

**AN ASSESSMENT BATTERY FOR THE DIAGNOSIS AND EVALUATION OF ATTENTION
DEFICIT HYPERACTIVITY DISORDER**

by

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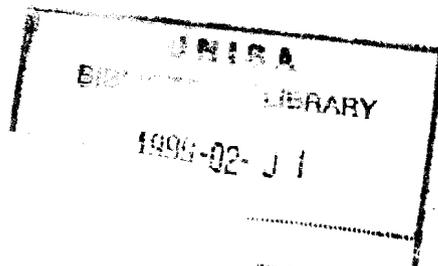
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PREFACE

The term "Attention Deficit Hyperactivity Disorder" is used in its abbreviated form: "ADHD". Other comorbid disorders used in abbreviated form are as follows:

"Conduct Disorder" — "CD"

"Oppositional Defiant Disorder" — "ODD"

"Learning Disabled" — "LD"

"Attention Deficit Disorder" — "ADD"*

All of the above are DSM-IV (1994) definitions.

* The term "ADD" is a loosely held term for Attention Deficit Disorders in general. However, new research points to ADD as a separate, if not oppositely occurring, disorder from ADHD (Barkley, 1996). ADD is still referred to in the DSM-IV (1994) as ADHD — "Predominantly Inattentive Type" and is therefore seen as a sub-type of ADHD. "ADD" children are generally inattentive and not hyperactive, while "ADHD" children are both inattentive and hyperactive.

Confusion continues to exist as clinicians refer to either ADD as all-encompassing, meaning this includes ADHD. Conversely, the DSM-IV refers to the disorder as ADHD for all types, including non-hyperactive. In actual fact, ADHD is a separately occurring set of symptoms, completely at the opposite spectrum of ADD.

As further research is performed, it is hoped that both DSM-IV and clinicians separate the two disorders accordingly. This assessment battery attempts to highlight ADHD as a

separate disorder, thus allowing for more accurate diagnosis and paving the way for treatment success.

KEY TERMS

Psychometric Tests; Behavior Rating Scales; Intelligence; Performance; Achievement; Conduct Disorder; Oppositional Defiant Disorder; Attention Deficit Disorder; Attention Deficit Hyperactivity Disorder; Impulsivity; Inattention; Hyperactivity; Behavior.

ABSTRACT

This study compared a group of ADHD males aged 7 to 16 years ($n=32$) with a control group of normal, non-diagnosed males aged 7 to 16 years ($n=32$). The purpose was to confirm the ADHD diagnosis and specifically pinpoint ADHD symptomatology. These measures could potentially be utilized in a comprehensive assessment battery for diagnosing and evaluating ADHD. Psychometric measures included the *Wechsler Individual Achievement Test (WIAT)*, the *Wechsler Intelligence Scale for Children — Third Edition (WISC-III)*, *Differential Ability Scales (DAS)* and the *California Verbal Learning Test — Children's Version (CVLT-C)*. Behavioral measures used were the *ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)* and *Conners' Parent and Teacher Rating Scales (CPRS-48 and CTRS-28)*. T-tests, bivariate and partial correlations revealed performance and behavioral differences between ADHD and control groups. Increased ADHD symptomatology on rating scales was associated with decreased performance scores on psychometric tests, and decreased IQ in the ADHD group.

CHAPTER 1

AN INTRODUCTION TO THE FIELD OF STUDY

Part I — What Is Attention Deficit Hyperactivity Disorder?

Attention Deficit Hyperactivity Disorder, or ADHD, is a commonly diagnosed disorder affecting both adults and schoolchildren. In schoolchildren, it is imperative that they be diagnosed early so as to prevent difficulties in adulthood.

While this is evident, it is often overlooked. ADHD has been extensively researched, but from a practical standpoint, more strategies are needed to benefit these children.

ADHD is defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994) as "a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequent and severe than is typically observed in individuals at a comparable level of development" (p. 78). According to the DSM-IV (1994), there are three types of ADHD:

- 1) "314.01" — ADHD "Combined Type". This refers to ADHD criteria inclusive of inattention, impulsivity and hyperactivity symptoms occurring over a 6 month period;
- 2) "314.00" — ADHD "Predominantly Inattentive Type". This refers to ADHD children who are primarily "inattentive", but not as hyperactive as in the "Combined Type"; and
- 3) "314.01" — ADHD "Predominantly Hyperactive-Impulsive Type". This refers to ADHD children who meet criteria for hyperactivity and impulsivity, but do not meet the criteria for inattention over a 6 month period.

It has been argued by Cantwell (1994) and Elia (1993) that stimulant medication has been relatively successful in treating these children and improving behavior. Both describe significant benefits to these children.

To diagnose and treat the ADHD child when young, appears theoretically practical. However, prior to treating these children, it is necessary to fully diagnose the problems and treat each aspect of the disorder. As a result of GENERALIZED tests for attention and hyperactivity problems, the child may either be misdiagnosed or not diagnosed at all.

To date, assessment batteries have shown limited success in providing an all-encompassing approach for concrete diagnosis (Batsche & Knoff, 1994; DuPaul, Anastopoulos, Shelton, & Guevremont, 1992). A full assessment program needs to be devised in such a way that teachers and clinicians are able to accurately assess, diagnose and evaluate a child's behavior and his/her educational requirements which result.

Arnold and Jensen (1995) further make the point on this issue that there exists no set of clinical tests or diagnostic batteries at present, which can make a definitive diagnosis of ADHD.

Effective ADHD assessment batteries could potentially diminish the number of children who require special attention in educational and social matters. Furthermore, as it appears that ADHD is associated with other learning disorders, the ADHD assessment battery will specifically examine which tasks and tests the child is scoring low on. This issue of comorbidity has been raised by Arnold and Jensen (1995), Nottelmann and Jensen (1995) and Cantwell (1994). To date, it is unclear as to whether the hyperactivity component is a result of attentional deficiencies. By making sound use of psychometric tests, each ADHD symptom could be described according to current DSM-IV criteria.

However, it is important not to overdiagnose or for that matter "under-diagnose" ADHD. ADHD children perform well on some tasks and poorly on others. Specifically, constantly changing tasks which are active and response-oriented such as video games, are an example of concentrated non-academic tasks. On these, ADHD children tend to perform well, but in contrast, tasks requiring sustained attention will be problematic for ADHD children (Hallowell & Ratey, 1994). A combined rating factor in numerical form will be used as a cutoff score for accurate diagnosis.

If ADHD is an important cause of social and educational problems, as described in recent epidemiological studies in Europe, and the USA, by Baumgaertel, Wolraich and Dietrich (1995); and Wolraich, Hannah, Pinnock, Baumgaertel and Brown (1996), the assessment battery needs to focus on educational and social problems. As a result, psychoeducational tests could potentially create a concrete diagnostic profile, and increase the input of a wider range of professionals (Cantwell, 1996). While not spelling out a multiprofessional approach per se, or attempting to focus merely on a psychiatric perspective to the disorder, this actually provides a symptom-based attempt to reach a diagnostic profile. Significantly, he writes of "appropriate cognitive assessment of ability and achievement" (Cantwell, 1996, p. 982). This indicates how limited the focus has been on psychodiagnostic testing — what is "appropriate", and what is the "ability" being screened?

Both observations and tests, require to be tested against each other to attain a level of congruency between them and to provide for accurate assessment. Situational observations will vary. However, combined with psychoeducational tests, a high level of accuracy can be attained, if observational scales and test scores can be utilized to specifically show concrete evidence of ADHD.

As Attention Deficit Hyperactivity Disorder (ADHD) is a commonly diagnosed disorder affecting both adults and children, there has also been some focus on the adult ADHD. In the adult population the focus is, however, relatively recent (Faigel, 1995), where ADHD has been followed up in relation to college students. This approach essentially indicates that there is a shift to studying ADHD on developmental levels, across a wider continuum. This establishes Russell Barkley's position (1990) that ADHD was a lifetime disorder, despite the fact that hyperactivity tended to diminish with age (Weiss & Hechtman, 1986).

To date, it is in relation to children and adolescents that the major focus has been noted. ADHD is essentially a low visibility, but high prevalence disorder which permeates every dimension of a child's life and impacts on the family as well (Smith, 1979; Taylor, 1980). The low visibility component reflects the normal appearance of the child, unlike, for example, mentally challenged children, Down Syndrome children, or children with Fetal Alcohol Syndrome (FAS). The normal appearance belies the significant impact that ADHD may have on the child, the family, the teacher, the school; and on the community at large.

Typically, while maturity modifies some of the presenting symptomatology, Attention Deficit Disorder (ADD), in general, reflects poor peer relationships, behavior problems, fluctuating motivation, high distractibility, limited ability to sustain attention, shifts of attention from one, uncompleted activity to another, excessive talking and excessive intrusion onto others by aggressive or non-compliant behavior (Cantwell, 1996). According to Ingersoll (1988), ADHD children cannot fit into any form of routine, and they are unpredictable in responding to being organized.

According to Douglas (1975), attention span rather than excessive activity creates conflict with others, and she postulates that attention span and impulsivity as well as inability to evaluate situations and determine consequences are the primary features.

The focus on attention, impulsivity and hyperactivity is reflected in the DSM-IV (1994), a nosological descriptive categorization aimed at standardizing diagnoses under the auspices of the American Psychiatric Association. The DSM-IV (American Psychiatric Association, 1994, pp. 83-85) provides the following guidelines for the diagnosis of ADHD:

DSM-IV (1994) GUIDELINES FOR ADHD

A) Either 1 or 2:

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

HYPERACTIVITY:

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

IMPULSIVITY:

- g) often blurts out answers before questions have been completed
- h) often has difficulty awaiting turn
- i) often interrupts or intrudes on others (eg., 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 (eg., 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 (eg., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Code based on type:

- 314.01 *Attention-Deficit/Hyperactivity Disorder, Combined Type:* if both Criteria A1 and A2 are met for the past six months.
- 314.00 *Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type:* if Criterion A1 is met but Criterion A2 is not met for the past six months.
- 314.01 *Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type:* if Criterion A2 is met but Criterion A1 is not met for the past six months.

The research of Barkley (1990) demonstrates that difficulty with rule governed behavior and motivation are integral parts of ADHD symptomatology and the DSM-IV does not adequately categorize these. Ingersoll (1988) says that negativism, disobedience and negative attitude are common features of the disorder. It is often described as "marching to one's own tune."

Clinical symptomatology of ADHD has been well described, but specific symptom management has not been as well defined (Barkley, 1990; Campbell, 1990; Cantwell, 1996). Impulsivity and limited or ineffective comprehension have consistently been specified from a clinical management perspective.

This infers that the ADHD child's noted symptoms of hyperactivity, impulsivity and inattention may serve to hinder day-to-day functioning. However, this type of problem is an observed result of the ADHD symptomatology and it is difficult to actually measure "resulting symptoms" such as reading and dealing with social relationship issues. Each situation will be unique and the ADHD child will either handle or not effectively solve the

problems that he or she is confronted with. Resulting social problems are, however, "detected" by school teachers, but cannot be "measured" as they are clinical laboratory symptoms. How the ADHD child will actually deal with situations is an extremely important aspect, especially in later treatment strategies.

According to Guevremont, DuPaul and Barkley (1990), 3% of school age children in the USA fit the ADHD diagnosis. Ingersoll (1988) suggests the figure to be between 3% and 5%, with a much greater likelihood in male children. In this regard, Berry, Shaywitz and Shaywitz (1985) compared hyperactive boys and girls and found that girls had more serious problems with complex thinking and language. Boys, on the other hand, were more overactive, aggressive and disruptive. According to these researchers, the ADHD girls were not as visible or troublesome to adults and frequently would not be referred for professional attention. Existing figures of male predominance have not been well explained, but Baumgaertel et al. (1995) and Cantwell (1996) raise the issue of a referral bias, as girls are generally less aggressive and more inattentive, consequently being viewed as less problematical in terms of behavior. The further implication was that the ADHD could not effectively be diagnosed only in behavioral terms and through rating scales.

This has been the major focus of diagnosis and there have been very limited attempts to assess beyond presentation of behavior and rating scales. The most popular rating scales have been Achenbach (1993), ACTeRS (Ullmann, Sleator, & Sprague, 1991), Barkley (1990), and Conners (1994) scales, but these all reflect behavior and symptom evaluation rather than any form of psychometric pattern of evidence. The literature indicates that there have been three ways of classifying ADHD:

- 1) The symptom approach has been a major means of classification. ADHD symptoms are often noted by parents and teachers; and the severity of behavior has by and large been the precipitating factor in seeking assistance (Cantwell, 1996).
- 2) The pharmacological approach has been utilized as an adaptive means of determining symptom reduction. The most popular symptom controlling medication has been methylphenidate (Cantwell, 1996; Arnold & Jensen, 1995; Barkley, 1990; Barrickman, Noyes & Kuperman, 1991; Elia, 1993).
- 3) The rating scale method has been popularized as a means of clarifying and correlating parental and teacher reactions. The use of rating scales and behavioral observation to make a diagnosis has been the major means of determining the existence of ADHD (Conners, 1994; Hinshaw, 1994; Swanson, 1992; Pelham, 1992).

In effect, classification has been largely from the perspective of attempts to precisely define ADHD, and the DSM-IV essentially depends upon whether specific qualities are exhibited. The diagnosis of ADHD is determined if DSM-IV diagnostic criteria are met, and these typically include inattention, impulsivity and hyperactivity.

At the same time, the exclusive criteria of schizophrenia, mental retardation and affective disorders must be absent. There has been fluctuating validation of these diagnostic criteria, and generally the diagnosis of ADHD has been made on the consensus basis of what clinicians believe ADHD should be. There have been a paucity of studies of a

psychometric performance nature, probably due to the fact that by and large clinicians have limited awareness of educational facets, focussing more on clinical symptoms. Psychologists by and large have not undertaken major studies seeking psychometric signs. Goldfried, Stricker and Wiener (1971), by contrast, using the Rorschach test, measured specific potentials and variables, specifically seeking psychometric signs. This approach was important because Goldfried, Stricker and Wiener (1971) attempted to objectify clinical indicators using a test which in structure was vague and open to interpretation.

Part II — History of ADHD

The Period 1900-1960 — The Brain Damage Era

The earliest study of limited "inhibitory volition" in children was undertaken by Still (1902) who described a sample from his medical practice. He described the children as defiant, resistant to discipline, aggressive, lawless and displaying defects in moral control. He saw significant risks for antisocial behavior, but his major contribution was that he noted observationally that these children were markedly different from the normal child population. Still, thus became the first to compare the ADHD population to the normal population. He was also the first to note that a larger proportion of males exhibited the symptoms than females, and that age of onset was before 8 years of age.

Still (1902) attempted to stereotype the abnormalities as part of a greater series of anomalies and he attempted to link up physical presentation with the behavior.

In terms of the current era, Still's (1902) child population would be distributed among Pervasive Developmental Disorder, Oppositional Defiant Disorder and Conduct Disorders; and his prognoses were pessimistic.

Still (1902) sought an organic, genetically based neurological component, and he sought an unseen form of brain damage as an explanation for the behavior. He believed that a cortical disconnection syndrome was occurring which promoted defects of control and social abilities. The contributions of Still, however, in a historical context were clearly the cornerstone of the term used later in the 20th Century; namely, "Minimal Brain Damage" which lasted well into the 1970s (Barkley, 1990).

This approach associated behavioral symptoms as linked to brain injury and, consequently, it meant that behavioral component abnormalities were in themselves evidence of brain damage. This led to a particularly speculative position that rather than a known brain injury being present to cause particular behavior, the behavior itself could simply be regarded as indicative of brain damage.

In recent times, this approach has been modified by attempts to find specific lesions in the brain, and Hartsough and Lambert (1985) have postulated that some form of prenatal problem causes Attention Deficit Disorder. In comparing hyperactive children with normal children, they determined that hyperactives tended to be born after long labors and were twice as likely to have experienced fetal distress. In their study, maternal health during pregnancy was poor; mothers were under the age of 20; most were first born children; toxemia was frequently reported; and children were born at a later age of gestation with medical problems at birth.

The attempts to seek an organic basis have been widespread, but this has been countered by the large numbers of children born with ADHD, who have been classified as normal births; but these approaches are the modern day technological-epidemiological continuation of Still's approach.

These early historical trends were developmental stages in the evolution of current conceptualization of ADHD.

The Development of Minimal Brain Dysfunction

The evolution of "Minimal Brain Dysfunction" has been extensively reviewed by Kessler (1980). The outbreak of influenza and encephalitis epidemics following World War I, raised a level of interest in the presentation of children who had survived brain infection, but were left with behavioral problems. Inattention, lack of impulse control and hyperactivity as well as social disruption were noted along with oppositional and defiant behavior. This was referred to as Post Encephalitic Syndrome or Post Encephalitic Behavior Disorder, with the prognosis being regarded as poor.

These cases of clear brain disease and behavioral sequelae appeared to be linked by the search for a lesion in the brain. This approach characterized some of the investigations of the era (Foudraine, 1974). Consequently, Post Encephalitic Disorders experienced loss of memory and cognitive skills, and the focus began to widen to other linkages between brain lesion, brain injury and behavior. Barkley (1990) notes that birth trauma, measles, lead toxicity, epilepsy and head injury were all found to be associated with cognitive and behavioral impairments. The focus tended to be the lumping of cognitive and behavioral issues, so that mental retardation and neurological sequelae were all included. This differed from eg. the work of Goodyear and Hynd (1992) who reviewed ADD subtypes with and without hyperactivity and sought behavioral and neuropsychological differentiation. The older studies in fact were brain injury samples by definition which used behavioral manifestations as an explanation of brain disease.

The focus during the 1920s and 1930s thus became on exploration of the effects of trauma on behavior with the identification and description of behaviors reflecting brain damage. This coincided with an increasing focus on comparative neurological and psychological type studies where brain sections and localization of lesions were behaviorally explored.

According to Levin (1938), a similarity was noticed between behavioral symptoms of hyperactivity in children and frontal lobe injured primates. The behavioral changes in apes led to the postulation that hyperactivity and restlessness were due to frontal lobe pathology.

Barkley (1990) notes that ADHD children who were hospitalized because of the symptom pattern were considered to have some form of brain damage whether or not any clinical features could be found, and the diagnostic pattern reflected a notion that behavior was a reliable determinant of the existence of brain injury. This process led to intensive physiological and psychological testing aimed at seeking specific areas of cortical involvement (Giedd, Castenalos, Korzuch, King, Hamburger, & Rapoport, 1994; Steere & Arnsten, 1995).

The argument put forward that behavioral disturbances were reflective of brain injury still prevails and remains a major research area (Giedd et al., 1994; Hynd, Semrud-Clikeman, Lorys, Novey, & Elioplus, 1990). Their use of computer axial tomography and various imaging approaches has led to studies ranging from comparing size of brain to brain functioning and biochemical components.

The importance of this is the fact that this approach led to the lengthy use of the term "minimal brain dysfunction" or "minimal brain damage" (MBD) during the 1950s and 1960s.

