Dulcan & Benson, 1997). AACAP also recommends that adult patients read books and newsletters about ADHD and attend support groups. There are several medications used to treat ADHD. Currently, methylphenidate is the most commonly used stimulant in the treatment of ADHD (Conners, 2002).

When Change Occurs

There are many theories of how to create change. As with any research one hopes that their research will have some influence on the field they are studying. Therefore not only is the research in itself important, but also the theory the researcher picks to implement the change that his/her research may bring to the field. Selecting this theory also demonstrates a commitment to the process of leadership and accountability to one's research.

Duke University's Executive Education program has been ranked number one the past 4 years (Duke Corporate Education, 2005). Duke University also has a Leadership Roundtable every year that is open to leaders from various backgrounds. It is through this program that Duke has developed a series of leadership books on various topics. The book *Influencing and Collaborating for Results* (Duke Corporate Education, 2005) details how to evolve change after an idea has been developed. The foundation to this theory is the importance of communication within a collaborated team, so that a sustainable relationship will create change for this project as well as for others in the future.

This theory was chosen because it applied best to the initial conception of this research. The first stage of the Duke theory is collaboration and the second is influence.

Both of these components were applied for this research in the following ways:

1. Collaboration: This research is a collaborative effort with the following universities: Children's Hospital in Montreal, University of Toronto, the University of British Columbia, Yale University, and Duke University. This research not only took into account the universities but also the people who would be a part of the team: Keith Conners, Thomas Brown, Lily Hechtman, Umesh Jain, Diane Johnson, Donald Quinlan, and Margaret D. Weiss. All of these researchers are well-known experts in the field of ADHD. Each team member is committed to making this research process be productive through his/her commitment of adopting and following standard codes of ethics in research protocols.

One of the key factors of the Duke change theory is that the team continues to work together on future projects because of the collaboration efforts they put forth in

current and past research projects. Many of these researchers have worked together in the past and have spent years developing among them the credibility principles of keeping good company, building goodwill, keeping engaged, and making connections. The team also continues to work together on this project and others because of the respect they have established for each other through their collaborative work.

2. Influence: This collaborative team is now working on the final aspect of this research through writing up this research for journal article submissions. The team is still using the collaborative approach at this stage. The team is committed to presenting papers to various professional conferences.

Every scientific study or idea has the potential for being an agent of change in the way individual patients are eventually understood and treated. Ultimately, scientific study of any disorder, such as adult ADHD in this study, must exert its effects through individual practitioners. In this study, I have tried to show that a certain approach to diagnosis, the use of a comprehensive interview, has validity for diagnosing ADHD. It is my expectation that data from the study will prompt some practitioners to use these tools. If data continue to confirm the value of these tools and result in a wider acceptance, then I may expect initial changes in the form of compliance to result in a period of more complete identification with the approach.

How does one know that research has initiated change? In psychology/psychiatry, change usually is evident in the recommendations of prestigious academic bodies such as NIMH, APA, ACAP, FDA, etc. Another way change can be assessed is by the number of scientific articles on similar topics that have been published. As one change theory suggests (Day, 2001), the motion of change can occur the moment the idea

is conceived. Only time will shadow how far-reaching the outer circumference of change will extend to creating change in diagnosing of adult ADHD.

Methodology

The overall study, from which this study was extracted, was sponsored by an educational grant from Smith-Kline Beecham, entitled *Treatment of Adults With Attention Deficit Hyperactivity Disorder and Varying Degrees of Anxiety and Depressive Symptoms*. Ninety-eight patients, between the ages of 18 and 60 years, were recruited for the study. Data from the CAARS and CAADID were collected from the patients, observer, and physicians. The present study utilizes data only from the baseline visit.

The CAARS comes in several different versions. I used the following versions: Conners' Adult ADHD Rating Scales Self-Report: Long Version (filled out by the patient); Conners' Adult ADHD Rating Scales Observer-Report: Screening Version (filled out by the physician); and Conners' Adult ADHD Rating Scales Observer-Report: Long Version (filled out by a spouse, friend, or significant other).

All versions of the CAARS mentioned above include the symptomatic criteria for ADHD according to the *DSM-IV*. The long versions of the self and observer report are identical except for pronoun differences according to the person being rated. The Screening Version includes only the *DSM-IV* symptoms and a composite index. Thus, it is possible to compare across the CAARS instruments with respect to their assessment of *DSM-IV* symptoms.

Unlike these rating scales, the CAADID is an interview that not only contains the basic symptoms of ADHD, but also the other diagnostic criteria, including age of onset, chronicity, pervasiveness of symptoms, impairments across multiple domains, and most

importantly, the verification of childhood onset of the disorder. The study examined whether the complete diagnostic interview is capable of agreeing with the *DSM-IV* subtyping arrived at independently from the symptom rating scales.

Patients were diagnosed as having either a subtype of ADHD or not having a subtype by the CAADID. Qualitative methods were used, via the CAADID, in which a series of questions was asked and clinical judgment made for separating the sample into two groups: those with a CAADID diagnosis of Combined or Hyperactive/Inattentive subtype and those without a CAADID diagnosis of Combined or Hyperactive/Inattentive subtype. The CAARS rating scales are quantitative, that is, the scores for individual groups of items are summed and the totals transformed into standard scores.

Data Analysis

After the sample was divided into two groups, the difference between the diagnosed group and non-diagnosed group on each of the CAARS Rating Scales was examined by independent sample *t*-test. An independent *t*-test is when the groups are composed of different individuals (i.e., not repeated measures on the same individuals, or when the groups are correlated by virtue of some common factor). The difference is expressed as a probability. For this study probability is considered significant when it is less than 0.05. This means that if this experiment were repeated 100 times, the results would occur by chance less than 5 times.

The *t*-test used in this study is a two-tail test. Since a normal distribution (bell curve) has two tails, the *t*-test can be calculated for one direction only, or for both directions (i.e., for both high and low score outcomes). A two-tail test was used in this study versus a one-tail test because it was theoretically possible that either group could

have higher or lower scores than the other group, so a two-tail test was thought to be appropriate.

Findings

The null hypotheses for questions 1-5 were rejected while the null hypothesis for question 6 was accepted. In summary, the ratings by the CAARS are not considered a satisfactory method for a diagnosis when information only from an outside observer is available. When information is gathered by the mental health professional or the patient, diagnoses will closely approximate the more comprehensive diagnostic instrument (CAADID).

Research Questions and Null Hypotheses

Research Question 1. Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Null Hypotheses 1. There will be no difference between the mean CAARS ratings by the patient for Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Inattentive subtype.

The data compare the mean scores of the two diagnostic groups using the CAARS self-report of symptoms from the patient. The data indicate that the mean score of the Hyperactive/Impulsive subtype is significantly higher than the mean score of the non-Hyperactive/Impulsive group. The significantly higher mean (average) score indicates that the Hyperactive/Impulsive patients rate themselves higher (have more symptoms)

than the other group. The two groups have a mean difference in scores that would occur by chance less than one time in ten thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Research Question 2. Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Null Hypothesis 2. There will be no difference between the mean CAARS ratings by the doctor of ADHD Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.

The data compare the mean scores of the two diagnostic groups using the CAARS screening report of symptoms. The data indicate that the mean score of the Hyperactive/Impulsive subtype is significantly higher than the mean score of the non-Hyperactive/Impulsive group. The significantly higher mean (average) score indicates that the Hyperactive/Impulsive patients had more symptoms than the other group. The two groups have a mean difference in scores that would occur by chance less than one time in ten thousand. Therefore the null hypothesis that the two means are the same was rejected.

Research Question 3. Is there a difference in the mean score on the CAARS as rated by the observer (significant other) between those patients who have been diagnosed, according to the CAADID, as Hyperactive/Impulsive subtype of ADHD compared to those who have not?

Null Hypothesis 3. There will be no difference between the mean CAARS ratings by the observer for Hyperactive/Impulsive symptoms for groups diagnosed by the CAADID as ADHD Hyperactive/Impulsive subtype versus those not diagnosed with ADHD Hyperactive/Impulsive subtype.

The data indicate that the mean scores of the Hyperactive/Impulsive subtype are significantly higher than the mean score of the non-Hyperactive/Impulsive group. The significantly higher mean (average) score indicates that the Hyperactive/Impulsive patients had more symptoms than the other group. The two groups have a mean difference in scores that would occur by chance less than eight times in a thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Research Question 4: Is there a difference in the mean score on the CAARS as rated by the patient between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Null Hypothesis 4. There will be no difference between the mean CAARS ratings of the ADHD Combined subtype by the patient for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

The data indicate that the mean scores of the Combined subtype are significantly higher than the mean score of the non-Combined subtype group. The significantly higher mean (average) score indicates that the Combined subtype patients rate themselves higher (have more symptoms) than the other group. The two groups have a mean difference in scores that would occur by chance less than three times in a thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Research Question 5. Is there a difference in the mean score on the CAARS as rated by the doctor between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Null Hypothesis 5. There will be no difference between the mean CAARS ratings of the ADHD Combined subtype by the doctor for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

The data indicate that the mean scores of the Combined subtype are significantly higher than the mean scores of the non-Combined subtype group. The significantly higher mean (average) score indicates that the Combined subtype patients had more symptoms than the other group. The two groups have a mean difference in scores that would occur by chance less than one time in a thousand. Therefore the null hypothesis that the two means would not differ was rejected.

Research Question 6. Is there a difference in the mean score on the CAARS as rated by the observer between those patients who have been diagnosed, according to the CAADID, as Combined subtype of ADHD compared to those who have not?

Null Hypothesis 6. There will be no difference between the mean CAARS ratings of the ADHD Combined subtype by the observer for groups diagnosed by the CAADID as ADHD Combined subtype and not diagnosed with ADHD Combined subtype.

The data indicate that the mean scores of the Combined subtype are not significantly higher than the mean scores of the non-Combined subtype group. The non-significantly higher mean (average) score indicates that the Combined subtype patients did not have more symptoms than the Non-Combined subtypes. The two groups have a mean difference in scores that is well below the critical value for the t-test, and is

therefore non-significant. Therefore the null hypothesis that the two means would not differ was accepted.

While Self-Report and Screener-Report (doctor) of symptoms are in substantial agreement when it comes to a diagnosis of ADHD Combined subtype by the CAADID, the observer did not distinguish between CAADID diagnosed and not-diagnosed groups. A diagnosis is more than symptoms, so when the information from the CAADID is added, a more accurate diagnosis of the symptoms can be made.

Summary

The following is a brief summary of the interpretation of the data.

1. CAADID and the CAARS are in good agreement on ADHD Hyperactive/Impulsivity subtype for the CAARS Self-Report, Screening-Report (doctor), and Observer-Report. Hyperactive/Impulsivity behavior is readily recognized by all rating sources because the behaviors are easy to see and describe.

2. CAADID and CAARS are in good agreement for Combined Subtype for the CAARS Self-Report and Screener (doctor), but not for the Observer report.

Discussion of Findings

This study is important because it shows that the rating scales have sufficient validity for medication management. Previous studies demonstrate that 76% of adults with ADHD will respond to treatment with stimulant medication, when treated with adequate doses (Spencer et al., 1995; Wilens et al., 1995). One way to assure that treatment is adequate is by measuring the symptoms on scales before and after treatment.

ADHD is a complex disorder with many comorbid conditions in addition to the core symptoms. Identification of these core symptoms is therefore a challenging clinical issue. Biederman et al. (1993) studied 84 adults referred with and without ADHD. Seventy-seven percent of the adults referred for ADHD met the criteria for comorbidity. This study is important in showing that doctors can use valid and reliable measures of adult ADHD, despite the comorbidity. This should enhance their ability to develop appropriate management and follow-up of the pharmacologic and other treatments.

Correctly identifying symptoms of ADHD has an effect on treatment and diagnosis of ADHD, and one can see the trickle-down effect this would have on society in general. If patients are diagnosed and treated correctly, many of the problems communities face in dealing with this disorder would be eliminated. Statistically, adults with ADHD are at a higher risk for losing their jobs, families, and friendships. They also have a higher likelihood of abusing drugs and alcohol. The disorder can result in problems with mood swings, depression, poor self-esteem, and never reaching one's full potential as an adult (Hechtman & Weiss, 1986). The impact therefore is not only immense for communities but also for patients to become the potential leaders they aspire to be in their field of study.