In some jurisdictions this was continued into the 1970s. While Barkley (1990) points out that a number of investigations raised major questions about the issue of brain damage without clinical documentation, this label of MBD tended to be significantly in use. It was, however, the point of departure for early investigators like Strauss and Lechtinen (1947) who devised behavior modification techniques to treat hyperactivity.

The problem of diagnostic clarity was complicated because, while brain injury, and at times mental retardation, were being confused with MBD, so too were learning deficits. A picture was built of a multifaceted problem where learning disabilities, neurological dysfunction and behavioral symptoms were all unified. This was followed by attempts to distinguish the components of MBD, and to form specific behavioral constructs. This meant that behavioral distinctions now became the norm and in the 1980s and 1990s clusters of symptoms were incorporated into the DSM-III, DSM-III-R and DSM-IV as a result. These were hyperactivity, restlessness, impulsivity, distractibility, aggression and short attention span (American Psychiatric Association, 1994).

The neurological-organicity approach (Cantwell, 1996; Foudraine, 1974) and its attempts to localize lesions shifted somewhat in the 1950s to the thalamus, and hyperactivity as a brain disorder became established with prognosis regarded as poor. This was due to extensive pharmacological studies and efforts at localization, impinging on biochemistry, endocrinology, enzymology and pathology. The three major issues thus raised were 1) whether drug actions stimulated or depressed; 2) did the primary action involve the central or autonomic nervous system; and 3) what were the behavior changes induced by drug administration. Hyperactivity in terms of early studies was regarded as some type of brain damage (Cantwell, 1996).

These approaches were aimed at influencing specific brain areas, so that alteration of behavior after medication would be indicative of a drug effect on a particular segment of the brain.

The investigations undertaken in the field of localization led to the term "Hyperkinetic Impulse Disorder," and this label of "Hyperkinesis" or "Hyperkinetic child" became synonymous with MBD. Laufer and Denhoff (1957) and Laufer, Denhoff and Solomons (1957) undertook studies of cortical overstimulation. The fact that electrical impulses, electrical brain changes in EEG and action site localization studies were undertaken, raised the clinical focus to a questioning of what specific mechanism created hyperactivity. The contributions of the era moved towards an awareness that cortical overstimulation ameliorated Attention Deficit Disorder (ADD) symptoms. The use of amphetamine and methylphenidate (Ritalin) to control ADD symptoms developed as it became evident that stimulants acted via brain catecholaminergic systems.

Shaywitz, Shaywitz, Jatlow, Sabrecats, Anderson and Cohen (1986) have developed this approach extensively in recent years by measuring catecholamines in body fluids of ADD children. They determined that stimulants reduce metabolites of catecholamines in cerebrospinal fluid and urine of ADD children. This strategy potentially created a non-invasive approach to determining any relationship between behavior and chemicals in the brain by urinary studies.

In the late 1960's to early 1970's, the terms "MBD" and "hyperkineses" were utilized less, with the realization that the entire concept was vague, nebulous, and lacking in supporting evidence of a specific lesion being present. There was a lack of specificity, and studies tended to generalize far too widely based upon limited operational research. The

focus on catecholamines and amine metabolism in general as a means of diagnosis on the basis of metabolic differences led to a better description or understanding of hyperactivity (Shaywitz et al., 1986).

Werry and Sprague (1970) argued that hyperactivity was a behavioral syndrome which might or might not be linked to organicity. This enabled wider descriptive and treatment options.

Weiss and Hechtman (1986) determined that ADHD could also be an adult disorder, and significant investigations of adults and young adults have been undertaken in recent years. As a commonly found feature of childhood, no organicity was needed to explain it. The features were not dependent upon any brain damage. This was established in the late 1980's and according to Rutter (1988), Taylor (1980) and Goodyear and Hynd (1992), diagnostic criteria and subtypes showed specific behavioral components, with no necessity for a neurological explanation.

The delineation of symptoms led to a major research focus into the 1970's. Barkley (1990) in reviewing the period 1970-1979 found 2,000 published studies on ADD in that period alone. Resnick and McEvoy (1994) also raised the issue that ADHD children continue to manifest symptoms including significant vocational, interpersonal, marital, and familial problems into adulthood. They estimate that approximately 2 million adults in the USA meet the criteria for Attention Deficit Disorder. Resnick, as President of the American Psychological Association, has raised attention to the need for psychologists to increase their diagnostic and treatment skills in regard to this population.

The major move into the field of Attention Deficit Disorder classification was due to Rie and Rie (1980), Rutter (1977; 1982; 1989), Whalen, Henker and Dotemoto (1980), and

Barkley (1977). In the late 1970's Barkley was using the term "hyperactivity" and "hyperkinesis" interchangeably, focussing on aspects of behavior noted in the hyperactive child (Barkley, 1982). It was largely due to extensive descriptive behavioral research that the term MBD was replaced by the terminology "hyperactivity" and "hyperkinesis."

There was no defined syndrome of organicity, there was no neurological abnormality of a consistent nature, there was no uniform pattern of behavior in brain damaged patients, and even epileptics showed no consistent trends of behavior. Overall, hyperactivity seldom showed any substantial evidence of organicity, and once the psychological rather than neurological model was emphasized, the term MBD fell into disuse (Barkley, 1982).

Tourettes Syndrome, by contrast has been viewed from the stance of organicity, possibly due to the focus on comorbid conditions. Cantwell (1994; 1996), for example, emphasized comorbidity. By contrast, Mash and Johnston (1990), Johnston (1996) and Hechtman (1996) focussed on families and interactive stress, as well as psychological effects on families where ADHD is diagnosed.

The move from the concept of "pure" hyperactivity or a hyperactive disorder occurred in the 1970's where a broadening descriptive process was noted. This occurred when the research focussed on psychological effects and components, rather than a purely symptom-based approach. This is evident, for example, in the work of Feldman, Denhoff and Denhoff (1979) and Cunningham and Barkley (1979). The cognitive and behavioral features now started to be studied, with an emphasis on levels of distractibility, levels of attention, impulse control and variability. The emphasis became task oriented and sought answers on issues of what the hyperactive child could do, and specifically how they differed from other children. Douglas (1972) found that sustained attention, impulse control and deficiencies

in moral development were evident. These findings however did not analyze how moral development features were not developed in these children, or make the connection between inability to sustain attention, lack of impulse control and integrating broad societal expectations of morality.

The earlier findings of diminished hyperactivity in adolescence had however led to the idea that with adolescence and adulthood that ADHD was essentially a problem of childhood (Conners, 1995; Hallowell and Ratey, 1994). Research done by Weiss and Hechtman (1994), Wender (1994), Barkley (1995), Conners (1995) and Hallowell and Ratey (1994) indicates a shift to a broader developmental framework in studying the ADHD syndrome more extensively through adolescence and adulthood. This, however, is a relatively recent development. These studies have defined ADHD in terms of deficits of attention and effort; inability to control impulsivity; inability to meet situational expectations; and requirement for immediate reinforcement.

Barkley (1990) points out that the 1980 DSM-III was significantly influenced by Douglas (1972; 1975), but Barkley (1984); Cotugno (1993); Wherry, Paal, Jolly, Balkozar, Holloway, Everett and Vausat (1993); and Atkins and Pelham (1991) raised the issues as to how and whether an attention focussed model could explain the level of behavioral difficulties. Barkley (1990) portrayed ADHD not so much as a hyperactivity or attention disorder, but rather as a disorder of motivation.

In the past 20 years, a number of investigations have occurred by the Boston group of Barkley, the Montreal group of Douglas, and in latter years, the Hawaii group led by DuPaul. The latter years also saw the intensive drug evaluation studies led by Conners (Conners & Taylor, 1980); Douglas (Douglas, Barr, O'Neill, & Britton, 1988); and Werry

(Werry & Sprague, 1974), and the concomitant use of rating scales to determine symptoms of hyperactivity. In this area, Conners was a pioneer. From the perspective of behavioral pediatrics and child psychiatry, the intensive investigation of hyperactivity occurred, and the focus, on treatment too became important. Psychology led the field in cognitive behavioral approaches, and Psychiatry and Pediatrics applied pharmacological compounds to control symptoms of ADHD. In essence, though, four approaches came to be used:

- 1) Pharmacological approaches
- 2) Psychological approaches
- 3) Educational approaches
- 4) Non-traditional approaches

1. The Pharmacological approaches:

The usage of stimulants to control symptoms has been the vogue in the 1970's and 1980's. It was estimated by Safer and Krager (1983) that between 1% and 2% of the school age population in the USA are given methylphenidate. DuPaul and Barkley (1994) point out that much research has been undertaken on the effects of stimulants on hyperactive children. They argue in favor of medication, notably major doses of methylphenidate as a means of improving short term behavioral, academic and social functioning. DuPaul and Barkley (1994) pointed out that heavy dosages of methylphenidate which were subsequently lowered appeared to be the most effective usage of that particular drug.

Solomons (1973) pointed out the prevalence of inappropriate prescribing of stimulant medication, and criticized approaches to monitoring and prescribing. The general tendency to prescribe without objective evaluation, however, remained widespread. Gadow (1981)

noted that improper follow up and evaluation was common. Essentially, despite major research investigations into appropriate use of psychostimulants, an argument could be made about inadequate and inappropriate usage of psychostimulants.

Further, with greater public awareness, the short and long term side effects of psychostimulants for ADHD were highlighted. These effects included physiological and psychophysiological effects as well as cognitive, academic, behavioral and mood and emotion effects (Swanson, Cantwell, Lerner, & Hanna, 1991).

The long term effects included stimulant responses, dose effects and side effects — both short and long term. In terms of long-term side effects, there has been concern as to whether children can become addicted to psychostimulants as medication tolerance increased.

To date, little evidence appears to exist on the issue of addiction. Investigators recognize the requirement, however, to make a sound diagnosis prior to treatment. Evans and Pelham (1991) and Swanson et al. (1991) point out that the psychopharmacological approach is directed towards controlling school behavior, academic performance and social-behavioral issues.

2) Psychological approaches:

Social interactions between ADHD children and normal children tend to be somewhat weak (Barkley, 1990). ADHD children tend to be rejected by their peers as they lack the natural social skills and know how which is necessary for peer acceptance. Research over the past 25 years has highlighted the fact that ADHD children lacking peer

relationships tend to wane socioeconomically, becoming addicts, alcoholics, or antisocial in nature.

It is possible that early childhood problems can be the root cause for later in life maladjustment. Observational studies in classrooms and natural settings portray ADHD children as inappropriate, not "fitting in", aggressive, and often, possibly as a result, engaged in solitary play. Peer rejection appears to have been and continues to be a common problem with the ADHD child. As a result, social skills training programs have been developed (Barkley, 1990; Braswell & Bloomquist, 1994; Brown & Cantwell, 1976). Most of these programs have been developed over the past 15 years and continue to be upgraded as more diagnostic criteria becomes available.

Programs such as problem-solving, anger management, conversation skills and social entry skills have been implemented in a variety of settings. It appears that short-term social skills training programs are not as useful as long-term programs. Long-term programs, using parents and peers to change maladaptive behavior patterns, seem to be more meaningful and their effects last longer (Barkley, 1990; Braswell, Bloomquist, & Pederson, 1991; Braswell, & Bloomquist, 1994; Hechtman, 1993, 1996; Johnston, 1996; Mash & Johnston, 1990).

3) Educational approaches:

Behavioral and cognitive behavioral interventions in the classroom have been used more recently. Teacher training is deemed important in the success of this approach. Teachers must be fully aware of all the diagnostic issues of ADHD as a disorder. As "ADHD is primarily an impairment in the regulation of behavior by its consequences and

by rules," the educational approach must implement rule sets and consistently remind the ADHD children of the rules and consequences (Barkley, 1990; Cantwell, 1996; Hallowell & Ratey, 1994).

Intervention strategies of management have been developed or reviewed by a number of investigators (Barkley, 1990; Conners, 1994; Pelham & Bender, 1982; Swanson, 1992). Cantwell (1996) describes these approaches as multimodal in nature, and postulates the multimodal approach as a sound treatment method.

Teacher-administered intervention strategies include positive consequences such as attention, rewards, or tokens; while negative consequences such as ignoring, reprimanding and time-out strategies have been used with some degree of success. Often peers seem to enhance the problem of the "silly" behavior tendencies of the ADHD child. Peer strategies are designed to teach the peers to avoid or ignore the ADHD child's silly remarks and to praise the child's appropriate actions. These strategies have only worked if peers have learned and use the program effectively.

Other strategies used educationally include home-based contingency programs, cognitive behavioral interventions, classroom re-structuring, managing academic programs specially for ADHD children and special placement education services. While these programs have met a limited degree of short-term success; the long-term outcome may be more effective.

These programs are implemented at an early age. However, cognitive behavioral intervention strategies and academic management programs may be continued through adolescence and adulthood. If this occurs, these two strategies could potentially be useful. In contrast, home and classroom-based programs are limited to age, as the ADHD child

moves to higher education and the workforce. Therefore, behavioral and academic programs may be adapted and "generalized" longitudinally to serve the ADHD child through each stage of life well into adulthood.

Other childhood-based programs appear limited. As the ADHD child continues to higher education, these programs tend to diminish with a lack of support networks in the early years. If the problem is not addressed early enough or during adolescence, ADHD symptoms can potentially continue into adulthood.

4) Non-traditional approaches:

More recently, the ADHD child in the home setting has become a major area of focus (Hechtman, 1996; Johnston & Behrenz, 1993; Mash & Johnston, 1990). The Home Situations Questionnaire (HSQ) was developed for mothers to rate their ADHD children's behavior problems in the home sphere (Barkley, 1990; DuPaul & Barkley, 1992). It seems evident that parental discipline has been a leading factor in the home situation as the ADHD child has difficulty fitting in to the daily norms and rules of home life. Often, the parents have a difficult time in disciplining their troubled children.

As a result, intervention strategies based on the behavioral model (Barkley, 1990; Brown & Cantwell, 1976; Pelham & Bender, 1982) have been developed. This involves the parents and child/adolescent in a series of therapy sessions. As this approach has been relatively successful in the short term, more research is needed to evaluate its success, such as long-term studies and follow-ups. Also cross-sectional studies are needed to evaluate its full effectiveness.

The "Family Systems Approach to Parent Training" (Barkley, 1990) is a parent training program developed to increase the functionality of the family as a whole. Parent questionnaires are utilized in the form of the Child Behavior Checklist (Achenbach & Edelbrock, 1983) and the Home Situations Questionnaire (Barkley & Edelbrock, 1987). Each session has been developed to objectify, evaluate and correct the issues of parenting where friction occurs. Through a step-by-step process, each session deals with coping, problem solving, positive and negative reinforcement tactics and other behavioral modification strategies. This program appears to be widely used and shows a limited degree of success. However, the effectiveness needs to be tested clinically in order to determine if this approach is successful. Further, it must be determined if it works for all types of families, or only targets specific families. Again, the diagnostic issue is a requirement for any specific treatment programs. Barkley's contributions, while important, tend to be focussed beyond the clinical and research communities. This is largely because he has provided numerous workshops to parents and teachers (Children with Attention Deficit Disorder, 1996).

Part III

Proposed Study: The Development of An Assessment Battery for ADHD

This assessment battery will allow for a more accurate diagnosis based on all evaluative aspects of ADHD. A battery of psychometric tests and behavioral rating scales will be used to establish differences between an ADHD group and a control group. Comparison data between the control group and a previously classified ADHD group will be examined. This process will potentially outline a foundation for future researchers to

pinpoint and identify exactly which subtests and behavior subscales are representative of ADHD symptomatology.

To achieve the foundation for an assessment battery, this process will consist of parent and teacher observations combined with IQ, memory and achievement criteria. In effect, an examination of performance and behavioral attributes for each child in each group should yield "differences". These "differences" will ultimately portray strengths and weaknesses, as ADHD children will likely perform more effectively on certain tests and tasks.

To achieve concrete evidence of group differentiation, the non-diagnosed control group and ADHD-diagnosed experimental group should yield certain disparities. Any disparities will be an important discovery, as further research into these disparities between the two groups could potentially lead to a greater understanding of the ADHD child. Disparities which are significant will also be questioned as to why, and what, has led to differences between the two samples.

Further questions such as "How much behavior constitutes ADHD?" will arise, although, an attempt to achieve closure on this issue cannot be implemented until clinicians have a comprehensive, workable and user-friendly assessment battery. Diagnosis and evaluation are paramount to the foundation for our understanding of ADHD. By examining the specifics — namely specific subtests and subscales together, and not just simply certain subtests or certain subscales in separate studies, the attempt to create an all-encompassing understanding of ADHD seems within reach.

To date, no behavior rating scales are specific enough to adequately classify ADHD children. Moreover, performance scores are merely a component in the measurement

process. Behavior ratings, while seeming obvious on their own, can be matched with performance scores to achieve differentiation and eventual concrete diagnostic evidence for ADHD. It is possible that only certain subtests and subscales will highlight ADHD symptoms, and the significant data will then be of use in the assessment process.

By combining both performance and behavioral aspects in one study, rather than in separate studies, the assessment battery will have greater diagnostic utility. The result will be a more comprehensive understanding of ADHD.

CHAPTER 2

PSYCHOPATHOLOGY AND RECENT DIAGNOSTIC ISSUES

In the previous chapter, the major focus was on the historical foundation of ADHD under the general heading of ADD. While related facets of ADHD have been examined in the first chapter, no real emphasis has been made on actual diagnostic elements and the issue of comorbidity.

The term comorbidity reflects the presence of other conditions at the same time as ADHD. These may serve to complicate the clinical diagnosis.

Cantwell (1996), acknowledges comorbidity as an important component of the differential diagnosis, from a ruling out perspective, for example, the ruling out of other psychological disorders or medical conditions.

An equally valid focus could be argued for the acceptance of a series of comorbid components like learning disabilities being present. The problem with an "inclusionary comorbidity" would, however, lead to an argument about what is primary.

In order to determine the problem, diagnostic clarity is essential. However, there still appears to be no set diagnosis for ADHD. The DSM-IV (American Psychiatric Association, 1994) has finally established ADHD as a distinct and separate disorder from ADD, which now appears to have been overshadowed by ADHD as the dominant disorder from ADD. Generally, a process aimed at refinement of concepts and diagnostic clarity seems to be developing. Why this has occurred is still not exactly clear, although the DSM-IV appears more concrete than the DSM-III-R (American Psychiatric Association, 1987) in its separation

of the two disorders. Historically, however, interest in hyperactivity preceded interest in inattentiveness and over-shadowed ADD, largely because hyperactivity was more disruptive and noticeable than pure inattentiveness.