Effect size (ES) is a measure of how large an effect is when expressed in standard deviation units (Cohen, 1988). This allows comparison of experimental effects with varying sample sizes or different units of measurement. ES may be calculated in several different ways, but is calculated here by Cohen's (1988) method, from the difference between the means of the experimental and control samples, divided by the pooled standard deviation: $\text{Mean 1} - \text{Mean 2} / \sigma_{\text{pooled}}$. Cohen (1988) considered ESes of 0.2 or less

to be “small”; 0.5 or less to be “medium”; and 0.8 or larger to be “large.” The ESEs in this study for Tables 3-8 were 0.957, 1.098, 0.606, 0.632, 0.742, and 0.133.

Thus, all of the ESEs are large or medium with the exception of the Observer’s ratings of the Combined Subtype, which is in the “small” range. The rather large ES for both Self and Screening Doctor rating of Hyperactivity/Impulsivity (H/I) implies that a trained professional and his or her patient will be in close agreement regarding diagnosis of H/I. However, the Observer’s ratings are not likely to be reliable in picking out the Combined subtype diagnosis, which involves recognizing both H/I and Inattention.

Several hypotheses may explain why the observer ratings were less valid diagnostically than self-report and doctors’ ratings. Patients selected their own observer. Data on who the patients selected as their observer were not available. Knowing this information and detailed information on the relationship between the observer and patient would have been beneficial. Such things as how long they have known each other, how frequently they see each other during the day, etc., might account for the lesser accuracy of observers. Also observers may be better at identifying hyperactive than inattention behavior compared with doctors and patients.

Self-report of the patient and the doctor’s screening report agree closely with the CAADID diagnoses. The results indicate that these rating scales can be used as a valid indicator of a comprehensive diagnosis derived from an extensive interview. These scales work because of the patient’s firsthand knowledge of their disability and because the doctors were highly trained.

Conclusion

The most important conclusion of the study is that the ratings by the CAARS are a satisfactory method for diagnosing ADHD when information is used directly from the patient and doctor, but not from an outside observer alone. When information is gathered from the mental health professional or the patient, diagnoses will closely approximate a more comprehensive interview diagnostic instrument (CAADID). Self-Report and Screener-Report (doctor) are in substantial agreement with the CAADID when it comes to a diagnosis of ADHD Hyperactivity/Impulsivity and Combined subtypes. But the observer (significant other) did not distinguish between CAADID diagnosed and non-diagnosed individuals.

Initial diagnosis of ADHD information can come from several different perspectives: for example, a physician, research assistant/nurse, friend, a significant other, or from the patient themselves. This study shows that in most cases these different perspectives reveal the same picture of the patient, but there are instances where these sources paint a different picture. The data reveal that a childhood history and an extensive interview are needed to supplement observation and ratings by an observer when diagnoses are made.

As outlined by the American Academy of Child and Adolescent Psychiatry (Dulcan & Benson, 1997), before a diagnosis of ADHD is made by a clinician he/she needs to complete several steps. Two of these steps are obtaining a detailed record of the patient's symptoms and acquiring both a childhood and adult history (medical, education, home life, work experience, etc.) from the patient. The current study has been very important in giving mental health professionals valid and reliable measures to use in making a diagnosis using the prescribed professional guidelines from AACAP.

Recommendations for Further Study

The following is a list of recommendations for further study:

1. Follow-up studies of ADHD in adulthood show there may be different outcomes. Some patients become successful leaders, advance in education, and assume jobs with numerous responsibilities, whereas other patients are not successful. These tools that have been validated could be useful in determining which ADHD adults are likely to be successful. For example, one subtype or another may have differential impact on the outcome of the patient's leadership skills.
2. Cross Validation of results should be studied before the findings are translated into clinical practice. Cross validation means a replication of the study on a new sample of adult ADHD participants.
3. Further study should be conducted of patient characteristics (social class, gender, age, education, etc.) that might bias diagnostic information.
4. Further research is needed to determine what characteristics make a reliable observer or unreliable observer.
5. If symptoms were changed to better describe adult hyperactivity, there might be a better agreement in diagnosing combined type and the Hyperactive Type of ADHD in adults.
6. If symptoms were changed to better describe adult inattentive symptoms, there might be a better agreement in diagnosing Inattentive Type of ADHD in adults.
7. Further study is required of the impact of results in patients who do not have the comorbidity of Anxiety Disorder.

APPENDIX A

LETTERS

Andrews University

October 14, 2002

Carolyn Cofrancesco

36 Stoneridge Place
Durham
NC 27705

Dear Carolyn

RE: APPLICATION FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS
IRB Protocol #: 02-G-071 Application Type: Original Dept: Leadership
Review Category: Exempt Action Taken: Approved Advisor: Elsie Jackson
Protocol Title: Validity of Three Different Adult ADHD Measures

On behalf of the Institutional Review Board (IRB) I want to advise you that your proposal has been reviewed and approved. You have been given clearance to proceed with your research plans.

All changes made to the study design and/or consent form, after initiation of the project, require prior approval from the IRB before such changes can be implemented. Feel free to contact our office if you have any questions.

The duration of the present approval is for one year. If your research is going to take more than one year, you must apply for an extension of your approval in order to be authorized to continue with this project.

Some proposal and research design designs may be of such a nature that participation in the project may involve certain risks to human subjects. If your project is one of this nature and in the implementation of your project an incidence occurs which results in a research-related adverse reaction and/or physical injury, such an occurrence must be reported immediately in writing to the Institutional Review Board. Any project-related physical injury must also be reported immediately to the University physician, Dr. Loren Hamel, by calling (269) 473-2222.

We wish you success as you implement the research project as outlined in the approved protocol.

Sincerely,



Michael D Pearson
Graduate Assistant
Office of Scholarly Research

Office of Scholarly Research, Graduate Dean's Office, (269) 471-6161

Andrews University, Berrien Springs, MI 49306-0200

ADHD RESOURCES, INC.