Analysis and Critique of Comorbidity Issues

The most recent literature fails to effectively distinguish ADHD as an independent disorder from ADD. Indeed, Wolraich et al. (1996), Baumgaertel et al. (1995), and Cantwell (1996) tend to group their findings into a broad "ADD" with subcategories. This may be in part due to the recency of the DSM-IV (American Psychiatric Association, 1994). Much of the recent literature has relied on earlier DSM-III-R (American Psychiatric Association, 1987) criteria. The major problem, however, appears to be the fact that there are no established symptom cutoffs (set symptomatology) for ADHD; and other disorders, similar in symptomatology may, in many cases, confound the diagnosis of ADHD.

Recent literature appears to strive toward an accurate diagnosis of ADHD, but continues to be confounded by symptomatology paralleling other disorders. By looking at a neurological basis for ADHD; Riccio, Hynd, Cohen and Gonzalez (1993) have attempted to describe the etiology of this disorder. They examined the conceptualization of ADHD through neurological models of etiology, by presenting neuroanatomical, neurochemical and neurophysiological perspectives. The neuroanatomical basis showed involvement of cortical and subcortical structures portraying "ADD" children as having decreased metabolic activity in frontal lobe areas. The neurochemical basis showed attention control as being an imbalance in dopamine/norepinephrine formation, resulting in decreased stimulation of the locus coreolus. Finally, the neurophysical basis postulated that ascending/arousal and

descending/inhibitory pathways cause activation and deactivation of other brain regions, and when these patterns are disrupted, an adequate level of arousal is no longer maintained.

The shortcoming of the Riccio et al. (1993) study appears to be in that the authors fail to distinguish ADD from ADHD, and it now seems apparent in the DSM-IV (American Psychiatric Association, 1994), and according to Barkley (1996), that ADHD is a completely separate disorder. The result of this study by Riccio et al. (1993) failed to distinguish between the two disorders. However, their work is based on earlier DSM-III-R (American Psychiatric Association, 1987) criteria. The study calls for diagnosis based on a multidimensional approach and taking into account behavioral observations to address the issue of comorbidity.

While there have been significant attempts towards defining neurological mechanisms and their associated characteristics, the issue of a clear neurological localized substrate is not effectively proven (Riccio et al., 1993; Giedd et al., 1994). Indeed, the argument as put forward by Cantwell (1996) for a multimodal approach to dealing with the disorder broadens previous approaches.

While Barkley (1990; 1996) can be criticized for proposing unproven theories, it can be argued that he is arguing from a psychological perspective in dealing with ADHD. It can be further argued that the purely organic biochemical theories of localization and neurological substrates are limited in nature.

Foudraine (1974), in relation to schizophrenia, put forward the argument that acceptance of proof of genetic and biochemical evidence appeared to be of a lower standard than any other acceptance because there appeared to be a specific attempt to make a genetic, biochemical explanation. In this respect, the imaging studies and genetic studies

and reviews of Goodman and Stevenson (1989) and Cantwell (1975; 1996) return to the primary view that no specific gene and no substrate has been found.

As Cantwell (1996) notes, this is an area of active research, but the argument needs to be clearly formulated that other approaches are equally important.

Riccio, Gonzalez and Hynd (1994) in a later study have attempted to address the issue of comorbidity in the etiology and diagnosis of ADHD. They have examined the overlap between ADHD and LD (Learning Disability) and the inconsistencies in diagnostic criteria between the two groups. The question is posed as to whether ADHD causes learning problems or vice versa. Three hypotheses are established: 1) That ADHD may be a result of academic problems; 2) Inattention and hyperactivity precede and impede academic performance; and 3) That ADHD and LD are separate entities that may co-occur. This is an attempt to purify the construct.

The comorbidity concerns need to be further addressed, and more effective and accurate classification strategies need to be addressed before the issue of comorbidity can be clearly established (Riccio et al., 1994). The Riccio et al. (1994) study calls for longitudinal research to follow each child and determine the relationship between the two disorders. This appears to be the only way to document whether or not ADHD results from continued academic frustration, or whether or not academic frustration results from LD or ADHD, or whether it is a combination of factors relating to each disorder. This opens a new area of study in the etiology of these disorders with the emphasis placed on cognitive functioning abilities of LD and ADHD children in varying settings and situations.

Russell Barkley (1996) has provided, in a workshop, a brief overview of proposed etiologies for ADHD. The etiological component of ADHD appears to need further

research, as does the diagnostic component. Barkley (1996) divides etiologies into Neurological, Genetic, Psychosocial and Environmental categories. There appears to be little evidence for neurological causes, although he does emphasize the aspect of neurochemical abnormalities as being a possible cause, but to date there is no research to fully support the idea. The genetic familial component, however, shows a heritability of .55 to .92, and family characteristics of ADHD children appear to show a relatively high correlation between parental/family dysfunction and ADHD symptoms. This area of family characteristics will be further explored in Chapter 3. The psychosocial component appears to be more of a management component, rather than a causal component and may serve to worsen ADHD symptoms and, as a result, may be more related to ODD (Oppositional Defiant Disorder) and CD (Conduct Disorder). Finally, the environmental component with respect to toxins and allergens appears to have a weak correlation of only .08 to .15, with the exception of prenatal exposure to alcohol, narcotics, or tobacco smoke. The prenatal aspect appears to have a significant link toward possible causes of inattentive and/or hyperactive behaviors while at the same time being a primary causal factor of Fetal Alcohol Syndrome/Effects which may also be comorbid with both ADD and ADHD symptomatology.

The issue of comorbidity with other disorders becomes more apparent when actual, differing settings and environmental factors are examined. The home environment has been a setting in which ADHD behavior has been examined. In a study by Biederman, Milberger, Faraone, Kiely, Guite, Mick, Ablon, Warburton and Reed (1995), it was investigated whether family environment risk factors are associated with ADHD. By utilizing Rutter's Adversity Factors Scale, they revealed that several, not just one adversity factor, led to "impaired development". It is, however, to date, unclear whether the

definition "impaired development" relates directly to ADHD or other comorbid symptoms of other disorders. Adversity factors such as severe marital discord, low socioeconomic status, large family size, paternal criminality, maternal mental disorder and foster care placement apparently led to such "impaired development". It is, however, also unclear, as to whether Rutter's adversity factors are causal or simply worsening or management factors of ADHD behavior. Researchers like Russell Barkley (1996) tend to view these factors as detrimental, not so much causal factors. However, it appears that more research is needed to establish the etiology of ADHD and differentiate it from comorbid disorders. Rutter's adversity index scores not only showed ADHD symptoms, but also related psychopathology such as depression, anxiety, CD, ODD, LD, cognitive impairment and general psychosocial dysfunction — the latter symptomatology being more representative of internalizing disorders which are often overlooked as a result of being "masked". ADHD appears to be an externalizing disorder, and its more noticeable symptoms should not be confused with conduct or oppositional symptomatology which often appears comorbid with ADHD.

Discussion of Environmental Contexts

In a study by Johnston and Behrenz (1993), childrearing discussions were undertaken in families with non-problem children, and families with ADHD children, with varying levels of aggressive/defiant behavior. The result of this study showed that the primarily aggressive children's parents elicited greater punishment and, as a result, the highest degree of negativism was found in the aggressive children's families. This study, however, failed to establish a distinct difference between what they called "ADHD-AD" (aggressive/defiant ADHD) and regular ADHD, or whether or not there is a difference. There may be varying

levels of aggression in ADHD. However, in order for a child to be diagnosed as ADHD, the issue of aggression requires clarification. Cantwell (1996) refers to disruptive behaviors; and aggressive behavior per se is not a DSM-IV (American Psychiatric Association, 1994) criterion. However, diagnostic criteria and diagnostic instruments tend to vary (Cantwell, 1996).

It may well be argued that the criteria of aggression/defiance as noted by Johnston and Behrenz (1993), could have been described more in terms of "disruptiveness" and "frustration". Disruptive behavior and inability to cope in day-to-day situations are an escalating continuum to an aggressive type of reaction. It may be that dysfunctional family/dysfunctional parenting strategies further exacerbate the aggression/conduct factors in these children. It seems apparent that parental interactions can only positively reinforce the aggression, and the process becomes cyclical — a reciprocal, vicious cycle between the relationship of parents and their children. The essential diagnostic factors for ADHD, however, appear to have clouded the study in the comorbidity liaison between ADHD and CD or ODD. Future research in the area of aggression should focus on whether or not aggressive ADHD's are actually CD or ODD. Again, the discriminatory factors between ADHD, CD and ODD are absent. Consequently, this study appears to have amalgamated the conduct/oppositional symptoms into a higher form of ADHD called "ADHD-A/D". This serves to cloud the diagnosis of ADHD and, as a result, the results of this study may be less accurate without the established symptom cutoffs which should be viewed according to each situation.

Situational variability will likely affect the child's responses and level of reactivity. These situational factors should also be accounted for, especially when examining varying levels (severity) of ADHD behavior. Certain situations will likely trigger certain behavior.

In a study by Umbreit (1995), the view shifts to the school/classroom setting, and examines influences on an 8-year-old ADHD child. The study identifies disruptive behavior occurring during specific seating and grouping arrangements. Results point to an increase in disruptive behavior when the child was in groups, and the more social attention he received, the more distracted he was. It appears that the ADHD student was directly influenced by other students' proximity. As this study was performed in a controlled school classroom environment, the results seem obvious, however, in reality the situation may differ as other children may react differently towards the ADHD child, especially since they are not told to ignore or socialize with and respond to the ADHD child's disruptive behaviors. Results in a natural setting would probably be of more value, perhaps by direct observation, as the researcher would actually be able to determine whether or not the other school-age children actually positively reinforce the ADHD child's behavior, or simply ignore him when he is inappropriate. However, this approach of a natural classroom setting would raise the number of variables present, and potentially affect attempts at replication because of variability of classroom settings.

It may also have been useful to have developed a "distractibility index" to determine exactly how much and what is causing his behavior to be disruptive, and how many times this occurs in a given situation and in a given time slot. A more natural study in both classroom and play settings would possibly yield sounder results for potential intervention and possible treatment.

Macaulay, Reid and Johnson-Fedoruk (1991) in an earlier study have attempted to define, the ADHD population and understand the relationship between "learning theory" and the education of ADHD children. Findings show that an ill-adapted school system can result in a manifestation of ADHD into CD or ODD as the ADHD child struggles to meet demands and expectations. This can occur particularly on a social-emotional level, but also on an academic level (Barkley, 1996; Cantwell, 1996). In the classroom, they found that teachers not educated about ADHD can negatively affect these children especially if they see the ADHD children as "poor or unmotivated learners". It seems apparent that the environment, in which the ADHD child is placed will have a definite effect on his or her behavior. The results of this study call for a positive learning environment based on realistic expectations and praise.

In a study by Reid, Maag, Vasa and Wright (1994), they have examined ADHD in the school setting and attempted to isolate ADHD from LD. The purpose of this study was to build an awareness of which children are diagnosed with ADHD and, as a result of that knowledge, calls for a need for general education teachers to be aware of the disorder and to know how to deal with it. They used a "behavioral intervention scale" to separate ADHD from LD, and from normal non-diagnosed children. Interventions such as "time-out" breaks and shorter assignments were required more for ADHD students than normal non-diagnosed students. However, not enough criteria were established to distinguish strictly between ADHD and LD children. The study also touches on the fact that some children may have been misdiagnosed or not diagnosed at all. This evaluation of performance characteristics in the school setting fails to classify ADHD as a distinct group of special needs children and, as a result, may skew the appropriate interventions, as they would be more directed to

general learning disabilities. Once again, the comorbidity between ADHD and LD is seen as a confounding factor in the appropriate diagnosis.

Cotugno (1993) has attempted to differentiate and assess the extent of comorbidity in the diagnosis of ADHD. In this study, the extent of diagnostic confusion in referrals to community mental health centres is examined. Ninety-two previously diagnosed ADHD children were evaluated on the basis of cognitive, intellectual, personality, academic, social, behavioral, developmental and medical concerns. The results showed only 22 percent of the sample to be given a primary diagnosis of ADHD, while 37 percent were given a secondary diagnosis; leaving the remainder to be diagnosed with anxiety and mood disorders. In discussing the findings, praise is given for providing a comprehensive evaluation of ADHD in this setting. However, results may have been skewed due to the referral of previously diagnosed ADHD children who may have only been referred due to the severity of the symptoms. In addition, the lack of a control group reduces the ability to make comparisons with normal data, and without such data, accurate evaluation is difficult if not impossible.

Another potential drawback is the fact that this study was performed in a clinic-only environment. This may have skewed the results in that the children are prone to act differently in the field or natural setting. To assess for comorbidity, it would have potentially further validated this study if the sample was examined in both "clinical" and "natural" settings. The latter would likely have provided less "clinic-bias", as these children could react and interact as they normally would. Finally, in such an all-encompassing evaluation, the symptoms need to be classified to reduce any evidence of comorbidity that may have confounded the results. Each symptom reviewed here may serve to further

complicate the diagnosis, as these symptoms are components of ADHD, but also comorbid mood and anxiety disorders. As a result, there are no "specific" symptoms to each disorder, and it is unlikely that comorbidity can effectively be reduced (Barkley, 1990).

In Greene (1995), compatibility issues are dealt with, while the focus is on the initial conceptualization of ADHD prior to assessment, intervention, and treatment. The interactions of the ADHD child are examined in the school classroom, providing guidelines for assessment strategies. This study places emphasis on the actual environment and calls for assessments to be "systems-oriented", taking into account the lack of consistency in a child's environment. It calls for all situational influences on the child's behavior to be accounted for prior to accurate diagnosis. In addition, it calls for multimodal assessment involving direct observation of the child in varying contexts, and rating scales to be completed by several different sources. Descriptive diagnosis is another aspect called for, reflecting upon the importance of pinpointing situations, whereby the symptomatology is affected. Consequently, ADHD behavior that is problematic can be noted. Causes of problematic behavior could be, for example, waiting in line for the cafeteria, group discussions, or other "social" events. Finally, the study calls for assessment to be based on these situational elements of behavior. One shortcoming of this study is that it calls for assessment to occur after intervention has been initiated, in order to determine child/teacher responses and assess the intervention program. In theory, this may work. However, a diagnostic foundation based on descriptive approaches and situational elements of behavior could potentially lead to trying to deal with too many conflicting variables.

In dealing with the responses of ADHD children to varying situations, Milich (1994) examined the notion of failure in ADHD boys. This was based on a "learned helplessness"

paradigm whereby the persistence and performance attributions of ADHD and normal boys was examined in this situation. In addition, they compared the performance of medicated ADHD's as well as ADHD's given a placebo. The result showed ADHD boys exhibiting helpless characteristics. However, ADHD boys who made external attributions for failure were more adaptive in their responses. ADHD boys who made effort attributions for failure were less adaptive and more helpless. This study shows that ADHD children may in fact be better off externalizing the blame to other factors in order to operate more effectively. This may be an explanation of why ADHD children often tend to blame others for their mistakes — as an adaptive response to difficulty. To the untrained observer, this response would show lack of insight into the situation.

Impulsivity, lack of focus, and inability to sustain attention may affect insight, but does the individual have the basic understanding and ability to control his or her behavior? Insight and potential lack of insight and understanding in ADHD children appears to govern their responses when confronted with a difficult situation. It is apparent that more attention needs to be focussed on how ADHD children approach tasks, and how they react.

Discussion of Problem Solving Strategies

Zentall and Ferkis (1993) have previously dealt with the issue of problem-solving in ADHD, ADD and LD students. By using mathematical tasks, problem-solving strategies have been examined. The findings show that ADHD students require "novelty stimulation" and are less tolerant in repetitive tasks than are ADD and LD students. ADHD children also showed higher impulsivity levels and, as a result, made a greater number of errors than did LD students. In addition, the lack of rule governed behavior in ADHD students was a noted

impediment in their ability to follow the mathematical rules in the given tasks. All three groups were unable to eliminate extraneous information, handle multiple operations and process verbal information in the problems. In addition, slow computation appeared to increase the attentional load for all groups. The shortcomings of this study appear to show too much overlap between LD, ADD and ADHD groups with little emphasis on the impulsivity factor in ADHD students. ADHD children would make more mistakes than LD and ADD children, but complete the tasks more quickly. ADD and LD children should have been slower, but more accurate. This study fails to emphasize this major discriminating factor and appears to combine the three groups together on too many different tasks and, in effect, portrays more similarities than differences. All three groups also appeared to have reasoning skills deficits. However, they were not examined in such a way as to differentiate between the levels of severity between such symptoms.

In a later study by Zentall, Smith, Lee and Wieczorek (1994), mathematical outcomes of children with ADHD were examined. Academic performance and behavior of 121 normal and 107 ADHD boys aged between 7.4 and 14.5 years were assessed. Reading, computation and mathematical problem-solving tasks were examined on two performance measures: accuracy and speed; and three behavioral measures: vocalizations, head movements and bottom movements. The purpose of the study was to determine effects of ADHD on conceptual and computational mathematics. By holding reading and problem structure constant for greater precision, they were able to record actual speed of processing, number recognition and motor responses. The result was much lower problem-solving scores in specific mathematical concepts, and slower computational performance in ADHD boys. This demonstrates the educational implications of ADHD on mathematical skills, and

the need for specific interventions geared to the actual deficits. Impulsivity factors were examined in this study by using timed arithmetic trials, and recording accuracy. At the same time, distractions were also examined.

As in the earlier study by Zentall et al. (1993), the issue of "novelty stimulation" appears to be paramount in the ADHD child achieving success in academic performance. This study also improves on the earlier Zentall et al. (1993) study in that it focusses on and measures impulsivity as well as examining the behavioral issues such as distractions which impede academic performance. By examining specific behavioral symptomatology, the results appear to be of more use possibly in other subjects aside from mathematics. The study examines the way ADHD children approach and behave in certain task-oriented situations and is beneficial in breaking down specific learning deficits in one subject — mathematics.

While insufficient emphasis was placed on the normal children's results, this study does provide useful data on ADHD academic and behavioral symptomatology when confronted by a situation. As a result, it appears possible to replicate this study and use it as a criterion for other educational subjects in order to further examine ADHD behavior as related to academic performance.

In an earlier study, Zentall (1993) reviewed the major academic problems of ADHD students, noting that environmental stimuli serve to distract ADHD students in all major subject areas. In addition, by examining behavioral issues such as boredom and frustration due to repetition, he notes that ADHD children rapidly lost interest, causing a high rate of failure in the classrooms. ADHD students attend to novelty factors such as environmental

change, color, movement and size changes; and their inability to sustain attention to repetitive stimuli often results in academic difficulties.

Zentall (1993) also examined listening tasks and found that because they are unable to filter out extraneous knowledge to find an answer, ADHD students become disruptive. Language production problems also occur as ADHD students only speak when they want to (impulsively), but cannot respond when asked to. On mathematics tasks, the WRAT-R shows ADHD students falling behind the control group. However, it appears that ADHD children can absorb vocabulary as it is not associated with sustained attention. On the other hand, he notes that spelling and handwriting problems may occur as a result of visual-motor deficits.