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C. KEITH CONNERS, Ph.D.
President

KAREN C. WELLS
Secretary/Treasurer

May 28, 2003

To Whom It May Concern:

I am the author of the CAARS and CAADID Rating Scales, and I give permission to Carolyn Cofrancesco to reproduce these scales for illustrative purposes in her dissertation. I have asked that the scales be stamped with an indication that they are not to be reproduced in any form without permission of the author.



C. Keith Conners, Ph.D.
Professor Emeritus
Department of Psychiatry and Behavioral Sciences
Duke University Medical Center,
Durham, North Carolina

APPENDIX B
CONSENT FORM

IRB No. 2265-00-12R1

Consent for Research: Treatment of Adults with Attention Deficit Hyperactivity Disorder and Varying Degrees of Anxiety and Depressive Symptoms

IRB No. 2265-00-12R1
CONSENT FOR RESEARCH

Treatment of Adults with Attention Deficit Hyperactivity Disorder and Varying Degrees of Anxiety and Depressive Symptoms

SmithKline Beecham
Protocol 707

Principal Investigator: Diane E. Johnson, Ph.D.

Attention Deficit Disorder Program
Duke University Medical Center
Box 3431
Durham, NC 27710
(919) 416-2082

INTRODUCTION:

You are being asked to participate in a medical research study. Before you decide to participate, you should read this form. This form, called a consent form, explains the study. Please ask as many questions as needed so that you can decide whether or not you want to be in the study. This consent form may contain words that you do not understand. Please ask your study doctor or the study staff to explain any words or information that you do not understand. To be in this study, you cannot already be in another medical research study.

RATIONALE OF ADHD:

Attention Deficit Hyperactivity Disorder (ADHD) begins in early childhood and is defined as severe inattention and/or hyperactivity and impulsivity that impairs the child's ability to function successfully at home, school, or socially. Not all children outgrow ADHD. ADHD is found in 1% to 9% of the adult population and results in continued difficulties at work, in relationships, and in functioning at home. More than half of adults with ADHD also experience depressed mood and/or anxiety.

There have been very few research studies of medications for adults with ADHD. The purpose of this study is to see how effective two different medications are (either taken alone or together) in reducing ADHD symptoms and improving one's functioning in life.

IRB No. 2265-00-12R1
CONSENT FOR RESEARCH
Treatment of Adults with Attention Deficit
Hyperactivity Disorder and Varying Degrees
of Anxiety and Depressive Symptoms

STUDY MEDICATION:

The two medications in this study have been approved by the Food and Drug Administration and are available to anyone when prescribed by a doctor. One drug is called Paxil (paroxetine HCl) which is a medication taken once a day to treat depression and/or anxiety. The other drug is called Dexedrine (dextroamphetamine sulfate) which is taken one or more times a day for the treatment of ADHD.

PROCEDURES:

This research study will enroll 100 adults with ADHD at five different research sites across the United States and Canada. At this site, 20 adults with ADHD will participate. The study consists of up to 11 visits over 20 weeks of treatment. Today's visit is the first of two screening appointments where we will determine if you do have ADHD and if this study is a good idea for you to consider. If you decide to participate and you qualify, you will begin medication at the end of the second screening visit. Then, there are four "titration (dosing)" visits over four weeks where we will evaluate how you are doing on medication and will change the medication dose up or down until the ADHD symptoms have gone away. There must be an improvement in ADHD symptoms at the end of this four-week dosing period in order to continue. Once we determine the best medication dose for you, you will continue taking that dose of medication for the rest of the study. You will come in five more times, at weeks 6, 8, 10, 15, and 20, the final study visit. It is important for you to know that you will have to ask someone (such as a wife or husband, roommate, adult child, parent, employer) who currently knows you and your habits well, to complete several checklists/rating scales about you during your participation in this study. This should be the same person throughout the 20 weeks of this study. This person can turn in forms to you or us and does not have to come to the clinic visits.

Screening Visit:

Today's visit will last three to four hours. The second screening visit may last two to three hours. You will have psychological tests/interviews and a physical to help the study doctor determine if you meet the requirements to be in the study. These are called "screening" tests. The screening tests for this study are:

Psychological Screening:

Psychosocial history, computerized version
 Structured Clinical Interview for DSM IV, Axis I
 Conners' Adult Attention Deficit Rating Scales – completed by you, your rater, and the clinician

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Psychological Screening (continued):

Adult Symptom Inventory, completed by yourself and the other person
 LIFE measure of functioning
 Global Assessment of Functioning
 Brown Attention Deficit Disorder Rating Scale

Conners Adult ADHD Diagnostic Interview for DSM-IV (Part I: History and Part II: Diagnostic Interview)

Sheehan Disability Scale

Social Adjustment Scale

Weschler Adult Intelligence Scale, 3rd Edition – three subtests

Weschler Memory Scale, 3rd Edition – one subscale

Medical Screening:

Medical history

Physical exam

Vital signs taken

Side Effect Report

Hamilton Rating Scale for Depression

Hamilton Rating Scale for Anxiety

Blood pregnancy test – for women of child-bearing potential

Urine drug screen – if required

Women of child-bearing potential, who are not pregnant, will be allowed in the study. It is important that you understand that Paxil and Dexedrine are both medications that have warnings about pregnant women taking them. This research study may have an adverse reaction on an unborn child and should therefore not be done during pregnancy. It will be necessary that a pregnancy test (using 2 teaspoons of blood drawn from a vein by a needle stick) be done first. By signing this consent form, you are telling us that you are not pregnant at this time.

For women of child-bearing potential, if you are sexually active, it is also important that you are currently taking appropriate contraceptive measures now and will continue for the duration of the study. Acceptable birth control methods include hormonal contraception (such as birth control pills or Depo-Provera), barrier methods used with spermicides, or contraceptive devices. By signing this form, you are indicating that you will take contraceptive measures for the duration of this study.

To be included in the study, you must be between the ages of 18 and 60 years old and have ADHD currently as determined by the psychological screening tests. You will not be allowed to participate in the study if you are currently abusing alcohol or illegal drugs,

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If you have an eating disorder (such as anorexia or bulimia), any brain or nerve-related diseases, if you are taking any other medications for psychiatric reasons, if you are having thoughts of hurting yourself, if you do not understand the English language well enough to understand what needs to be done in the study, or if you know now that you can not do the study for the next five months.

You will receive the study medication at the end of the second screening visit. There are four different groups and you have an equal chance of being assigned to any of the four groups. Three of the groups are active medication – either Paxil, Dexedrine, or both Paxil and Dexedrine. The fourth group is a placebo (non-active, “sugar pill”) medication. This means that you have a 3 in 4 or 75% chance of being on an active medication and a 1 in 4 or 25% chance of not receiving any active medication throughout the study. You will not know which medication group you are in. In addition, all patients will be on placebo for one week during the study. The study doctor who is dispensing the medication will not know what medication you are taking. The person who is evaluating how you are doing and gathering the information about how you are responding to the medication will not know what medication group you are in.

All medication groups require you to take four capsules of medication a day, by mouth, two every morning and two at midday, every day of the week. All medications will look the same. The four medication groups are as follows:

Paxil: You will begin by taking a 10 mg Paxil capsule and a placebo capsule by mouth in the morning and two placebo capsules at lunch. We may increase the dosage during the “titration (dosing)” visits by 10 mg intervals to a maximum of 40 mg by mouth every morning and a placebo capsule at lunch.

Dexedrine: You will begin by taking a 5 mg Dexedrine capsule and a placebo capsule by mouth in the morning and a 5 mg Dexedrine capsule and a placebo capsule at lunch. We may increase the dosage during the “titration (dosing)” visits by 10 mg/intervals to a maximum of 20 mg by mouth every morning and 20 mg by mouth at lunch.

Combination: You will begin by taking two capsules in the morning, by mouth, one contains Paxil 10 mg and the other contains Dexedrine 5 mg, and you will take a Dexedrine 5 mg capsule and a placebo capsule at lunch. We may increase the dosage of Paxil and/or Dexedrine using the dosing described for each medication separately to a maximum of Paxil 40 mg and Dexedrine 20 mg by mouth every morning and Dexedrine 20 mg by mouth at lunch.

Placebo: You will take two placebo capsules by mouth in the morning and two placebo capsules by mouth at lunch.

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Hyperactivity Disorder and Varying Degrees
of Anxiety and Depressive Symptoms

You will be expected to return any unused study medication at each visit. The other person’s rating scale will also have to be returned at each visit.

Regardless of the medication group to which you are assigned, you will also receive Problem-Focused Therapy for ADHD which provides support, education, and management information for major life problems in hopes of helping you cope with ADHD and, if applicable, depression and/or anxiety. The Problem-Focused therapy sessions will take place during each of the scheduled visits and will be done with the study doctor who is also giving the medication.

Four Titration (Dosing) Visits (Weeks # 1, 2, 3, and 4):

On these 90 minute long clinic visits, the study doctor will rate your ADHD, mood, and anxiety symptoms, check your blood pressure, heart rate and weight, and ask about any side effects. You and the other person who is providing ratings will each complete an ADHD rating scale. Your study medication will be adjusted as needed. If it is determined that the ADHD symptoms have decreased and you are doing well before the end of the Titration (Dosing) Visits, you may move to the Treatment Visits sooner. If you have not benefited from the medication given you by the end of the Titration (Dosing) Visits, you must stop the study. We will work with you to find a referral, if necessary. You will be receiving Problem-Focused therapy at these visits as well.

Four Treatment Visits (Weeks 6, 8, 10, and 15):

The treatment visits at Week 6 and 8 will last about 90 minutes each, and the visits at Weeks 10 and 15 visit may last up to three hours. You will continue to receive the same medication dosage that was determined to be most effective for you at the Titration (Dosing) Visits for the remainder of the study. At these visits, the study doctor will rate your ADHD, mood, and anxiety symptoms, check your blood

pressure, heart rate and weight, and ask about any side effects. You and the other person who is providing ratings will each complete an ADHD rating scale.

Last Visit (Week 20):

At Week 20, you will discontinue medication. This visit will last up to three hours. The same procedures completed at the Screening Visit will occur at the end of the study. You will complete the Psychological and Medical Screening procedures (except that women of child-bearing potential will not have a blood pregnancy test). The other person's rating scale should be returned for a final time and all unused study medication must be returned. At the end of your participation, whether you left the study early or completed the study, we will determine what treatment group you were in, and if you were taking Paxil, will work with you, and your physician to slowly remove you from the medication. We will also work with you in finding referrals for further treatment.

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of Anxiety and Depressive Symptoms

EARLY WITHDRAWAL:

If you have to discontinue the study for any reason, we ask that you come back to the clinic one last time to complete Last Visit procedures. It is important to know that the medication Paxil should not be stopped suddenly, instead, you should slowly go off the medication by having a doctor lower the dose.

RISKS AND DISCOMFORTS:

For women of child-bearing potential, blood draws for pregnancy testing may result in pain and/or bruising at the place on your arm where blood is taken. Blood clots may form and infections may occur, but this rarely happens. If you feel faint after a blood draw, you should lie down right away to avoid falling down. Then you should notify one of the study staff.

While you are in this study you should not use any other medications (over-the-counter, herbal, prescription, or illegal) without approval from the study doctor. Taking other medications or drugs could result in serious and even life-threatening reactions.

Paxil, the antidepressant/anti-anxiety prescription medication used in this study, is currently available to the general public. Reported side effects include headache (19%), weakness (13%), constipation (12%), dry mouth (18%), nausea (23%), dizziness (10%), and feeling tired (20%).

Dexedrine, the ADHD prescription medication used in this study, is currently available to the general public. Reported side effects include hypertension (high blood pressure), tachycardia (rapid heart beat), Central Nervous System overstimulation (jitteriness), GI disorders (stomachache), anorexia (decreased appetite and weight loss), and, rarely, urticaria (rash, hives, itchiness of skin).

Pregnancy Dangers – If you are pregnant now or think you may be pregnant, you should not enter this study. It is very important that you not become pregnant during this study. If you become pregnant during the study you will be withdrawn from the study. You are aware that not having sex is the only certain way to prevent pregnancy. If you are a woman who is able to become pregnant, and choose to have sex during this study, you agree to use a medically proven type of birth control (discussed previously) throughout the study.