The major result of this study is that it yields a better understanding of ADHD behavior as related to a particular situation — in this case, the school or educational environment. It also seems apparent that the notion of novelty plays a vital role in the performance of the ADHD child. This notion of novelty appears to be a core finding. ADHD children often succeed in achieving high scores and appear to sustain attention in video games. If this model, using novel stimuli can be applied in the classroom, similar to video games, academic success could potentially be achieved more easily. It appears that ADHD is a "novelty-seeking disorder" that impedes academic performance, due to the need for constant change.

While the results of this study seem to lean toward the idea of novel stimuli for educating ADHD children, this study fails to make a comparison of ADHD to normal children. In not doing this, the study may have been confounded by comorbidity of ADHD with other similar disorders as well. There is little emphasis on the actual diagnosis and on

how they achieved an ADHD sample for this study. In addition, there may also have been varying levels of severity of ADHD which may have skewed the results. A future study may be of more benefit if specific diagnostic criteria for ADHD are examined and matched to their direct effects on actual real-life performance in a variety of settings. Once this is achieved, the educational implications of ADHD would become apparent and this study would then aid in a more complete diagnosis of ADHD.

In continuing with the academic issues of comorbidity of ADHD with other disorders, Gillis (1994) has argued that when children have reading difficulties, the teacher should emphasize the reading problem and correct it prior to searching for other comorbid disorders. This is rooted in his research on ADD and LD children, and he questions the labelling of the disorders. His study is based upon previous research, but current emphasis is on "reading problems" and how they apply to the broad category "ADD".

His examination of "ADD" and "reading problems", however, becomes confounded, as "LD" and "ADHD" classifications are also separately mentioned, but his emphasis on "reading problems" takes primary importance. He does not fully address possible comorbidity between "reading" and "attention". He calls for a need to look for other disorders, but only if reading adjustments fail. In addition, he criticizes ADHD as being too general as well as the issue of how appropriate the reading instruction is, and the fact that diagnosticians often fail to question this factor. The child's behavior may merely be a result of situational frustration due to the type of instruction. He claims that deficiencies in task-appropriateness, materials and school and situational environments are the cause for reading failure.

While these environmental factors appear to contribute to such disabilities, Gillis appears to be correct on the issue of situational variation as affecting the performance of these children, but he has apparently overlooked a critical factor — attention. How does one correct reading problems without examining attentional problems? In addition, he appears to have overlooked the fact that ADD and ADHD are separate disorders, while criticizing ADHD as being "too general." In doing this, he fails to identify and examine the hyperactivity component which should have been the obvious differentiating factor between ADHD and LD. Hyperactivity appears to be an externalizing, noted symptom of ADHD, while LD or reading-disabled symptomatology is less observed. However, it does seem apparent that reading problems are likely to either be a causal factor or a symptom of ADHD, and this is not adequately addressed.

Stewart (1994) has attempted to examine evidence for differentiating ADHD from ADD. He concludes that there is little evidence for separating the two disorders. Nevertheless, from a behavioral standpoint, parents, teachers and peers view ADHD's as more hyperactive or aggressive and having more external behavioral symptoms. ADD children appear more sluggish and daydreamy, and tend to be more socially withdrawn and shy, having more internal behavioral symptoms.

This study is based on an examination of ADD and ADHD symptomatology from both psychophysiological and behavioral standpoints. Parents', teachers', and peers' perceptions were noted with regard to behavioral characteristics. In addition, family history/upbringing was noted as a distinguishing factor between ADD and ADHD children. The psychophysiological component was emphasized, leaving behavioral issues as a secondary, less emphasized component.

In this study, the hyperactivity factor is portrayed as the only distinguishing factor between ADHD and ADD, and little emphasis is placed upon it, leading to a conclusion that psychological test performance fails to "show" differences between the two disorders. This may well be a major clinical contribution as purity of the construct is further determined. Aside from hyperactivity, there are other distinguishing components such as impulsivity in ADHD's, and its opposite symptom, obsessional behavior, found in ADD's. In addition, ADHD's tend to be less socially withdrawn than ADD's, while there may potentially be other differentiating symptoms that this study fails to emphasize.

By using psychological test profiles, the failure to show differences between the two groups is obvious as the most visible differences are the ones that are observed behaviorally — not tested on performance scales. In addition, by attempting to separate the disorders from a psychophysiological standpoint — little evidence is established as ADHD's appear to be more responsive to stimulant medication. This is observed, but not adequately measured. ADHD behavior is more observable than ADD behavior, but these results remain inconclusive due to overemphasis on psychophysiological differences. In its failure to adequately incorporate behavioral profiles, the study fails to show marked differences between ADD and ADHD groups. In addition, the poor reliability/validity of the medication studies further confounds the result. Had the behavioral component been more effectively integrated and emphasized, concrete differentiation would have further validated this study. Behavioral differences, not psychophysiological differences should be most obvious to detect.

Behavioral Symptomatology

This issue of behavioral symptomatology has been further examined by Stanford and Hynd (1994) who question whether LD children share behavioral symptoms with ADD and ADHD children. This study used parent/teacher behavioral ratings for the three groups previously diagnosed with ADD/H, ADD/WO (without hyperactivity) and LD. Behavioral ratings were based on symptoms of impulsivity, inattention and social withdrawal. Seventy-seven outpatients in a diagnostic and referral service clinic were divided into three groups. Group one (n=35) was the ADHD diagnosed group, group two (n=25) was diagnosed as ADD (without hyperactivity) and group three (n=17) diagnosed as LD.

The result of the research indicates that both teachers and parents saw the ADHD group as the most disruptive. Both ADD and LD groups were seen as less active, shy and more daydreamy than the ADHD children. ADD and LD students were also rated most similar in areas of greater social withdrawal and less impulsivity, while they differed on the inattention scale — ADD appearing less attentive than LD. ADD children's performance IQ appeared to be the lowest. The greater differences based on all scales did appear to be between ADD and ADHD children, while more similarities were depicted between ADD and LD groups.

The shortcomings of the study, however, indicate that the results are based on clinic-only criteria, and a natural field observation was not integrated into this program to reduce the clinic-bias factor. In addition, the smaller number of LD-diagnosed children may not have been representative of differences in behavioral symptoms by age.

On a more constructive note, this study provides a foundation on which to build more evidence in order to differentiate these disorders and, in effect, aid these children in succeeding both academically and socially.

Dykman and Ackerman (1993) parallel this study to some extent in their review of ADD subtypes. With the emphasis on ADHD, they also reviewed three behavioral subtypes of ADD: ADD/WO, ADDH and, in lieu of the LD group used in the Stanford and Hynd (1994) study, they established a more severe subtype of ADHD, namely "ADDHA" — hyperactive/aggressive type. These "ADDHA" children appear to be more at risk for ODD or CD, while the ADD/WO group tends to show more anxiety and depression.

Teacher and parent ratings appear more sensitive than laboratory ratings in their differentiation of the three subtypes. Classroom teacher ratings were initially used to identify the three groups of children. In comparison to normal groups, all behavioral attention-disorder subtypes had slower reaction times, however, ADDHA appeared to be most reactive to stimuli. In addition, school and clinic samples showed ADDH children to be more impulsive and aggressive/defiant than ADD/WO children. ADD/WO tended to internalize their symptoms, while ADDH externalize their behavioral symptoms, and the latter are thus more easily observed. Both groups, however, did experience more academic difficulties than control groups. ADDH children were less accurate, but quicker on tasks than ADD/WO, showing the heightened impulsivity factor in ADDH children.

In the ADDHA category of Dykman and Ackerman (1993), it is questioned as to whether it stands alone as a separate subtype of ADD, or whether it is more related to CD or ODD? As ADHD children display aggressive tendencies given a certain situation, this "sub-category" may be eliminated. If, however, these aggressive tendencies become violent,

it may be necessary to classify the child as ODD or CD, or perhaps ODD leading to CD, the resulting violence due, perhaps, to years of frustration.

The aggressivity component for the most part, however, appears to fit the ADHD diagnosis, but within cutoff limits, so as not to be confused with ODD or CD. This study sets the stage in calling for more accurate classification of ADD subtypes by reducing the confounds in the measurement techniques.

In a study by Saklofske and Schwean (1993), they attempted to identify standardized measures that were reliably diagnostic of ADHD, and that could be used in the schools. In addition, they examined whether or not methylphenidate (Ritalin) would alter ADHD children's performance on test profiles.

This multidisciplinary approach was designed to examine cognitive, social, behavioral and academic correlates of ADHD. Fifty-three children with ADHD, aged between 8.4 and 11.9 years were referred for disruptive behavior, overactivity, short attention span and impulsivity. In testing for comorbidity, teachers completed a "Child Behavior Checklist" for 45 diagnosed ADHD's and examined aggression, anxiety, depression and social problems. The WISC-III was used to examine cognitive abilities of ADHD children. Cognitive processes examined included self-regulation, planning, attention and information processing skills. There was no comparison, however, between ADHD-diagnosed and non-ADHD children. In addition, there appeared to be some overlap in academic achievement results for ADHD and LD children, and attempts to find the difference by using both achievement and behavior tests were deemed invalid due to lack of subjects and appropriate data.

This study attempts to standardize diagnostic measures for ADHD children. However, it becomes too complex in that it attempts to evaluate and assess ADHD

symptoms by using methylphenidate to determine the composition of ADHD. Methylphenidate may have been more useful in treatment at a later stage, but not as it is used in the assessment process. In order to treat, it appears necessary to have a concrete diagnosis of the disorder — not an experimental diagnosis based on methylphenidate outcomes. They also failed to compare ADHD with non-ADHD children in their attempt to find the correlates. There still remains no standardized measurement process to diagnose ADHD.

Intellectual Functioning ✓

In a follow up study by Saklofske, Schwean, Yackulic and Quinn (1994), they examined the relationship between WISC-III and the Stanford-Binet Intelligence Scale (4th ed.) in a sample of children diagnosed with ADHD. These tests were used to determine the performance of ADHD children. The general consensus shows moderate to high correlations between test scores. However, there may be some variability. Intelligence tests are generally seen as less useful in diagnosing ADHD children, as levels of intelligence appear to have nothing to do with ADHD. Intelligence levels tend to vary. In addition, medicated ADHD's may perform differently on these tests, further confounding the results.

It does, however, appear apparent that these two tests are useful in the assessment of intellectual functioning and intelligence of ADHD children, as in all other groups of children, but may become invalid if used purely as a diagnostic measure for ADHD. They can be used only to detect intelligence differences between ADHD and all other groups of children, and perhaps differentiate ADHD, LD, ADD, normal and other groups from mentally impaired children. As a result, this study calls for a multidisciplinary approach as

ADHD is not an intelligence problem, but one of performance, distractibility and the associated behavior that results.

Reid and Maag (1994) have presented a critical analysis of the use of behavior rating scales used in the diagnosis of ADHD. They, too, call for a multimethod approach to the diagnosis of ADHD, gathering information from all settings. The use of "cutoff scores" is addressed in the example of number of "fidgets" that occur in ADHD children. In addition, they examine interobserver agreement and the correlational reliability issue.

The study calls for raters to have a common understanding of the attributes and representative behavior of each attribute, and calls for the use of rating scales to be in conjunction with other forms of assessment; not used alone. They conclude that there is no correct standard for diagnosing ADHD, as neither rating scale, nor clinical judgement can claim an accurate diagnosis for ADHD. They call for rating scales to be used only in a multimethod assessment battery.

By examining the number of "fidgets" for an ADHD child, it is necessary to look at the situation and resulting levels of arousal. To measure such activity and give it a "cutoff score", normal children would have to be compared with ADHD children, and the number of fidgets compared in a given time and situation. In this study, little attention is given to situational arousal levels using stimuli for both normal and ADHD children while no emphasis is placed on attention shifts/loss of concentration factors. It is necessary to know why and how many times ADHD children lose concentration. It is apparent that situational factors are paramount in diagnosing ADHD.

McBurnett, Lahey and Pfiffner (1993) have reviewed the DSM-IV preliminary diagnosis and the newly upgraded ADHD category. They examined the relevance, functions and limitations of the DSM-IV diagnosis for educational assessment of ADHD.

By performing field trials to examine symptom "cutoffs" — the number of symptoms required for making a diagnosis, they used 336 boys and 104 girls aged between 4 and 17 years, based on varying ethnic composition. Symptom information for these children was gathered by parents, teachers and other children using the DISC-II (Diagnostic Interview for Children) and C-GAS (Child Global Assessment Scale) to determine functioning. Academic performance was rated over a four week period. Needs for assistance and levels of carelessness/impulsivity were also noted.

Clinicians made their diagnoses based on all available data and associated hyperactivity and impulsivity with global impairment. They also hypothesized that as the number of symptoms increases, the level of functioning decreases. These students generally met ADHD criteria. However, a non-specified "ADHD" group was added. This may have been the previous "UADD" (Undifferentiated Attention Deficit Disorder) subtype from the earlier DSM-III-R (American Psychiatric Association, 1987). This subtype has subsequently been eliminated in the DSM-IV (American Psychiatric Association, 1994) due to lack of diagnostic criteria.

The limitations of this study appear to be in the analysis of the child's current functioning, with more detailed analysis required, and additional assessment of specific impairment also needed to set the stage for intervention strategies. In addition, cutoff scores set may be too vague, and each score should have a number that is universally diagnosed and accepted. Finally, variation in ratings due to varying clinicians eliminates a set standard

and may have resulted in inaccuracy. Set, established cutoff scores are needed for each and every behavioral symptom in order to diagnose and assess the disorder.

The assessment of ADHD with the use of behavioral rating scales has been further researched by Reid (1995), as he examined the extent to which behavioral rating scales accurately assess ADHD in culturally different groups.

Issues of cross-cultural assessment were the notion of "equivalence" by interrater reliability — a common understanding of cross-cultural behavior. In addition, equivalent literal wording on tests, for example, "fidgets", must mean "fidgets" in all languages. Finally, all visual and conceptual misunderstandings have to be clarified.

The conclusion of the study calls for multimethod assessment as one single assessment instrument used would diminish the validity. In addition, it is also concluded that there is still no "magic number" which one can use to diagnose ADHD. In this study, rating scale inconsistencies are tested for differences due to behavioral or cross-cultural biases. Other causal factors such as socioeconomic status, poverty and psychosocial stressors such as war also had to be taken into account.

The implications of this important study appear to be on the issue of equivalence. The use of internal raters from each country represented may allow for a greater level of familiarity with local cultural norms. After this is achieved, a global panel would have to be set up to review cross-cultural results and evaluate them. Since there is currently no actual defined diagnosis for ADHD (Cantwell, 1996), in order to develop cross-cultural equivalence norms, a concrete assessment battery would have to be established and converted into usable, local assessment batteries that can be used for other cultures. To date, the diagnostic focus has been too narrow and limited (Cantwell, 1996).

Psychometric Measures

McKinney, Montague, and Hocutt (1993) have not only looked at educational assessment of ADD, but also focussed on ADHD and LD. Their focus on comprehensive assessment for educational purposes involves parent and teacher rating scales, observations and interviews. They describe DSM-III-R based checklists and multifactor rating scales to reflect on aggression, passivity, immaturity, inattention, impulsivity and hyperactivity. The Conners' Teacher Rating Scale is used to assess hyperactivity, conduct, emotion, anxiety, social and attention factors, while situational variation is taken into account by the Home and School Situations Questionnaires. An observational analysis is used to assess varying responses at different times of the school day. Structured interviews administered for parents and children are designed to determine socioeconomic status and develop a history for each child.

This study describes the instruments and methods used in the assessment process. However it only focusses on ADD, when the symptomatology described and examined is more representative of ADHD. They fail to separate ADD from ADHD, and it appears that in this analysis, there is no diagnostic definitive method mentioned that distinguishes ADD from other disorders. They may be able to assess ADD, but not distinguish it.

A comorbidity rating scale would have to be the next step but no accurate assessment protocol has been established to date. Assessment comparisons between ADD, ADHD and other comorbid disorders would be necessary in order to fully diagnose ADHD and its specific symptomatology.

Maag and Reid (1994) have developed a functional approach to assessment and treatment for ADHD. They examine different assessment approaches for ADHD and note

that ADHD conceptualizations vary across cultural, familial, socioeconomic and situational factors.

Their functional approach identifies factors contributing to observed performance problems. Those factors were split into two categories: a) Individual-specific deficits or excesses and b) Ecological variables. They argue that one paradigm to explain ADHD has hampered efforts to develop a functional approach to assessment and treatment. Their functional approach breaks down ADHD into constructs in order to better understand the processes. They argue that emotional arousal responses are influenced by environmental factors to create problem-solving, behavioral-skill, self-control and cognitive deficits. This model is designed to conceptualize ADHD, showing its actual inner-working mechanisms. It also shows that ADHD children appear to have reasoning, evaluation and self-monitoring deficits.

This approach appears to work in theory, but, realistically it would have to be tested with each factor being examined before it can be accepted into the complex structure of ADHD. If this model is effective in explaining ADHD, treatment would be facilitated as it would be able to examine each factor and manipulate it until all factors are dealt with in a process of complete and thorough intervention. By pinpointing the problem areas specifically, a more accurate evaluation and diagnostic strategy could be implemented.

In a prevalence study, Garnett (1993) used several rating scales to identify ADHD children in a midwestern Canadian school division. The Conners' Teacher Rating Scale — 28 was used to compare the results of this study with previous studies; while an ADHD rating scale was used to reflect an accurate diagnostic evaluation. "Self-fulfilling prophecy" correlates to ADHD such as academic, social and behavioral difficulties were also

examined. This may potentially highlight internalizing and externalizing behavior. Teachers' feelings, often negative, may have caused ADHD children to perform worse. This aspect of perception by others was examined to determine if it would affect ADHD children. Negative feelings may have created a "self-fulfilling prophecy" for ADHD children and, in effect, potentially diminished ADHD social, academic and behavioral functioning, but there is concrete evidence for defining perceptual effects on a child's functioning.

The results of this study indicate that males were identified as ADHD approximately four times as much as females, due to the fact that females tend to externalize their ADHD symptoms less than males. Approximately 9.65 percent of the children in total were identified as ADHD by the Conners scale, while 7.46 percent were identified by the ADHD rating scale, while both scales combined, achieved an identifiable rate of 6.36 percent — an apparent higher degree of accuracy. Fifty-five percent of identified ADHD students scored poorly on the Academic Performance Rating Scale while 62 percent scored in the normal range of the School Situations Questionnaire — Revised Edition.

This study appears to have been beneficial in identifying ADHD children as a general group. However, issues of comorbidity are still not clearly addressed. Anxiety and mood disorders, as well as aggressive or CD/ODD children may have fallen into their diagnosis, as the rating scales made use of external and internal behavioral symptoms in their diagnosis. As ADHD boys externalize their symptoms such as aggressive, conduct, defiance, hyperactivity and impulsivity symptoms, the girls tend to internalize their symptoms as mood or anxiety disorders. As a result, one may ask the question as to whether or not these are symptoms representative of ADHD. There may have been too much overlap between the various symptoms. Finally, the causes of ADHD also should have been examined, not

only the apparent, resulting symptomatology. As this study was designed to set the stage for intervention, the causal factors, as well as resulting, effectual symptoms would be required to provide a complete all-encompassing scope of what constitutes ADHD.

Sabatino and Vance (1994) have asked the question as to whether the diagnosis of ADHD is actually meaningful. In doing this, they examined 75 children who were previously diagnosed with ADHD. However, unsatisfactory educational and medical interventions were completed, so a re-analysis was performed to look for comorbidity.

DSM-IV Criteria

The data appears to support the DSM-IV's (American Psychiatric Association, 1994) changes to the previous DSM-III-R (American Psychiatric Association, 1987) diagnosis, but, further attention appears to be needed to isolate the comorbidity between ADHD and other disorders. They call for extending the list of behavioral descriptors used in order to more accurately diagnose ADHD.

Their findings suggest that ADHD is over-diagnosed, and the results indicate that while the "easily distracted" and "trouble paying attention" symptoms appear to be associated with ADHD, the "trouble listening" and "not following through" factors appear to be school related, and more likely to be associated with LD. The study attempts to separate DSM-III-R symptoms of ADHD and test them on parent/teacher rating scales in order to differentiate ADHD symptomatology from LD, CD, ODD and other comorbid disorders which "contaminate" the diagnosis of ADHD.

In concluding the study, they call for more accurate diagnosis of ADHD by use of behavioral symptoms as related to specific tasks, and their effects on the ADHD child versus

the normal child. They call for and praise the additional classification and behavioral descriptors found in the DSM-IV, but, the problem of comorbidity continues to arise and still needs to be dealt with. Perhaps it would be effective to diagnose and re-diagnose children several times in order to know if they are in fact ADHD. To avoid doing this over and over again, a more efficient method using more stringent "cutoff scores" needs to be established in order to get the diagnosis right the first time. By using stringent, universally established cutoff scores for each symptom, the issue of comorbidity would be lessened or eliminated.

In a critique of ADHD as a separate disability category, Reid, Maag and Vasa (1994) criticize the DSM-III-R as it fails to show environmental/situational interactions of ADHD children, and how they adapt to their environment. They claim that diagnosis is only an assumption and that ADHD behavior may be an environmental construct. In addition, they ask the question as to whether ADHD children can adapt to their environments, and how they react to differing environmental situations.

In their claim that diagnosis to date is too narrow, there appears to be a failure to come to a large-scale solution. The study makes suggestions and criticizes the diagnostic process, however, fails to clearly specify a solution. They debate DSM-III-R and DSM-IV criteria and behavioral rating scales as being too narrow and not being accurate enough to create ADHD as its own disability, but, they fail to devise a new diagnostic system that takes into account situational, societal, cultural and global factors. They do however, call for a movement of ADHD diagnosis onto a global or "macro" perspective in order to directly pinpoint the problem issues at stake. In doing this, the resulting diagnosis may become useful in more effective treatment of all aspects of ADHD and could be used in a broad range of situations to identify the ADHD child.

In identifying the ADHD child, this chapter was designed to direct and follow a continuity from chapter one, providing a more in-depth review of the most recent literature while at the same time, attempting to distinguish ADHD symptoms and separate them from other similar disorders. In order to delineate ADHD on its own, and discriminate it from other disorders, a critical analysis of the literature has examined comorbidity issues in depth, while attempting to systematize the diagnostic conflicts of clarifying the problems in the previous diagnosis of ADHD. This overview of the literature has examined the faults and benefits of each study in order to attempt to establish a more concrete, less uncertain diagnosis of ADHD.

CHAPTER 3

EDUCATIONAL, FAMILIAL AND BEHAVIORAL ISSUES IN ADHD

Previously, in chapter two, issues of comorbidity and symptomatology relating to ADHD diagnosis were examined. This attempted to establish an in-depth overview of ADHD as a disorder standing alone. In identifying the ADHD child, much focus has been on situational variation, and the ADHD child's interactions in a particular environment.

Once the essential diagnostic framework is established, and ADHD is identified, a greater awareness of the disorder can be promoted. In creating an awareness, it is important to note where and when ADHD behavior manifests itself. The ADHD child may behave differently in certain situations, and an awareness of the symptoms and causality is paramount in determining eventual management and intervention strategies.

The manner in which a child interacts with his or her environment may set the stage for future coping and functional behavior strategies. These issues are at the helm of both family and school situations as they play a crucial part in any child's life.

On educating the family and building an awareness of ADHD, this chapter serves to examine the family as a functional unit. By examining the day-to-day functions of the family, the behavior of the ADHD child would be the focal point. This examination would allow the researcher to focus on the problems or dysfunctions in the family unit. The ADHD child may fragment positive family interaction. The extent to which the ADHD child disrupts day-to-day family functions and interacts with siblings and parents needs to be

examined. Negative interactions may promote dysfunction as family communication breaks down creating significant disruption.

In further examining the situational variation and its effects on ADHD behavior, the issue of teacher awareness becomes apparent. As in the home, the behavior of the ADHD child may disrupt school activities and diminish the functional abilities of both teachers and peers. The effects of this may also have a direct negative effect on the ADHD child especially if the parents, teachers and other children are unable to cope with and understand the ADHD child's disruptive behavior.

A direct result of this inability to cope may manifest itself into an ongoing cycle of negative reinforcement. Disruptive behaviors are continuously reinforced while parents, teachers and peers become angry, only further exacerbating the cycle of dysfunction. These reciprocal effects can create a potential, ongoing perception of ongoing negativity.

In order to reverse cyclical dysfunctionality, building an awareness of the disruptive behavior is important. This can only be accomplished by pinpointing the problems in both familial and educational settings. Once accomplished, the continuous reinforcement cycle would potentially be modified.

Recent studies such as Hechtman (1996), Cantwell (1996), and Johnston (1996) have taken the stance that as familial and parent-child interactions are problematic, improvements and changes can occur by diagnosing both familial issues and treating families and the index patient, the child. The focus is consequently on parent-child interactions.

While Johnston (1996) looks at issues of characteristics and interactions in an attempt to improve the family or school situation, Hechtman (1996) uses a genetic theoretical basis as a reason for trying to build better long term relationships. Hechtman also notes the issue

of improvement with adulthood. However, Wender (1994) and Hallowell and Ratey (1994) actually question whether symptomatology really changes.

Cantwell (1996) argues that procrastination, poor concentration and explosive outbursts still typify the disorder in adulthood, thus confirming the findings of Wender (1994). This raises the question as to whether Hechtman's 1996 findings possibly reflect a greater adaptability and familial tolerance with aging.

In exploring the familial setting it appears that families with ADHD children bear the brunt of the condition and its symptoms. This occurs often without familial awareness. They learn to function or perhaps dysfunction in a global familial context, and each member of the system is impacted in some way (Hallowell & Ratey, 1994; Hechtman, 1996; Johnston, 1996; Mash & Johnston, 1990).

There is some evidence that ADHD families can be regarded as an entity as there appears to be a mechanism that interrelates family characteristics as a whole. These characteristics of families with ADHD children show that parents and siblings are likely to be affected in terms of functional behavior.

There has been considerable research into family issues. Barkley (1990) among others, has written extensively in this area. His contributions are important because of attempts to quantify family pathology. In the process, he raises questionable statements as apparent fact. However while Barkley can be criticized for apparent simplicity of complex issues, a series of supportive findings have been postulated in respect of family psychological issues, where the dysfunctional familial unit is examined to attempt to reach greater effectiveness through intervention (Braswell, Bloomquist, & Pederson, 1991; Hechtman, 1993, 1996; Johnston, 1996; Mash & Johnston, 1990; Pelham, 1994; Swanson, 1992).

Barkley (1996) specifies that fathers of ADHD children are at least 25 percent likely to exhibit ADHD symptoms, while mothers are at least 17 percent likely. Depression and dysthymia are noted to be at least 22 percent likely to occur in parents of ADHD children, while a general level of anxiety appears to be 16 percent likely. He also notes that a decreased sense of competence seems to be a result of this symptomatology. However, in mixed ADHD/CD children, mothers and fathers appear to present with more severe symptomatology.

Johnston (1996) and Cantwell (1996) describe family disruption and coping issues to be significant in parents of ADHD/CD children. That these symptoms contribute to marital discord in ADHD families is evident, and it is through these disruptive effects that familial interactional and psychological approaches have been attempted (Barkley, 1990; Cantwell, 1972; Hechtman, 1996; Johnston, 1996; Morrison & Stewart, 1971).

In siblings of ADHD children, the apparent likelihood of them being diagnosed with ADHD is greater than 35 percent, while conduct problems appear to be 25 percent likely, as are learning disabilities (Barkley, 1996).

Consequently, an argument can be made that one of the major effects of ADHD is on the individual and on the family (Hallowell & Ratey, 1994; Hechtman, 1996; Johnston, 1996).

A family oriented view of ADHD essentially serves to look at communication and interactions that are maintained by the symptoms of the ADHD system. A sound argument can be deduced from the literature to describe an ADHD family system (Bell & Harper, 1977; Dumas, 1986; Patterson, 1982; Wahler, 1976).

It appears that the presence of ADHD elicits a potential vulnerability to a multiplicity of family and developmental pressures which produces cyclical coping behavior. Different family members will find different means of coping. One parent may withdraw and appear to give up all hope. Another may be the constant controller, and sibling rivalry may erupt into regular battles, and attempts to promote harmony may be unsuccessful.

This raises questions of bonds between family members. There may be close, symbiotic relationships with one parent, accompanied by distant relationships with another parent. Barkley (1990), in replicating an earlier study by Bowen (1961), reports distinct marital disturbances in these families as one parent is perceived as siding with the child or refuses to acknowledge the problems.

In the context of disruption, Haley (1974) would describe the behavior in terms of disruptive power and communication control. Haley was an early promoter of the family intervention method. "The family therapist who is offered an adolescent as a case does not see the child as the problem, but rather the whole family situation" (p. 44).

It appears that the ADHD child may respond differently to his or her father than towards the mother. In addition, the issue of which parent is at home more often with the child would also be a major contributing factor. These perceptual biases on the part of the parents can only further degrade the functioning abilities of the family. If this results in marital discord, the likely result would be a fragmentation of unity, and it would only reinforce the level of family dysfunction.

There may well be a useful argument in viewing ADHD familial effects from the perspective of consistency. Families seldom appear to see the predictability component and that similar patterns are played out. The ADHD family appears to show continuing patterns

of inconsistency in values and limits, different patterns of negotiation, and differential reactions to situations and challenges (Cunningham, Benness, & Siegel, 1988; Barkley, 1996). A parent may, for example, overreact to inappropriate behavior at one time and ignore identical behavior at another time. One parent may respond punitively to a particular behavior, while the other parent subtly encourages it. This further enmeshes the ADHD child into a conflict between the parents.

Another example of family dynamics noted is the tendency for parents to react to a particularly bad behavioral situation with blandness and fear; doing anything to exacerbate the problem. This type of tendency removes in the family system, all traces of the very organizational structure needed in dealing with ADHD (Barkley, 1990).

The direct result of this familial dysfunction is an increasing negative outlook on coping ability. This inability to cope may lead to depression or dysthymia in mothers. Such an inability to cope may further reinforce the cycle of dysfunction and the child may become the controlling figure and prey on the now susceptible, hopeless and helpless parent (Hallowell & Ratey, 1994; Hechtman, 1996; Johnston, 1996; Mash & Johnston, 1982, 1983).

In contrast, the father may react in a more violent, angry manner toward the disruptive child. This only would serve to further exacerbate the inconsistency in parenting strategies, only leading to greater dysfunction. In addition, the ADHD child may be prone to adopting the father's anger and temper symptoms only worsening the situation for the mother and reinforcing the depression (Barkley, 1990; Lahey et al., 1988; Tallmadge & Barkley, 1983).

The focus on the family appears, from both evaluative and treatment components, to be somewhat limited. While inconsistency, values, alliances, and effects of interactions have been well documented, there appears to be a lack of treatment success in dealing with ADHD from a family perspective. The general consensus appears to favor the use of methylphenidate (Ritalin) as the symptom controller of choice. Barkley (1990), Hechtman (1996) and Cantwell (1996) in particular have made statements in favor of pharmacotherapy as the most valuable of treatments.

The psychological literature in the field of psychotherapy, however, produces numerous contra indications to this view. Haley (1963, 1974), for example, argues that the active, direct therapist who takes charge of situations is most likely to promote change. Bergin and Strupp (1972) point out that effective psychotherapists promote change; and Cancro, Fox and Shapiro (1974) have argued for strategic intervention, for example, in schizophrenia. While these strategic interventions are for significantly different disorders, the directive approach is likely to foster change.

In the ADHD family, there appears to be a similar system to the earlier approach taken by Haley (1963, 1974). By actively focussing on systematized behavior change through a shift in the way a family operates, the same author argues that in family intervention, there is a need to clarify and systematize the steps to be taken if behavior is repeated. This is the opposite of weak negotiation, but creates specific goals:

1. The problem can be evaluated and managed.
2. It increases parental awareness, but decreases parental fears and the fear of other family members, because there is a clear, formulated plan of action to be implemented.

3. Parents will be able to confront the acting out child, and not be afraid to do so.
4. Parents become specific, consistent, and are able to set limits leading to a clarification of demands and establishing clear boundaries.

This model for intervention and management (Haley, 1963; 1974) can be applied to general parenting strategies in the dysfunctional and, in particular, the ADHD family.

On the other hand, non-ADHD parents who cannot control and manage their ADHD children may take a more punishing approach in a futile attempt to "discipline" their children. This type of interaction appears to be the most detrimental as it will serve only to reinforce the levels of aggression in the ADHD children, possibly resulting in oppositional or conduct problems.

For these very reasons, it appears that the family is to be the focus for intervention strategies. The family structure appears to shape the child's behavior (Hechtman, 1996; Johnston, 1996). As a result, the focus on the family is vital to the management and success of the ADHD child.

Barkley's (1996) positive view of methylphenidate as the symptom controller of choice appears strongly rooted in the belief that the ADHD child is the cause for the family's problems. This appears to contradict Barkley and his colleagues' (1990) previous work noting that the family structure shapes and moulds the functional abilities of the ADHD child. In turn, the ADHD child greatly influences the family. The ADHD child exhibits significant effects in the family because of direct behavioral impacts, thus determining a dysfunctional family system.

By administering medication to the ADHD child, his or her behavior and/or performance may improve, but the surrounding family which shapes the child's behavior may block or serve to worsen the ADHD child's day-to-day interactions. As a result, it seems important that parents and children need to be aware of the problems affecting them so that they can work together in dissecting the problems, evaluating them and managing them. This all needs to be performed within the family unit with the aid of a clinician.

Once the parents are able to notice the symptoms, and the child has been diagnosed with ADHD, a level of awareness and functionality can be established. Parents, once aware of the symptoms of ADHD, and their own family dysfunction, will be prepared for the demands and constant need for rewards of the ADHD child. By addressing the symptomatology of ADHD, parents will be able to build their awareness of the diagnosis and be able to effectively manage each symptom in a step-by-step fashion. Once this level of knowledge is established and symptoms are known, a reversal of disruptive symptoms can be inaugurated. The result would change, and should diminish, the positive reinforcement cycle of negative behaviors, and create a family that is aware of their problems, and is able to cope in a more functional manner. This could be argued to be a supportive process (Johnston, 1996).

In contrast to Barkley (1996) and his view in favor of medication, the notion of family management and awareness has been further examined by Mash and Terdal (1988) in a behavioral-systems approach. It appears that the family, as a whole, needs to be managed, not just the ADHD or disruptive children. All aspects of the family need to be examined as the ADHD family is generally dysfunctional in its coping strategies. By medicating the ADHD children only, it may help to reduce conflicts (Cunningham & Barkley, 1978).

However, as is often the case, the parents of the ADHD children exhibit dysfunctional coping mechanisms, and may, as a result, continue to mismanage their children. Dysfunctional parenting strategies will affect any children whether they are ADHD, medicated ADHD, or normal, non-disruptive children. Parents need to be made aware of ADHD manifestations, and need to acknowledge and be able to manage their reactions to these manifestations. It appears that the parents and their functional abilities are the shaping factors that govern and imprint upon the child's day-to-day interactions.

The effects of marital and family history on the ADHD child have been examined by a number of researchers. These effects also appear to be reciprocal in nature, as the long-term consequences of marital and family dysfunction can affect both parents and children. Once the ADHD child is affected, his or her problem behaviors may worsen. This in turn will only serve to exacerbate parental/marital dysfunction which is already rooted in a turbulent history of discord. The result only reinforces the negative behavior of the ADHD child, who is highly susceptible to the effects of the surrounding environment, and the behaviors become more problematic.

Brown and Pacini (1989) in a comparison of perceptions of parents of ADHD children found a higher divorce rate than in their control group of normal children's parents. In addition, they found that the level of functioning was poor by comparison with the control group. Greater stress levels and lack of support were found to be characteristic of these ADHD families. These parental perceptions of dysfunction and the history of marital discord appear to be causal factors in this cycle with one problem leading to another. The lack of emotional support, and family bonding as a result, only serves to promote the decay and fragmentation of the family unit.

Depression and anxiety may affect parents and children as a result of family dysfunction. Resulting cohesive and emotional decay will likely serve to promote the level of dysfunction and, in turn, reinforce childhood psychopathology (Hechtman, 1996; Johnston, 1996; Mash & Johnston, 1990).

To further examine this apparent "trickle-down-effect" of depression from parents to children, Jensen, Shervette, Xenakis and Richters (1993) examined lifestyles and child and family functioning. By using 47 children diagnosed with ADHD, they assessed family functioning and psychosocial and familial risk factors. They found a significantly high degree of depression and anxiety in these ADHD children. In addition, they noted a high degree of externalizing behavioral symptoms in these children. They also found a large degree of comorbidity between ADHD and other mood disorders. ADHD children comorbid with anxiety or depression appeared to be at the greatest risk for stress and appeared to be most affected by parental dysfunction.

This finding suggests that an increase in parental dysfunction, whether related to marital discord or not, may in effect, actually add other comorbid disorders to the original ADHD diagnosis. The result only further disables any functional framework that is left for the child and family. In the event of marital discord, the comorbid disorders may be mood disorders.

On the other hand, externalizing behaviors may arise from more aggressive parenting strategies. Lewis (1992) has examined family functioning levels in parents of children with ADD, ADHD and ADHD plus more aggressive symptoms.

Parents of ADD-only boys noted a higher level of family functioning than those of ADHD and ADHD plus aggression. The latter reported more severe levels of family dysfunction.

It seems possible that ADHD that is comorbid with aggressive, violent behavior will actually develop into an oppositional or conduct disorder. As family dysfunction increases, it is likely that these primarily aggressive ADHD symptoms will manifest into more severe disruptive behaviors.

The evidence for conduct problems being detrimental to well-being is substantiated in research by Lewis (1993) in an examination of family functioning correlates to the ADHD child.