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BENEFITS:

It is possible that your condition may improve, but there is no guarantee that you will receive any medical benefit as a result of being in this study. It is also possible that your condition could worsen or remain the same. You have a 75% chance of being on an active medication but there is no guarantee that the active medication is the medication that works best for you. You will receive Problem-Focused therapy from the study doctor that is designed to give you support, educate you about ADHD, and teach you additional coping skills.

Your voluntary participation in this study may result in helping to better understand ADHD in adulthood, mood and anxiety symptoms that often co-occur with adult ADHD, life issues and difficulties related to adult ADHD, and treatment options for adult ADHD. You will receive free study medication for as long as you are in the study. You will also receive medical care and tests associated with this study at no cost to you.

COMPENSATION:

You are volunteering for this study and, therefore, will not be paid for your participation.

The sponsor, SmithKline Beecham and Duke University Medical Center make no commitment to provide compensation for any physical injury by the study drugs or properly performed study procedures.

ALTERNATIVE TREATMENTS:

There are several medications that are approved by the Food and Drug Administration (FDA) for treating the symptoms of ADHD. Both the study medications have FDA approval and are available to you in the community. Your alternative is to not participate in this study and to see your doctor for possible treatment with an approved drug for ADHD.

NEW FINDINGS:

If you choose to enter in this study and at a later date a more effective treatment becomes available, the study doctor will inform you of the new treatment. You will also be advised of any new information that becomes available that may affect your willingness to remain in this study.

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CONFIDENTIALITY:

Your medical records will be treated as confidential information. The sponsor (Smith-Kline Beecham) representative(s) and the FDA (and possibly other regulatory authorities) may review your medical record from this study. They may also receive copies of the medical records from this study. If study results are published, your name will not be used.

CONTACTS/QUESTIONS:

By signing this consent form, you do not give up your legal rights.

If you have any questions about (a) this research study, (b) reporting a research-related injury or (c) information about study procedures, you may contact the study doctor, Diane Johnson, Ph.D. at (919)-416-2082 during office hours. You may also contact the study coordinator, Carolyn Cofrancesco, M.A., Ed.S. at (919) 416-2440 (or at (919) 970-2103 after hours). If you should become sick while you are in the study or experience a study-related injury, you may contact the medical director, John March, M.D., at (919) 684-4950 at any time.

Contacts for Research Rights - This consent and research study has been reviewed and approved by an Institutional Review Board (IRB). This is a group of scientific and non-scientific people who review research studies involving humans. The IRB follows the rules set forth by the U.S. Government's Department of Health and Human Services. If you have questions about your rights as a study volunteer, you may contact Duke University Medical Center Risk Management at (919) 684-3277.

WITHDRAWAL FROM THE STUDY:

Participation in this study is completely your decision. You should have all of your questions answered by the study staff to your satisfaction before deciding to be in this study. You have the right to leave the study at any time. You will not be penalized, punished, or lose any benefits that you deserve if you choose not to be in this study or if you choose to leave the study at any time.

If you would like to leave the study please contact a study staff member so that you may properly leave the study.

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 Hyperactivity Disorder and Varying Degrees
 of Anxiety and Depressive Symptoms

At the same time, your participation in this study may be stopped at any time without your permission by either the study doctor, the IRB, the sponsor, or by the FDA. You may be removed from the study if you do not follow the instructions/procedures as they are given in the study or by the study staff.

In order to stay in the study, we expect you to take at least 21 out of 28 pills a week and attend at least 7 of the 9 Problem-Focused therapy sessions.

If you leave the study before completing all clinic visits, you will need to return any unused study medication. For your safety, you will need to return to the clinic and have a physical exam and assessments completed.

VOLUNTEER AGREEMENT/CONSENT

"I have read the above and have been given the opportunity to discuss it and to ask questions. These questions have been answered to my satisfaction. I have been informed of whom to contact to answer any questions I may have during the study. I understand that participation in this study is entirely voluntary and that I may refuse to participate or I may withdraw from the study at any time without any consequence to my continuing medical care. I have received a copy of this consent form for my records. I agree to participate in this study".

Signature of Participant

Date

Signature of Person Explaining Consent

Date

APPENDIX C

SAMPLES OF THE CONNERS' ADULT ADHD DIAGNOSTIC
INTERVIEW FOR DSM-IV (CAADID)
PART I

Demographic Information

Your Name: _____

Age: _____ Sex: M F

Date of Birth: ___/___/___
 dd mm yyyy

Home Address: _____

Today's Date: ___/___/___
 dd mm yyyy

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For Administrative use:

What is going on in your life that leads you to believe that you have Attention-Deficit/Hyperactivity Disorder or ADHD?

Childhood

Let's start at the beginning. Who was in your home when you were a child?

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Relationship	Name	Current Age
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Where did you live? _____ Q10

What was your father's job? _____ Q11

What was your mother's job? _____ Q12

Were you adopted? Y N Q13

If yes, what was your age at the time? _____ Q14

Gestational Risk Factors

Did anyone ever tell you or did you ever hear anyone talk about any of the following happening during your mother's pregnancy with you?

Mother ill (toxemia, anemia)	Y	N ^{OR}
Mother took medication	Y	N ^{OR}
Mother smoked cigarettes	Y	N ^{OR}
Mother drank alcohol	Y	N ^{OR}
Mother used illicit drugs	Y	N ^{OR}
Premature birth		

Was there anything else unusual about your mother's pregnancy?
(If yes, please describe on the lines provided below.)

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Delivery Risk Factors

Did any of the following happen at the time of your birth?