Psychosocial and demographic family characteristics were examined in 79 families of ADHD and ADD children. As expected, ADD children's families reported less dysfunction than those of ADHD children. However, the most significant correlation was that of age. ADHD children's families were seen as more dysfunctional when the children were older. These ADHD families reported greater dysfunction and incompetence levels. Furthermore, it is postulated that higher impulsivity and hyperactivity levels combined with an older age of the ADHD child can actually predict family dysfunction.

Family conflict and difficulties may well escalate as children grow older (Lewis 1993). Lewis further focusses on adaptability and cohesiveness problems in such ADHD families. Furthermore, competence levels among parents have also been affected by such perceptions. Parents who see their child's behavior as problematic appear to be the least competent and may suffer from more parental stress in the longterm (Lewis, 1991).

When parental perceptions are established, resulting negativism can potentially be reversed by building a greater awareness of the spectrum of ADHD behavior and how it impacts on the family. By building awareness, parents would be able to better understand the situations they are in, and in effect, would be able to, with proper effectiveness training, be able to create functional coping strategies. These functional coping strategies would contradict instinctual, internalizing, dysfunctional strategies such as dysthymia and depression.

Cantwell (1996) promotes preventative measures and strategies from the perspective of an integration of school based interventions, psychotherapy, psychostimulants and psychosocial approaches.

Further research by Lewis (1992) focusses on boys with ADHD and their specific effects on their parents and family functioning. Parental perceptions showed that ADD boys' parents were the most functional, while ADHD families were the least functional and most disorganized. The hyperactivity factor thus appears to have had a negative effect on family functioning. This research serves to suggest that further differentiation between ADD and ADHD children in the diagnosis can be established based upon these noted differential family functioning levels. It appears that ADHD children are the most disruptive to their families. This often appears to be an effect of a dysfunctional family history, often at least with one parent being diagnosed with ADHD. Finally, ADHD, being an externalizing behavioral disorder, is the most noticed, and, as a result, can create the most chaos and turmoil within a family structure (Barkley, 1996).

By eliminating other comorbid disorders, the ADHD child in his or her family can be directly examined. Family history and dysfunction can be the focus, and it can be more

easily determined as to whether such familial effects are the driving force behind the ADHD child's behavior. By isolating ADHD on its own, it may be easier to focus on each problem behavioral symptom not caused by familial/parental dysfunction, but exacerbated by it. These effects can then each be dealt with.

A number of investigations recognize links between ADHD and parental/familial dysfunctionality (Cantwell, 1996; Hechtman, 1996; Johnston, 1996). The major areas appear to be coping stress, management problems, cyclical patterns of ineffectiveness, academic issues and difficulty adapting to environmental expectations. In addition ADHD and comorbid pathology or learning disabilities have been raised by Seidman, et al. (1995).

The effects of family history on ADHD children's performance have been further examined by Seidman, et al. (1995). In examining neuropsychological performance they found that comorbidity issues as well as familial signs affect ADHD children's performance. ADHD children with learning disabilities (LD) appeared to be the most affected and presented with more apparent motor skills and reading deficits.

In this study, the results showed that the ADHD group diagnosed with a family history of ADHD was the most impaired on performance tests. In addition, they suggest that ADHD + FH (family history) children were most impaired in their frontal networks. LD children on the other hand, appeared slower in motor speed, and this suggests an impairment in the left hemisphere of the brain, of this group. However, they call for further analysis into these findings and a further examination for other more specific comorbid disorders that may have a greater impact on performance.

With results pointing to familial status and learning disabilities both affecting ADHD children's performance, it appears that comorbid disorders in addition to LD, play a major

role in the functional abilities of these children and their families. Comorbidity may result as a maladaptive function of parental/familial distress and dysfunction. This in turn may predispose the ADHD child to dysfunction both behaviorally and academically, and this may manifest itself out of the home and into other situations where societal norms govern and evaluate dysfunctional behavior and performance. Such behavior becomes most noticeable in the school system as the child, with its lack of functional upbringing struggles socially, academically and, as a result, emotionally and behaviorally.

At school, the ADHD child may be perceived as socially and academically inferior to his or her classmates. Disruptive, socially inappropriate behaviors such as talking out aloud during quiet times or running around the classroom hitting the other children may occur. Such behaviors if not regulated and controlled may self-reinforce the ADHD child's social and academic problems. This may be brought upon by other children actively reinforcing these behaviors by laughing at, provoking or scorning the child. In addition, if the teacher fails to understand the issues at stake, inappropriate actions will tend to further impede any functional abilities that the ADHD child has. Swanson (1992) focusses on the importance of social skills training in schools to deal with poor anger and impulse control. This school-focussed approach essentially shapes school programs to be able to deal with the ADHD child. An inconsistent school environment thus will serve to worsen and reinforce these disruptive behaviors to the point where general classroom functioning will be at stake.

Teacher awareness, just as parental awareness is of paramount importance to the ADHD child's behavioral tendencies. Often teachers, not aware of the causes and effects, and resulting impacts of ADHD behavior, will view the ADHD child as oppositional, and

will reinforce the disruptive behavior inadvertently. In addition, academic performance will suffer as the ADHD child becomes bored and distracted by extraneous stimuli. Once off-task, and assignments are left unfinished, the ADHD child may go on to other tasks, never completing them, or simply create disturbances in the classroom. This behavior will in turn disrupt other students from their tasks, in turn creating a general problem of discipline and management for the teacher, with a resulting dysfunctional classroom environment, and a higher rate of failures in the classroom (Campbell, Endman, & Bernfield, 1977).

In a comparison study of American and Canadian teachers, Jerome, Gordon and Hustler (1994) found that both groups appeared to have limited knowledge regarding ADHD. In addition, they found that these teachers had little training in management techniques for ADHD children in their classrooms. Furthermore, the majority of these teachers were in favor of additional training and did acknowledge that ADHD is a prominent disorder in North American classrooms.

Cooper and Ideus (1995) in a study of British teachers appear to have similar results to that of the Jerome et al. (1994) study. A general lack of awareness, of ADHD diagnosis and its behavioral, social and academic symptomatology prevailed among these teachers. Furthermore, the U.K. diagnosis of ADHD apparently differs from that of the U.S. diagnosis in that it is less inclusive of symptoms and is viewed merely as an emotional and behavioral difficulty. It has been termed "EBD" (Emotionally and Behaviorally Disordered), which is highly generalized, but more commonly termed "Hyperkinetic Disorder" in the U.K.

Awareness and management skills for teachers of ADHD children would likely enhance their ability to cope with, and educate, these students (Umbreit, 1995).

In addressing this apparent need for teacher understanding of ADHD, the need to focus on restlessness and distractibility symptoms as well as the ADHD child's family upbringing is apparent. Teachers, however, need to first be able to identify the ADHD children in their classrooms and be aware of the issues before intervention can be implemented (Umbreit, 1995).

Schwiebert, Sealander and Tollerud (1995) have focussed on these issues and applied them to both school counsellors and teachers in the school system. Their all-encompassing approach brings into play the individuals involved with the ADHD children. This involves medical professionals as well as educators and counsellors, and also the parents of these children. By providing a general overview of behavioral tendencies in varying situations, those who are in contact and involved can then understand and begin to manage each specific problem behavior.

It appears that often ADHD children will be left out of certain activities whether in academic or at play situations. Whether this is a function of peer rejection, teacher rejection, or a combination of both, the effects of these negative outlooks may in turn drive the ADHD child to greater frustration. The result will only exacerbate the ADHD child's already intrusive, inappropriate behavior and serve to further decrease the child's social status and emotional well-being (Milich & Landau, 1982).

Results of social rejection may further impact upon the ADHD child and manifest from general intrusive behavior to an increase in external behavior such as aggression and the beginnings of social norm violations. As this lack of appeal further increases due to a constant increase in peer rejection, the child's ADHD and disruptive behaviors may become

more violent and defiant, paving the way to a conduct or oppositional defiant disorder (Hinshaw, 1987).

At the opposite spectrum of aggressive ADHD children who externalize their behaviors, those with internal symptoms more characteristic of ADD or LD diagnoses may present similar social inadequacies. Teachers need to become aware of the differential yet similar needs of those children and their social and academic functioning.

In the classroom and at play, observations of interactions should be examined with a purpose of being able to differentiate these groups based on their behaviors. This would impact upon general classroom functioning. A teacher who is able to identify problem issues would be able to act accordingly, reducing his or her stress and, as a result, general classroom dysfunction.

With an apparent high degree of overlap between ADHD diagnosis and other comorbid disorders such as LD, it is often difficult for teachers, let alone clinicians, to pinpoint the actual problems. It is still unclear as to how ADHD symptoms coexist with LD. The question still arises as to whether or not LD may cause ADHD or vice versa. Riccio et al. (1994) have hypothesized that ADHD may result from academic problems and that both inattention and hyperactivity serve to impact upon academic performance. It also seems apparent that LD and ADHD as diagnosed disorders are two separate disorders. Often, however, ADHDs are misdiagnosed as ADD or LD.

Whatever the end result of a longterm manifestation of symptoms may be, it does appear that ADD and LD are likely to have greater similarity in symptoms. These children should be identified by teachers as being more socially withdrawn, daydreamy and slow on their assignments.

On the other hand, the ADHD children tend to be overly outgoing and externalize their behavioral symptoms. As a result, their conspicuous and disruptive behavior may have the greatest impact on classroom dysfunction and prey on the teacher's abilities to control and manage classroom activity.

The specific training of teachers to recognize ADHD issues could be postulated as a sound early preventative approach. CHADD (Children with Attention Deficit Disorders) for example, is a public information organization creating an awareness of the disorder (Cantwell, 1996). Both parents and teachers must focus on awareness, coping and intervention issues to avoid behavior manifestations in the home and classroom settings.

It appears that teacher recognition of ADHD is vital not only for the wellbeing of the classroom environment, but to identify and effectively intervene when problems arise. Teachers may inadvertently allow for negative perceptions of ADHD children, but could potentially educate themselves and their students to understand specific behavioral symptoms.

ADHD children at school, and in the home, will present with behavioral problems which need to be monitored. Behavioral symptoms will vary, and diagnostic criteria could potentially focus on specific situations that exacerbate the ADHD child's behavior. Parent and teacher ratings will potentially differ between situations, resulting in variation in their input in the diagnostic process (Cantwell, 1996).

With some disparity in the evaluations by parents and those performed by teachers, some children may be misdiagnosed. These figures may offset prevalence statistics, and in turn adversely affect any future interventions dealing with ADHD behavior. It appears that a consensus on the part of parents, teachers and clinicians needs to be established. This

would serve to eliminate the diagnostic disparity that seems to confound the general understanding of what ADHD is (Cohen, Riccio, & Gonzalez, 1994).

With an apparent desperate need for both parents and teachers to understand and become aware of ADHD and its consequential behaviors, there appears, however, to be a somewhat positive outlook on what can be done to alleviate the associated problems.

Researchers such as Busch (1993) and Barkley (1996), although controversial, lay down basic structural frameworks designed to manage and treat these behavioral problems. There seems to be some agreement on diagnostic criteria, and from these, interventions can be formulated. As the quest for diagnosis continues, so does the understanding and awareness of this disorder.

Resulting parent and teacher management techniques need to be established, and with a constant increase of knowledge, these strategies will eventually be fine tuned. A greater success rate in the management of ADHD children will result from a greater awareness of symptoms and their requirements.

Only from this established level of awareness can teachers, parents and clinicians gather behavioral data and begin to assess the problems that they are dealing with. These assessment strategies will aid in the sorting process of diagnostic criteria and focus directly upon those children most in need of assistance. This step-by-step process of assessment, designed to identify these ADHD children, should also help the families of, and those who work with, ADHD children. A general improvement in their overall functioning abilities should result from comprehensive, accurate assessment strategies.

With much research still needed, those who work directly with ADHD children are at the focal point. Parents and teachers who may appear to understand these children may

in actual fact not know them at all. Only with planned strategic assessment and intervention strategies can the difficulty in obtaining consensus in diagnostic criteria be overcome. Answers should develop as to how and why the ADHD child experiences significant frustration.

An assessment of each environmental criterion and its impact on the situational behavior of the ADHD child should help researchers develop strategies for everyday management. Teachers and parents could use these assessment-based management strategies to effectively control the ADHD's environment. Only with concrete, accurate assessment programs can a diagnostic battery be established and eventually yield successful management techniques. These could be beneficial to the ADHD child.

CHAPTER 4

ASSESSMENT OF ADHD

In the previous chapter, the focus was on education, familial and behavioral issues. As these basic situational issues are addressed, the focus on assessment can further the understanding and implications of ADHD.

Assessment, from the perspective of this study may be postulated as a process of evaluating behavioral, psychometric and symptomatological components to determine with clarity the parameters of the ADHD.

In achieving this process, the situation and its environmental impacts on the ADHD child needs to become the area of direct focus. By viewing each situation and causal factors of the child's behavior, questions as to how behavioral and academic problems can be controlled, managed and treated can then be addressed. The environment is the key to the understanding and accurate explanation of ADHD.

The components of ADHD as employed in the DSM-IV (American Psychiatric Association, 1994) framework can then be matched to their environmental constructs. Of these components, the obvious and predominant player is that of hyperactivity. What causes hyperactivity? Is it an integral aspect of the disorder, or should it be isolated?

From these questions arise others: (1) In what setting and situations is the child displaying adverse behaviors? (2) Are these behaviors adverse or normal given the situation? The assessment process needs to take into account such norms in order to evaluate and thus create a behavioral profile from which one can work from.

The DSM-IV (1994) criteria for ADHD provide a symptomatological focus of the disorder. The evaluation process should integrate the specificity of symptoms with social, academic, and behavioral details from the perspective of successful adaptation, and problem areas.

According to Cantwell (1996), assessment should be a process which aims at the following areas:

- i) A clear evaluation and determination of an integrated series of performance and behavioral measures to determine the exact ability and functioning of the child.
- ii) Establishment of a set of parameters and criteria where longitudinal development can be measured on the same criteria over a period of time.

If this occurs, observational components, behavior rating scales and psychometric tests will all be part of a multi-modal approach to assessment (Barkley, 1990; Cantwell, 1996).

Once the child is identified either by a parent, teacher, or clinician as being "problematic," these behavioral issues can then be addressed and examined. The assessment process sifts, sorts and matches the behavioral criteria to these situational demands in order to create an idea of the problems that plague a child. An assessment can only be established once a full, comprehensive and all-encompassing understanding of the child's lifestyle is established. This would involve parent questioning, teacher questioning, observations of the child in various situations such as at play and at work. In addition, tasks and psychometric tests can be employed, but observations of these tasks and tests should take into account the situation in which they are administered.

Controlled environments can also be useful in determining a child's functioning and interactional and social skills. In addition, to further understand the basis of such behavior in given situations, a family history is of paramount importance. This can elevate the level of awareness for the clinician and provide insight into the causal nature of the child's affect and behavior.

According to Barkley (1990), Arnold and Jensen (1996), and Cantwell (1996), no specific set or series of tests exists to make a definitive diagnosis of ADHD. The repertoire of existing assessment methods appears to include the following:

- i) Recognition by teachers and parents of a behavioral and academic series of problems.
- ii) Clinical diagnosis of ADHD by psychologists and physicians on the basis of functional impairment at school, home, and peers, along with matching these to DSM-IV or ICD-10 (International Statistical Classification of Diseases and Related Health Problems) (1992) criteria.
- iii) Developmental questionnaires and general behavior rating scales.
- iv) Assessment interviews with the child.
- v) Specific ADHD determination scales, for example, Conners (1990) and Acters (Ullmann, Sleator, & Sprague, 1991).
- vi) Selected psychometric measures of cognitive abilities.

It may be argued that teacher and parent "diagnosis", as well as clinical diagnosis is based on observational criteria. It may be further argued that developmental questionnaires and general behavior rating scales such as the Child Behavior Checklist (Achenbach, 1993) are general and not specific to ADHD.

It has been argued as noted by Barkley (1990), and Reiff, Banez and Culbert (1993) that no current cognitive tests provide specificity of diagnosis. The behavior rating scales have shown promise, largely because of attempts to create a convergent and discriminant validity around symptoms. To this end, the Conners (1990) scale and the Disruptive Behavior Disorder Scale (Pelham, 1992) are reflective of this approach.

Once pertinent information is established, the clinician has a framework from which to work, and can move onto the more effective use of behavioral rating scales. These rating scales require common, cross-cultural equivalence factors established to promote accuracy and reliability (Reid, 1995). Provided that these rating scales are representative of the true functions and resulting behavior levels of the subject, they can yield promising results that can lead to the identification of ADHD or other comorbid disorders. Thus, the essential question which can only be addressed through this assessment process is as to whether or not the child is a subject of ADHD. Unfortunately the answer to date is not so clear-cut as the prevailing literature continues to strive for accuracy and solid results in this fundamental step in the diagnostic process. The psychological and statistical technology in the rating scales, for example, Conners (1990), ACTeRS (Ullmann, Sleator, & Sprague, 1991) and Pelham (1992), in particular, reflect this process.

The importance of the assessment process appears rooted in current misconceptions and preconceptions of ADHD diagnosis. This has been epitomized by Desgranges, Desgranges and Karsky (1995). They examined the impact of a preconceived diagnosis of ADHD on the assessment and treatment of children and adolescents. Of 375 patients examined, it appeared that 119 demonstrated ADHD-like symptoms. However, their result was that only 45 cases were actually ADHD cases, suggesting overdiagnosis by other

sources. Comorbidity appeared to play a factor in this overdiagnosis, as tic disorders, anxiety disorders and substance abuse were present in the general group of 119 cases. This could potentially affect treatment and evaluation options, and the study calls for a greater awareness of comorbid and other disorders displaying ADHD-like symptomatology. This reflects the ongoing problem of the issue of diagnosis in psychology and psychiatry. This study reinforces the work of Szasz (1961) and Rosenhan (1973) who criticized psychodiagnostics.

This study is further important to the assessment process and diligently attempts to narrow down and pinpoint ADHD minus comorbidity. However, the opposite may be true in the sense that it is too narrow and that some of these disorders that are excluded may in fact be more related either as causal or effective of ADHD. One needs to be cautious so as not to overexclude "peripheral" ADHD-type symptoms.

Prevalence, comorbidity and presentation in the assessment process are further examined by Searight, Nahlik and Campbell (1995). They note that ADHD is difficult to differentiate from other disruptive behaviors such as ODD and CD. They call for a systematic approach for assessment and diagnosis by incorporating a mental health examination with parent and teacher reports. This, they believe, should be used with a noted family history in the initial assessment, allowing for a more accurate explanation once diagnosis is complete. In addition, they call for monitoring medication dosages and repeating mental status examinations once medication has stabilized.

The latter step incorporating medication appears to confound their approach as it seems more reasonable to first assess the need and use of medication prior to its incorporation. They appear to promote the use of medication too early and this may alter their

otherwise reasonable step-by-step assessment approach. It seems more valuable to exclude the use of medication until the assessment is complete and the researchers and/or clinicians can evaluate the need for such intervention. Their call for the use of medication seems premature.

By placing the medication-model toward the end of the assessment, diagnosis and evaluation process, it seems more valuable as a form of treatment, based on early and accurate assessment. This would allow for assessment of attention and developmental factors that appear to be the core issue to be examined.

Erk (1995) has effectively addressed these basic issues and examines attention as the focal point of both ADD and ADHD. He examines ADHD and ADD symptoms such as lack of motivation and daydreaming. Here, he attributes these developmental factors as being inherited and caused by irregular brain chemical metabolism and its effects on performance and social skills.

In addition, he calls for assessment checklists developed for teachers and parents. These would be based on the symptoms of both ADD and ADHD. However, his neurological model appears to complicate his basic identification of symptoms and the purpose of assessment. It may have been more useful to deal with neurological factors in a study of causal explanations.

By examining ADD and ADHD behavior, he appears to set the stage for assessment and diagnosis, but too rapidly moves on toward intervention. It seems it would have been of more value to address symptom issues in this study and develop assessment techniques for diagnostic purposes. Inherent causes and post-diagnostic interventions seem to be of

greater value if examined in follow on studies. Nevertheless, he does provide a general framework representative of the entire process from causes to treatment.

Multimethod Assessment Approaches

The assessment of ADHD has been extensively researched. There are a series of significant approaches which need to be examined. Shelton and Barkley (1994) have addressed ADHD from a direct, critical stance; focussing on and evaluating assessment issues. They provide an overview of ADHD, and present guidelines for developing a comprehensive assessment battery. In addition, they also provide links between ADHD and language disorders while noting that the three essential symptoms of ADHD, namely inattention, hyperactivity and impulsivity must exceed developmental norms.

In criticizing the clinical assessment process, they call for increased knowledge of how each component of attention relates to ADHD. Furthermore, they criticize the lack of appropriate tasks and instruments for assessing each of these components. Finally, they call for the employment of parental and child interviews, behavior rating scales and psychometric measures for intelligence, achievement and, most importantly, attention.

Schaughency and Rothlind (1991) attempt to provide a more comprehensive assessment model from which later diagnostic estimates can be based upon. In their discussion on classification, assessment and evaluation of ADHD-type disorders, they argue that ADHD diagnosis should be based upon a multimethod behavioral assessment program. This would in turn be based upon a selection of appropriate assessment techniques. These techniques would include diagnostic interviews, behavioral rating scales, peer assessment and observational methods.

Researchers such as Reiff et al. (1993) and Cantwell (1996) argue in favor of the multimethod assessment approach. This approach incorporates the use of clinic-based tests and tasks, used in conjunction with behavior rating scales.

DuPaul et al. (1992) further support multimethod assessment, although, they call for enhanced ecological validity between clinical measures when manipulated in conjunction with parent interviews and behavior rating scales. It appears that more research is required in order to validate the multimethod approach to promote it as a workable framework for diagnosis.

Cantwell (1996) and Swanson (1995), along with Braswell and Bloomquist (1994), and Johnston (1996) call for further evaluation of multimethod assessment, questioning its utility when too few measurement instruments are incorporated. They promote the use of a variety of specific assessment techniques including rating scales, cognitive assessment and screening for sensory deficits.

The evaluation of assessment methods has also been undertaken by Halperin (1991) as well as Shelton and Barkley (1994) and Braswell and Bloomquist (1994). Findings show the ability to distinguish between attentional deficits, and that inattention may be a component of cognitive or learning problems.

More detailed, in-depth, and specific, assesment tools such as behavioral tasks set in differing environments, and parent/teacher perceptions of specific behavior would potentially enhance the assessment process. Specific assessment techniques may assist in the understanding of links between ADHD, CD, ODD and other comorbid disorders (Luiselli, 1991).

Luiselli (1991) and Schaughency and Rothlind (1991) focus on comprehensive assessment models, but omit the core issues of assessment: behavior scales and performance tests which may potentially highlight the relationships. To separate behavior and performance measures may be useful, but each aspect will constitute only 50 percent of the assessment process. It is essential that both aspects are combined.

Barkley (1991a) has promoted the "behavioral approach" when examining the three core clinical issues of ADHD: inattention, impulsivity and overactivity. As behavior is the critical issue here, his approach is logical. However, the "complete" model for assessment would be validated if performance (psychometric) measurements are incorporated.

Researchers like Seidel and Joschko (1991) attempted to "integrate" both aspects, using IQ and performance tests combined with parent and teacher ratings, exploring correlations between parent/teacher ratings of performance and psychometric test performance. Performance differences were revealed between ADHD and control groups.

While these researchers have integrated both aspects—behavior and performance, their focus is primarily on behavior during performance, correlated with actual performance results. Behavior in general situations at home, and in the classroom, would have been an important aspect to add in the study. Barkley (1991a) is correct in his focus on behavior as the primary measurement focus.

Other researchers like Carker, Zelko, Oas and Waltonen, in contrast to Barkley's (1991a) behavioral approach have primarily focussed on intelligence and psychometric measurement. This is, however, a limited approach.

The model of Seidel and Joschko (1991) integrating both aspects would appear to yield increased clinical value, as it is inclusive of both behavior and performance aspects.

It is not necessarily a "multimethod comprehensive assessment battery," but provides the basic framework for the diagnosis and evaluation of ADHD. To fully assess performance, cognition and behavior, a wide range of measurement devices is required.

This has been attempted by the researchers Cohen, Becker and Campbell (1990) as they examine differential assessment methods (four in total) to form the multimethod assessment battery. Like Cantwell (1996), Swanson (1995) and Reiff et al. (1993), their promotion of a variety of assessment methods moves closer to the true purpose and utility of the assessment battery for diagnosis.

Researchers like Guevremont, DuPaul and Barkley (1990) have provided the essential framework based on the core clinical issues. They have provided the foundation from which the multimethod approaches are based upon. The foundation is also essential as a framework for other approaches, although, while these are mentioned and discussed, the multimethod approach is the most valid, as it is all-encompassing of the ADHD symptomatology.

Additional Assessment Approaches

The utility of a well-developed assessment battery can be applied to other approaches. For example, cross-cultural studies have been undertaken using aspects of the multimethod approach, such as teacher, and other diagnostic and behavior rating scales.

Specifically, Bauermeister, Berrios, Jimenez and Acevedo (1990) have attempted to standardize their assessment approach to culture-specific groups. Wolraich et al. (1996), Baumgaertel et al. (1995) and Reid (1995) reflect upon this challenge — linking North American and European "biased" tests to other cultures. The basic multimethod approach

is once again fundamental to the success of cross-cultural and culture-specific assessment as the foundation is necessary for later adaptations and variations (Guevremont et al., 1990).

With this established, additional, and potentially more complex, approaches such as the neuropsychological approach can be administered. Grant, Ilai, Nussbaum and Bigler (1990), as well as Korkman and Pesonen (1994), have utilized neuropsychological profiles and intellectual/achievement tests to specify ADHD and other comorbid disorders by identifying weaknesses. Their attempts to specify deficits are rooted in the need to eliminate diagnostic comorbidity and promote treatment. These approaches, by comparison with the standard multimethod approach, appear to have had limited success, although further research is required.

Following specific neuropsychological approaches, learning and memory deficits have been examined. The learning/memory approach, while specific in its instrumentation, has been examined by Phelps (1996). This approach has yielded a degree of utility, aiding in the discrimination between ADHD and other comorbid disorders. However, its specificity of measurement appears to limit its benefit in diagnosis.

Other related approaches, such as Cotugno (1995) have furthered learning and memory issues by examining cognitive and intellectual functioning. This was conducted based on matching ADHD and control groups on the basis of personality and academic functioning. Personality has been noted to affect social functioning due to lack of awareness and evaluative abilities in ADHD groups.

Personality approaches such as the Rorschach Inkblot Test are noted by Exner (1974) and Singer (1981) to portray inner conflicts and related anxiety, introversion-extraversion symptoms. These conflicts are noted to potentially manifest into day-to-day situations. It

is believed by these researchers that Rorschach responses are indicative of inner personality conflicts, potentially related to ADHD symptomatology.

These approaches, however, have remained on the "periphery" of the assessment process, and have been further criticized to lack test-retest reliability (Bartell & Solanto, 1995).

With the apparent lack of utility of the Rorschach, a more direct, "laboratory approach" was performed by Hinshaw, Simmel and Heller (1995). This process involved the assessment of ADHD behavioral manifestations. Laboratory measures based on oppositional and conduct issues such as "stealing," "cheating" and "property destruction" were noted.

It is possible that severe behavior symptoms can be integrated in the assessment process. However, the laboratory focus may be too narrow.

If, however, the laboratory focus could be integrated with other multimethod systems, there may be potential value to "real-world" demands. This process may, in effect, serve to provide a greater understanding of how the ADHD child copes with "day-to-day" issues.

The utility of the multimethod assessment battery appears rooted in its ability to specify the core symptomatology at stake, and evaluate its implications. With behavioral and performance measures in place, the potential for a diagnostic framework to determine if a child is in fact ADHD, is imminent. However, the assessment process remains incomplete without a review of situational awareness as an integral component. This awareness of behavior manifestations is rooted in home and school situations, and is essential to the underlying dynamics of ADHD.

The Home and School as Integral Components in the Assessment Process

The role of the family in the assessment of ADHD has been examined by Edwards, Shulz and Long (1995) with specific emphasis on family functioning, and its impact on the assessment process. Braswell and Bloomquist (1994), Brown and Cantwell (1976), Hechtman (1993;1996), Swanson (1992) and Edwards et al. (1995) have all reviewed the role of the family from a management perspective, education of the family and awareness of familial dysfunction.

These approaches are worthy of further detailed study as it may be valuable in integrating assessment and treatment from a family perspective. Furthermore, an argument can be put forward that rather than family therapy as a modality aimed at insight, an assessment-treatment continuum creates a new perspective on family functioning and management of the ADHD family. This method, or variation of it, has been used by DuPaul (1991) and Johnston (1996), as well as Edwards et al. (1995).

Once this is established and the family has developed some sense of awareness, the parents and children can be used as informants. However, as the research indicates, it is essential to initially screen the family for dysfunction.

Edwards et al. (1995) point to the fact that as the family is made aware of the issues, the researcher needs to be made aware of the introduction of new variables. These factors may adversely affect and influence child and parent reports — possibly distorting the data. The effect of new intervening variables being added could fundamentally affect reliability of findings.

Parents, children and other sources of familial reporting such as family counsellors can, however, be useful, but to guard against bias or defensiveness, possibly clinicians could

undertake interventions in the home. They would, however, have to allow for potentially altering family behavior as a new series of variables would be introduced.

Nevertheless, the family appears to be a vital aspect to the assessment process as it is an environment whereby all social, emotional and behavioral factors converge. As a crossroads of all life aspects, the family can be observed to yield important functional information. Parents, children and external sources will also gather varying perspectives of the family's abilities to function, and these must then be correlated to eliminate the biases.

Behavioral rating scales as used in home can then also be correlated to other situations. Aside from the home, the school situation appears to be a highly visible and observable arena for study. However, situational variation in the ADHD child's exhibiting behaviors must be taken into account and measured before a final analysis can be made.

Altepeter and Breen (1992) have examined situational variation in problem behavior in both home and school environments. The HSQ/SSQ (Home/School Situations Questionnaire) were used to collect data from 163 clinic-referred ADHD children aged 5 to 12 years.

Using factor analysis from both home and school situations, they found ADHD children to differ from non-referred children. As a result, a high degree of validity was found in the use of HSQ/SSQ tests to assess ADHD and compare situational behavior of ADHD to normal children.

This study yields useful comparison results in assessment of ADHD as compared to normal children. However, greater emphasis could have been placed on differentiation of behavior between home and school settings. This would aid the assessment process in allowing for correlations between home and school ratings of behavior and performance.

As a result, this could also help reduce home situation biases as parents often have not been exposed to large numbers of children for comparison purposes, and may not see their ADHD child as problematic.

On the other hand, the school situation and any teacher questionnaires seem to be most valuable, as the teacher is exposed to a variety of children, and can make comparisons between non-disruptive and disruptive children. The teacher is thus more likely to differentiate between these groups, reducing the biases that often plague home studies. In addition, clinicians and researchers can effectively work with teachers to determine and assess behavioral manifestations in both classroom and at play settings at school, making schools the most useful area for study.

Disruptive behavior in the school can be maintained by a number of variables such as teacher and peer attention, and boredom during academic tasks. These variables can be derived from a functional assessment process which can analyze these casual and maintaining factors of disruptive behavior (Broussard & Northup, 1995).

Teacher factors play an important role in the maintenance of disruptive behavior. Their ability, or lack of ability, to identify and stamp-out these behaviors is another crucial element in the conceptualization of ADHD behavior. This can also affect later treatment or intervention outcomes as teachers are consistently exposed to, and are thus catalytic in their ability to modify behavior problems (Greene, 1995).

Once an awareness of behavior issues is established from a variety of settings, the assessment process can then be completed. Diagnostic and intervention strategies can then be implemented, but will require a solid understanding based on a complete evaluation of behavioral issues.

As a summarative comment, family and school are useful in assessment, and can potentially play a role in assessment, intervention and treatment.

Some studies utilize DSM-IV criteria for assessment purposes (Baumgaertel et al., 1995; Wolraich et al., 1996). In previous studies, Johnston (1996) raises the question of earlier psychiatric classification being unlikely to provide maximum discrimination of ADHD.

The DSM-IV is an attempt from a psychiatric perspective to modify and improve psychiatric diagnosis. DSM-IV criteria are essentially descriptive in nature, and set a standard for clinicians to attempt to classify, communicate and study individuals (DSM-IV cautionary statement, American Psychiatric Association, 1994, p. xvii).

The criticism of this approach to diagnosis, by Rosenhan and Szasz (1975, 1979), that symptoms can be acted, and that symptoms as a means of reading a diagnosis are a myth, has not yet been addressed. Needless to say, DSM-IV serves as a criterion, because it clearly specifies behavioral symptoms.

Conners (1994) uses DSM-IV criteria for his assessment scales. Cantwell (1996) notes that with DSM-IV, core symptom dimensions exist pertaining to inattention and hyperactivity. It can then be argued that if these core areas are discriminated, a useful description of the construct exists.

CHAPTER 5

DIAGNOSIS OF ADHD

The previous chapter reviewed assessment procedures and approaches. This chapter focusses on the diagnostic process which follows assessment.

As numerous research studies have indicated, ADHD symptoms can be both observed and measured. Barkley (1990), Conners (1990), Elliott (1990), Ullmann, Sleator and Sprague (1991) and Wechsler (1991,1992) have developed rating scales and psychometric measurement devices used for diagnosing ADHD. Other researchers such as Reid and Maag (1994) have critiqued behavior rating scales, while others such as Anastopoulos, Spisto and Maher (1994) have examined the utility of psychometric measures. The essential question, however, remains as to how researches can incorporate ADHD symptoms into a combined, unconfounded, accurate and specific system to yield a concrete diagnosis.

By combining rating scales with psychometric tests, researchers could compensate for rater biases, and, in effect, yield more reliable results. From a well-balanced assessment model, the likelihood of attaining diagnostic reliability and concrete results appears greater than that of current unbalanced models.

The diagnostic process, in order to be successful, requires a complete understanding of the ADHD child. This will have been extensively developed in the assessment process, resulting in a strong focus on the child's functional strengths and weaknesses.

Following up on a comprehensive assessment program, researchers and clinicians can analyze and evaluate all aspects of the child and its environment. This process would require a critical analysis of the assessment scales to determine which are most useful in pinpointing behavioral and academic deficiencies.

Behavioral observations performed by both parents and teachers can then be correlated with appropriate psychometric tests that accurately portray the child's academic and functional abilities. The result of this assessment could then yield a workable diagnosis on which later treatment approaches could be based.

As previously mentioned in Chapter 4, behavioral and academic observations performed by teachers appear to be of most value. These types of rating scales may yield less biasing results as the teacher is more likely to determine and pinpoint problematic areas in classroom functioning. The way an ADHD child behaves and functions in the classroom can then be rated accordingly. Comparisons can then be made by the teacher in his or her evaluation of each child. In effect it seems that a classroom teacher is given a broad perspective so that behavioral and functional norms can be established.

From these norms, disruptive and other less functional behaviors can be noticed and rated effectively. The range of these "unusual" behaviors may range from extremely disruptive and extroverted conduct disordered children to barely noticeable introverted behaviors such as in learning disabled and shy, daydreamy ADD children. As a result, cutoff scores need to effectively establish set boundaries and yield strict guidelines in an attempt to eliminate comorbidity as much as possible.

As an example of a rating scale, the "ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)" (Ullmann, Sleator, & Sprague, 1991) will be discussed. This behavior rating scale

is potentially useful as it measures ADHD behavioral symptoms from the perspective of teacher observations.

Although teacher biases can still potentially alter results, teachers are subjected to a wide range of symptoms in the classroom, and can also note symptoms at play. The ACTeRS (Ullmann, Sleator, & Sprague, 1991) accounts for situational behavior problems — that is in certain situations, specific behavioral manifestations will occur, and these are measured as to the severity. Teachers can make comparisons between students, providing a natural set of norms from which to base their impressions.

Teacher rating scales such as the ACTeRS attempts to rate childhood behavior in the school situation. Twenty-four observational type items that relate to childhood behavior are incorporated. These are divided into 4 sections, namely: Attention, Hyperactivity, Social Skills and Oppositional Behavior.

For each of the 24 items, the scale rates each type of behavior by degree of occurrence. This is accomplished in the form of a scale from 1 to 5, with "1" referring to "almost never," meaning that the particular behavior hardly ever occurs. A "5" refers to "almost always," meaning that the behavior occurs frequently. A "3" rating on a given symptomatic behavior would thus indicate "sometimes," although the word "sometimes" is not used. As a result the teacher and/or clinician must then interpolate between the 1 and 5 scores.

Each of the four sections; Attention, Hyperactivity, Social Skills and Oppositional Behavior are well formulated in their attempt to portray and also eliminate or separate co-occurring symptomatology. As comorbidity is a significant problem in the diagnosis of ADHD, it seems apparent that a category such as Oppositional Behavior could potentially

highlight the occurrence of ODD (Oppositional Defiant Disorder) or even CD (Conduct Disorder).

On the other hand, social skills deficits, combined with low hyperactivity, and poor attention may potentially highlight symptomatology characteristic of ADD. In addition, a greater emphasis on hyperactivity may potentially indicate ADHD type symptoms.

While this process seems to be linear, one should guard against premature conclusions as incorrect diagnosis can be costly. However, this rating scale does appear to provide a relatively user-friendly method for teachers to utilize in determining and initiating the process for which a diagnostic foundation can be built.

To diagnose a child with ADHD is, however, a complex process whereby the clinician must construct and build upon a foundation of collected data, sifting through it, and eventually pinpointing problematic behaviors. These behaviors then require categorization to develop a working diagnosis from which comorbid disorders must then be accounted for and, if possible, managed.