Fetal distress	Y	N ^{OR}
Low birth weight (less than 5 lbs or 2000 grams)	Y	N ^{OR}
Breech birth with forceps delivery	Y	N ^{OR}
Staying in the hospital longer than expected	Y	N ^{OR}
Anoxia (lack of oxygen, blue baby)	Y	N ^{OR}
Was there anything else unusual about your delivery? (If yes, please describe on the lines provided below.)	Y	N ^{OR}

APPENDIX D

SAMPLES OF THE CONNERS' ADULT ADHD DIAGNOSTIC
INTERVIEW FOR DSM-IV (CAADID)
PART II

Demographic Information

Your Name: _____ " "

Age: _____ " Sex: M F " "

Date of Birth: ____ / ____ / ____ " "
 dd mm yyyy

Home Address: _____

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Today's Date: ____ / ____ / ____ " "
 dd mm yyyy

For Administrative use:

Patient #	_____
Name of Interviewer	_____

Instruction Page

Complete the section for each symptom by doing the following:

1. Ask **Primary Question**, that is, "Do you often fail to pay close attention to detail or make careless mistakes?" *Get examples of behaviors during adulthood and record on the lines provided. Use the examples to prompt patient if necessary.*
2. Ask **Secondary Question** to determine if symptom is clinically significant, that is, "Do you think you have more problems with failing to pay attention to detail or making careless mistakes than most people your age?" *Make note of responses on the lines provided.*
3. Make **clinical determination** of whether patient meets symptom criteria and circle **Y** or **N** beside the question "Symptom present in adulthood?"
4. Whether **Y** or **N** recorded for adult symptom presence, ask **Primary Question modified for childhood**, that is, "When you were a child, did you often fail to pay close attention to detail or make careless mistakes?" *Get examples of behaviors during childhood and write them on the lines provided. Use the examples to prompt patient if necessary.*
5. Ask **Secondary Question** to determine if symptom was clinically significant, that is, "When you were a child, do you think that you had more problems with failing to pay close attention to detail or making careless mistakes than most children your age?" *Note responses.*
6. Make **clinical determination** of whether patient meets symptom criteria and circle **Y** or **N** beside the question, "Symptom present in childhood?"

Example:

<p>DSM-IV Criterion A (a) Often fails to give close attention to details or makes careless mistakes in school, work, or other activities</p>	
<p style="text-align: center;">Adulthood</p> <p>1. Do you often fail to pay close attention to detail or make careless mistakes? (Write comments/examples)</p> <hr/> <p>EXAMPLES:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Careless mistakes <input type="checkbox"/> Accuracy sacrificed for speed <input type="checkbox"/> Fails to check over work <input type="checkbox"/> Not reading instructions before doing <input type="checkbox"/> Not good with detailed work <input type="checkbox"/> Not a detail person - doesn't balance checkbook regularly <p>If response to Question #1 was "yes," Do you think you have more problems with failing to pay close attention to detail or making careless mistakes than most people your age? (Write comments/examples)</p> <hr/> <p>Symptom present in adulthood? <input type="checkbox"/> Y <input type="checkbox"/> N</p>	<p style="text-align: center;">Childhood</p> <p>1. When you were a child, did you often fail to pay close attention to detail or make careless mistakes? (Write comments/examples)</p> <hr/> <p>EXAMPLES:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Careless mistakes in schoolwork <input type="checkbox"/> Missed items/problems knew how to do <input type="checkbox"/> Didn't go back over work to check answers <input type="checkbox"/> Rushed through work without thinking through <p>If response to Question #1 was "yes," When you were a child, do you think that you had more problems with failing to pay close attention to detail or making careless mistakes than most children your age? (Write comments/examples)</p> <hr/> <p>Symptom present in childhood? <input type="checkbox"/> Y <input type="checkbox"/> N</p>

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I am going to ask you about a variety of behaviors that you may have had during your adulthood and/or childhood. It is very important to remember that most people have these behaviors during the course of everyday life. What I am trying to determine is whether or not these behaviors occur or occurred for you more frequently than for other people that age and/or if you feel these behaviors did or did not cause you more problems than they do or did for other people that age.

Inattention Symptoms

DSM-IV Criterion A (a)
Often fails to give close attention to details or makes careless mistakes in school, work, or other activities

Adulthood	Childhood
<p>3. Do you often fail to pay close attention to detail or make careless mistakes? (Write comments/examples)</p> <hr/> <hr/> <hr/> <p>EXAMPLES</p> <ul style="list-style-type: none"> <input type="checkbox"/> Careless mistakes <input type="checkbox"/> Accuracy is sacrificed for speed <input type="checkbox"/> Fails to check over work <input type="checkbox"/> Not reading instructions before doing <input type="checkbox"/> Not good at reading work <input type="checkbox"/> Not a detail person - doesn't believe in check/re-check <p>If response to Question #1 was "yes," Do you think you have more problems with failing to pay close attention to details, making careless mistakes than most people your age? (Write comments/examples)</p> <hr/> <hr/> <hr/>	<p>1. When you were a child, did you often fail to pay close attention to detail or make careless mistakes? (Write comments/examples)</p> <hr/> <hr/> <hr/> <p>EXAMPLES</p> <ul style="list-style-type: none"> <input type="checkbox"/> Careless mistakes in school/work <input type="checkbox"/> Missed items for homework/forget to do <input type="checkbox"/> Didn't check answers before turning in work without thinking through <p>If response to Question #1 was "yes," When you were a child, do you think that you had more problems with failing to pay close attention to detail or making careless mistakes than most children your age? (Write comments/examples)</p> <hr/> <hr/> <hr/>
Symptom present in adulthood? <input type="checkbox"/>	Symptom present in childhood? <input type="checkbox"/>

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APPENDIX E

SAMPLES OF THE CONNERS' ADULT ADHD RATING SCALES (CAARS)
SELF-REPORT: LONG VERSION

CAARS-Self-Report: Long Version (CAARS-S:L)

by C. K. Conners, Ph.D., D. Erhardt, Ph.D., & E. P. Sparrow, M.A.

Name: _____ Gender: **M** **F**
(Circle One)

Birthdate: ___/___/___ Age: _____ Today's Date: ___/___/___
Month Day Year Month Day Year

Instructions: Listed below are items concerning behaviors or problems sometimes experienced by adults. Read each item carefully and decide how much or how frequently each item describes you recently. Indicate your response for each item by circling the number that corresponds to your choice. Use the following scale: 0 = Not at all, never; 1 = Just a little, once in a while; 2 = Pretty much, often; and 3 = Very much, very frequently.

	Not at all, never	Just a little, once in a while	Pretty much, often	Very much, very frequently
1. I like to be doing active things.	0	1	2	3
2. I lose things necessary for tasks or activities (e.g., to-do lists, pencils, books, or tools).	0	1	2	3
3. I don't plan ahead.	0	1	2	3
4. I blurt out things.	0	1	2	3
5. I am a risk-taker or a daredevil.	0	1	2	3
6. I get down on myself.	0	1	2	3
7. I don't finish things I start.	0	1	2	3
8. I am easily frustrated.	0	1	2	3
9. I talk too much.	0	1	2	3
10. I am always on the go, as if driven by a motor.	0	1	2	3
11. I'm disorganized.	0	1	2	3
12. I say things without thinking.	0	1	2	3
13. It's hard for me to stay in one place very long.	0	1	2	3
14. I have trouble doing leisure activities on my own.	0	1	2	3
15. I'm not sure of myself.	0	1	2	3
16. It's hard for me to do several things at once.	0	1	2	3
17. I'm always moving even when I should be still.	0	1	2	3
18. I forget to remember things.	0	1	2	3
19. I have a short fuse/hot temper.	0	1	2	3
20. I'm bored easily.	0	1	2	3
21. I leave my seat when I am not supposed to.	0	1	2	3
22. I have trouble waiting in line or taking turns with other...	0	1	2	3
23. I still throw tantrums.	0	1	2	3
24. I have trouble keeping my attention focused when working.	0	1	2	3
25. I seek out fast paced, exciting activities.	0	1	2	3
26. I avoid new challenges because I lack faith in my abilities.	0	1	2	3
27. I feel restless inside even if I am sitting still.	0	1	2	3
28. Things I hear or see distract me from what I'm doing.	0	1	2	3
29. I am forgetful in my daily activities.	0	1	2	3
30. Many things set me off easily.	0	1	2	3
31. I dislike quiet, introspective activities.	0	1	2	3
32. I lose things that I need.	0	1	2	3
33. I have trouble listening to what other people are saying.	0	1	2	3

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Items continued on back page...

APPENDIX F

SAMPLES OF THE CONNERS' ADULT ADHD RATING SCALES (CAARS)
OBSERVER-REPORT: SCREENING VERSION

CAARS—Observer: Screening Version (CAARS—O:SV)

by C. K. Conners, Ph.D., D. Erhardt, Ph.D., & E. P. Sparrow, M.A.

PERSON BEING OBSERVED	OBSERVER
Name: _____	Your Name: _____
Gender: M F Age: _____ <small>(Circle One)</small>	Gender: M F Age: _____ <small>(Circle One)</small>
Today's Date: ____/____/____ I am this person's: <input type="checkbox"/> spouse <input type="checkbox"/> parent <input type="checkbox"/> sibling <input type="checkbox"/> other: _____ <small>Month Day Year</small>	

Instructions: Listed below are items concerning behaviors or problems sometimes experienced by adults. Read each item carefully and decide how much or how frequently each item describes this person recently. Indicate your response for each item by circling the number that corresponds to your choice. Use the following scale: 0 = Not at all, never; 1 = Just a little, once in a while; 2 = Pretty much, often; and 3 = Very much, very frequently.

The person being described...	Not at all, never	Just a little, once in a while	Pretty much, often	Very much, very frequently
1. loses things necessary for tasks or activities (e.g., to-do lists, pencils, books, or tools).	0	1	2	3
3. is always on the go as if driven by a motor.	0	1	2	3
5. has a short fuse/hot temper.	0	1	2	3
7. throws tantrums.	0	1	2	3
9. has trouble keeping attention focused when working or at leisure.	0	1	2	3
11. appears restless inside even when sitting still.	0	1	2	3
13. is forgetful in daily activities.	0	1	2	3
15. is an underachiever.	0	1	2	3
17. can't get things done unless there's an absolute deadline.	0	1	2	3
19. makes careless mistakes or has trouble paying close attention to detail.	0	1	2	3
21. doesn't like academic studies/work projects where effort at thinking a lot is required.	0	1	2	3
23. sometimes overfocuses on details, at other times appears distracted by everything going on around him/her.	0	1	2	3
25. gives answers to questions before the questions have been completed.	0	1	2	3
27. interrupts others when they are working or busy.	0	1	2	3
29. appears distracted when things are going on around him/her.	0	1	2	3

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APPENDIX G

SAMPLES OF THE CONNERS' ADULT ADHD RATING SCALES (CAARS)
OBSERVER-REPORT: LONG VERSION

CAARS-Observers: Long Version (CAARS-O:L)

by C. K. Conners, Ph.D., D. Erhardt, Ph.D., & E. P. Sparrow, M.A.

PATRON BEING DESCRIBED	OBSERVER
Name: _____	Your Name: _____
Gender: M F Age: _____ <small>(Circle One)</small>	Gender: M F Age: _____ <small>(Circle One)</small>
Today's Date: ____/____/____ I am this person's: <input type="checkbox"/> spouse <input type="checkbox"/> parent <input type="checkbox"/> sibling <input type="checkbox"/> other: _____	

Instructions: List below are items concerning behaviors or problems sometimes experienced by adults. Read each item carefully and decide how much or how frequently each item describes this person recently. Indicate your response for each item by circling the number that corresponds to your choice. Use the following scale: 0 = Not at all, never; 1 = Just a little, once in a while; 2 = Pretty much, often; and 3 = Very much, very frequently.

The person being described...	Not at all, never	Just a little, once in a while	Pretty much, often	Very much, very frequently
1. likes to be doing active things.	0	1	2	3
2. loses things necessary for tasks or activities (e.g., to-do lists, pencils, books, or tools).	0	1	2	3
3. blurts out things.	0	1	2	3
4. blunts out things.	0	1	2	3
5. gets down on self.	0	1	2	3
6. is easily frustrated.	0	1	2	3
7. is always on the go, as if driven by a motor.	0	1	2	3
8. says things without thinking.	0	1	2	3
9. gets rowdy or boisterous during leisure activities.	0	1	2	3
10. has a hard time keeping track of several things at once.	0	1	2	3
11. forgets to remember things.	0	1	2	3
12. is bored easily.	0	1	2	3
13. has trouble waiting in line or taking turns with others.	0	1	2	3
14. has trouble keeping attention focused when working or at leisure.	0	1	2	3
15. avoids new challenges because of lack of faith in his/her abilities.	0	1	2	3
16. is distracted by sights or sounds when trying to concentrate.	0	1	2	3
17. is set off easily by many things.	0	1	2	3
18. loses things needed for work or tasks.	0	1	2	3

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REFERENCE LIST

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