It is feasible to refine some of the comorbidity issues. Learning disabilities, for example, can be separated; and while core symptoms may appear in other conditions, these, if separately diagnosed, can potentially be dealt with.

Reiff, Banez and Culbert (1993) and Cantwell (1996) refer to this issue from the perspective of pitfalls in the diagnostic process; and argue that with sound diagnostic approaches, these can be managed.

In the quest to eliminate conflicting diagnoses, a more in-depth evaluation of the ACTeRS scale could be taken as an example as it specifically focusses on teacher

observations. In the diagnostic process, teacher observation will likely focus on both behavioral and academic issues and, as a result, this particular scale is used as an example.

The scale focusses on some behavioral generalizations on a linear scale, weighted with scores of 1 to 5, depending upon severity of behavior. This scale consequently provides a range of scores on each category.

While this process is quick and simple to use for the teacher, it could, in effect result in a confounding diagnosis. The researcher would then be compelled, as is generally the case, to make use of other rating scales and tests and eventually correlate the results and, ultimately create a battery based on the most defined symptom scores. This appears to be quite practical, as these are among the most widely used instruments available.

In critically evaluating the ACTeRS, the apparent reason that it must be used in conjunction with other scales and psychometric tests is that of its behavioral generalizations. Because, the teacher must decide on how much a particular behavior is occurring, the ACTeRS can be both helpful, and also "hopeful" in terms of accuracy.

The ACTeRS scale does not, however, provide levels of exactitude. It is difficult to specify what is the determination of categories like "sometimes" or "almost always", because there is no specificity to these scores. It can be argued that it is a subjective determination of impulsive behavior, as there is no clarity of how many times a behavior needs noting before it is categorized as "almost always".

Perhaps the crucial issue is that to date there are no set behavioral norms established, nor does it appear feasible to establish behavior norms. Every child will react differently in varying situations, and it is left up to the teacher to judge as to whether one, two, or several children in his or her classroom present as "extraordinary" in any way.

From a philosophical perspective, one can question what constitutes "extraordinary" behavior, and how can one fairly and accurately set it apart from "normal" behavior. This is the crux of the equivalence and cutoff scores issue. Exactly *how much* is how many and *how often* is almost always?

To date it seems virtually impossible to practically measure and comparatively quantify each behavior symptom to "norms" which cannot accurately be established. Thus it may be impractical to actively count "how many" times a child "squirms" in his or her seat. However, ultimately, this type of process, combined with appropriate, established norms would greatly benefit researchers and clinicians in the quest for diagnostic purity.

As the future of ADHD diagnosis may utilize and establish accurate norms and boundaries, the current focus in reality, rests upon the use of assessment batteries, and the ever-present quest for an assessment battery that can yield concrete diagnostic results.

There are indications that clinicians may fall prey to quick diagnostic conclusions, often misdiagnosing, not diagnosing, or inappropriately diagnosing. Clinicians may utilize one or two methods of diagnosis or rely on observations alone — often misconceptions (Foudraine, 1974; Rosenhan, 1973). In the case of ADHD, such approaches, it can be argued, could be detrimental.

It has been noted by Barkley (1990), Cantwell (1996) and Reiff et al. (1993), that multi-method approaches to diagnosis are sound approaches. In this respect, it can be argued that rating scales involve a range of evaluations that can be useful.

By parents rating the child's behavior, a perspective is provided into perceived home behavior, despite potential response-bias concerns.

It is clear that diagnostic issues have been reviewed from the perspective of improved methodology (Cantwell, 1996; Reiff et al., 1993), and the issue of misdiagnosis is of concern. However, the research shows that significant effects on families occur where ADHD occurs (Cantwell, 1996; Mash & Johnston, 1990; Hechtman, 1996; Johnston, 1996).

This raises the question of whether it is feasible to discern a connection between parental evaluations of ADHD behavior and diagnostic ratings of dysfunctional family pathology.

This issue of parent characteristics and parent-child interactions has been advanced by Johnston (1996) who noted that ADHD parents had fewer parenting strategies that were effective, and a tendency toward higher negative reactivity. This too is noted by Hechtman (1996) in respect of families who found that ADHD families had significantly more problems intra-familially than non-ADHD families.

Consequently, an assessment-diagnostic model of impacts can be postulated, where behavioral problems reinforce family dysfunction. The findings of Hallowell and Ratey (1994) would also complement this approach.

Mash and Johnston (1990) and Hechtman (1996) in respect of mothers of hyperactive children argued that there is a "locking in process" of negative parenting patterns.

This led to stress, isolation, self-blame, depression and loss of confidence due to psychological distress. The family interventions model thus is one of the approaches proposed by Hechtman (1996). However, specificity of therapeutic intervention is not apparent.

While it seems difficult to define expected "norms", the issue of family functioning and diagnostic ability to determine actual functioning in terms of child behavior appears somewhat complex.

The Conners (see Appendix A) rating scales used in conjunction with the ACTeRS (see Appendix B) scale may potentially define family functioning, as both Conners and ACTeRS incorporate teacher ratings which can be correlated. Parental perceptions on the Conners parent scale can potentially, if correlated with the teacher scales, assist the researcher in formulating a diagnostic foundation. The ACTeRS and Conners teacher scales provide teacher perceptions to be used in the classroom observation process. This could provide insight into family functioning issues as Conners parent ratings are added or, in effect accounting for interrater reliability.

Researchers could potentially determine perceptual differences between teachers and parents, especially since ADHD and other behavior and learning problems manifest into naturalized settings such as classrooms and homes. Biases may persist for home ratings unless the researcher can actively enter the home without influencing or, in effect, modifying the "normal" behavior occurrences in the home.

The school situation, while routine, can possibly yield promising results, especially given reduced bias on the part of the teacher. As a result, the teacher's ability to detect behavioral anomalies in the classroom and at play will, and have been, most useful in constructing a diagnostic framework — a foundation from which one can build upon.

In building on this foundation, the Conners scales, like the ACTeRS are able to highlight variations in classroom behavior. While their focus is specific to the school situation, they both seem appropriate in their symptom descriptions. The ACTeRS, however,

appears more concise, being divided into 4 categories with 24 symptoms, while the Conners teacher scale CTRS-39 appears and attempts to examine situational developments; a total of 3 categories with 39 symptoms in all.

The CTRS-39's (Conners' Teacher Rating Scales-39) symptoms are divided into 3 categories; namely, "classroom behavior", "group participation" and "attitude toward authority". The subscales include the following: "Hyperactivity", "Conduct Problem", "Emotional Overindulgent", "Anxious-Passive", "Asocial", "Daydream-Attention Problem" and a "10-item Hyperactivity Index" (see Appendix A).

The CTRS-28 (Conners' Teacher Rating Scales-28) on the other hand, is non-categorized and consists of the following subscales: "Conduct Problem", "Hyperactivity", "Inattentive-Passive" and a "10-item Hyperactivity Index".

By using the "teacher-28" and "parent-48" scales, a potentially useful study could result, highlighting situational variability, and both teacher and parent biases.

With these two Conners scales representing parents and teachers, it may also be useful to add the ACTeRS (ADD-H COMPREHENSIVE TEACHER'S RATING SCALE). This scale could effectively take the place of the CTRS-39, as it is divided into similar subscales. These include the following: "Attention", "Hyperactivity", "Social Skills" and "Oppositional".

Each of these subscales is also closely related to those of the CTRS-28 and CPRS-48. The results could then be correlated to provide an emphasis on teacher rating variability, and specific emphasis on classroom behavior, where it can be postulated that significant behavior manifestations occur. This will depend on both the teachers and teaching methods which may affect attention span, for example.

The CPRS-48, while reflecting parent ratings, could potentially portray home behavior, although parent biases are likely to create some confounding results. With all three scales used, however, the results could effectively be utilized to highlight these vital behavioral components.

For each symptom, ACTeRS asks teachers to fill in as to how much each behavior is occurring. For example, on the "Hyperactivity" subscale, question number 7 "Extremely overactive" may be answered with a "5" (almost always), and could potentially assist in diagnosing ADHD (see Appendix B).

Conners, however, rates each behavior from "0" to "3" ("Not at All" to "Very Much"), so a child who scores a "3" on the "Daydreams" question (number 9) may be indicative of either ADD or ADHD behavior, depending on the other symptoms and diagnostic methods used.

The Conners CTRS-28 appears to provide a general overview of classroom behavior with 28 non-categorized, typical behavioral symptoms. It appears that these symptoms are representative of ADHD/CD type behavior, and correlated with CTRS-39, ACTeRS and parent/home ratings, should generally portray behavioral manifestations, thus aiding the researcher in establishing basal norms. These basal norms would be general, but should, in a sense, be sufficient to highlight behavioral anomalies, and with the use of psychometric performance tests develop a diagnostic profile of the subject.

In Reid and Maag's (1994) study and critique on behavior rating scales, they describe this diagnostic problem. Once again "cutoff scores" are noted as difficult to establish and they call for improved techniques to not only identify ADHD children, but identify associated diagnoses/comorbid symptomatology.

It may be useful to in fact create a "diagnostic spectrum." This "spectrum" appears useful if used as a severity scale of behavioral manifestations — a scale of severity ranging from less noticeable, introverted LD and ADD children to the highly observable, extroverted ADHD, ODD and CD children. Behavioral rating scales and questionnaires are useful in this area.

The task remains to categorize and quantify the symptoms of each disorder, and attempt to develop "cutoff scores" based on the original assessment battery. This would effectively place diagnostic criteria into perspective and attempt to reduce diagnostic overlap (comorbidity).

The next step after behavioral rating scales is an examination of the child's actual learning abilities. This would be an all-encompassing evaluation which may in fact further aid in distinguishing ADHD/CD type behavior from ADD and LD. Often, however, there will be overlap in the diagnosis, as the ADHD child may appear learning disabled. It is for this type of scenario that behavioral ratings/observations play an essential role in their ability to allow the researcher to match performance with behavior. This is in effect a direct and essential coexistence — a relationship between behavioral rating scales and psychometric tests.

As psychometric tests detect and define learning and performance abilities, it is important for the researcher/clinician to determine and select the appropriate measures. This process involves a careful screening of what performance/learning related aspects the researcher/clinician is searching for.

Psychometric tests alone do not appear to find clear trends in respect of ADHD, but can to date be appropriate measures in an attempt to clarify the dimensions researched, in conjunction with rating scales (Barkley, 1990).

Psychometric tests can examine aspects such as general intelligence, problem solving skills, abstract recall, memory processes, verbal abilities and impulsivity. These can also be matched with DSM-IV (American Psychiatric Association, 1994) criteria, although, the DSM-IV is more of a diagnostic framework — a guideline that aims at very specific criteria. As a result, one can essentially utilize psychometric tests to build from the DSM-IV and behavioral observations frameworks.

Psychometric tests alone do not appear to find clear trends, but can add a valuable and essential dimension to behavioral rating scales and the DSM-IV frameworks. However, as DSM-IV and rating scales attempt to classify "pure" disorders, the psychometric tests may help to detect behavioral/performance variations that may otherwise confound the diagnosis. This is a potentially valuable component, as psychometric tests could potentially find certain areas which would clarify behavioral observations and rating scales.

If this could be achieved, such an approach could well determine that psychometric findings alone will be, at best, indicators of problems. However, in conjunction with other methods like behavior rating scales, it may become possible to discriminate which measures or subtests could be sensitive to differentially diagnosing the presence of ADHD.

To date, Cantwell's (1996) results of psychometric tests have not been seen as particularly significant in themselves. It can be argued, however, that if the focus is on subtest or test specificity, that psychometric evidence could be valuable as a criterion measurement could be compared.

Psychometric tests such as the WISC-III (Wechsler, 1991) are commonly used in attempts to identify ADHD children.

Anastopoulos et al. (1994) examined construct validity and diagnostic utility of the WISC-III. However, they examined the "Freedom from Distractibility" factor as opposed to "Verbal Comprehension" and "Perceptual Organization" factors for the group and individually.

With the individual differences not adequately showing significant associations as did the group's, Anastopoulos et al. (1994) failed to determine individual variations in ADHD-type behavior. They found significant correlations, however, between teacher ratings and WISC-III "Freedom from Distractibility" factors, but possibly more WISC-III items could have been added.

Nonetheless, from the perspective of confirming a diagnosis of ADHD, and identifying individual children, this could not be achieved on the WISC-III alone. The Freedom from Distractibility factor did not, in itself, clarify a diagnosis.

The study, however, appeared to indicate that multiple measurement techniques and specific identification issues could be focussed on. Furthermore, this study proposed that the WISC-III incorporated with other measures could be useful for diagnosis and identification purposes in ADHD.

The Anastopoulos et al. (1994) study is at variance with Barkley (1996) who appears to minimize the utility of intelligence testing. Barkley, however, does not focus on the potential for discriminating ADHD patterns in such tests, nor does he focus on discriminating comorbid features in such tests. It is evident from the Anastopoulos study that significant advances are feasible, utilizing intelligence and achievement tests in conjunction

with behavioral rating scales. Consequently, psychometric tests and rating scales, together, are a potential diagnostic measure.

Other performance tests such as the DAS (Differential Ability Scales) (Elliott, 1990) may create further useful diagnostic dimensions. While Barkley (1996) calls for the use of CPT's (Continuous Performance Tests) such as the Gordon Diagnostic System (Gordon, 1983), they too have flaws such as "false negatives" resulting in meaningless "normal" scores.

The DAS (Elliott, 1990) for the same reason may have utility in identifying problems in performance, and linking specific achievement scores to behavior rating scale scores. It could be argued that the DAS, WISC and behavior rating scales could be a useful battery, if the Anastopoulos model is somewhat extended.

With a range of assessment devices for ADHD diagnosis, researchers need to carefully select appropriate measures for detecting behavior/performance variations. For a direct and unconfounded examination of behavior and performance in ADHD children, it appears that certain subtests will be meaningful if correlated with appropriate rating scales.

While other specific measures for ADHD may add a greater dimension for diagnostic accuracy, some appear on the periphery of diagnostic utility and therefore may not be useful in the multimethod assessment battery. The issue remains that the best approach to multi-modal diagnosis is through a wide range of assessment measures.

While Cramond (1994) found links between ADHD behavior and creativity, the question is raised as to how widely the search for diagnostic clarity should go. There is no major argument in favor of creativity as a diagnostic component of ADHD.

It is important to maintain an understanding of purpose in ADHD diagnosis. The crucial issue at this stage of diagnostic research is the separation of ADHD from CD, ODD, LD, ADD and other comorbid disorders.

Further Attempts to Diagnose ADHD

Other attempts to diagnose ADHD such as Cramond's (1994) study on creativity can be further complemented by other "peripheral" measures.

Because comorbidity is ever-present, a review of other measures which are related to or may parallel the measures selected for the new multimethod assessment battery may be somewhat useful. As ODD, CD, LD and ADHD variations of different intensity are at present difficult to accurately measure, the following studies have been selected as they appear to show some potential for diagnostic utility.

In their review of ADHD diagnostic history, Anastopoulos, Barkley and Shelton (1994), point to the fact that research in North America and Britain is able to portray ADHD as a separate and valid disorder, but in many cases, associated with ODD and CD. This is an important establishment as the basis for diagnosis, and establishes the need for differential diagnosis as primary to ADHD research. Without differential diagnosis, it appears difficult to understand ADHD.

Semrud-Clikeman, Hynd, Lorys and Lahey (1993) used WISC-R factors to differentially diagnose ADHD, ADHD + CD and a control group with an internalizing disorder. Their results point to WISC-R performance variations for ADHD + CD children differing greatly from the internalizing disordered (control group) and ADHD group. This indicates the ability

to separate ADHD from CD and also indicates some positive validity in the use of Wechsler scales.

Furthermore, the WISC-R was their sole source of instrumentation, proving positive in its distinguishability, at least on performance. The question then arises as to whether the study could have been expanded and further validated to determine and distinguish the control group's internalizing disorder from the ADHD-only group.

Educational and behavioral issues used in combination are essential to the diagnostic definition of ADHD. Both factors can be developed to show up situational performance/behavior manifestations and effectively studied to define comorbidity boundaries. Further "peripheral" measures that appear to demonstrate a degree of diagnostic utility are the Child Behavior Checklist (CBCL) scales, structured interviews, Continuous Performance Test (CPT's) and related Wechsler devices such as Wechsler's Deterioration Index (WDI). These are shown to potentially examine comorbidity with specific emphasis on the comorbid issues such as anxiety and depression, which are often overlooked in the ADHD diagnosis.

Biederman, Faraone, Doyle and Lehman (1993) have further examined this comorbidity in ADHD diagnosis. Using CBCL scales and structured interviews for ADHD and normal boys aged 6 to 17 years, they found high levels of convergence. This showed the CBCL "attention problems" scale to indicate ADHD diagnosis, while the "delinquent behavior" scale indicated CD diagnosis, and the "anxiety/depression" scale showed anxiety disorders. As a result, they approve of the CBCL as a useful screening tool in identifying ADHD and comorbid diagnoses.

While appearing to be a positive study with the CBCL as a promising identifier of comorbidity, the results, however, may be somewhat superficial. The CBCL scales appear to have preconceived boundaries designed to indicate and screen for co-occurring disorders. However, it is still virtually impossible to develop such clear-cut boundaries until accurate norms and exact cutoff scores can be established. Nevertheless, the study does appear valid in its attempt to define such boundaries, although, they may be "rough" boundaries. Only with further research and appropriate instrumentation can those boundaries be further defined to yield an ADHD diagnosis separately from co-occurring symptomatology.

The specific symptoms of ADHD namely inattention, impulsivity and hyperactivity have been examined by Halperin, Matier, Bedi and Sharma (1992). By using a CPT (Continuous Performance Test) to evaluate inattention and hyperactivity, their results point to the overactivity measure as the determining factor of ADHD, while inattention and impulsivity appeared non-specific.

These findings appear to lack specificity as the researchers failed to group attention and impulsivity components and apply them to specific comorbid disorders such as ADD or LD. Furthermore, they associate inattention as a general component of "child psychiatric disorder," rather than categorizing it into specific components, thus it appears too general. However, inattention while occurring in many psychiatric disorders can be broken down into specific components and possibly linked specifically to comorbid disorders such as ADD or LD. Could inattention, for example, be singled out as the prime symptom of ADD or LD; and is inattention the driving symptom of ADHD?

By focussing specifically on this important aspect, researchers may be able to more easily pinpoint and clarify the inner mechanisms that specify a particular disorder.

Once this is accomplished, not only would the comorbidity question be closer to being answered, but other factors, such as intelligence could also be pinpointed to determine if and why the group is performing and behaving in a negative manner.

In an attempt to combat severity and situational variability, Barkley (1991b) proposes the use of a multi-method combination of standardized behavior rating scales, laboratory measures of ADHD, and both classroom and clinic-based behavior observations.

With these measures, however, the actual "severity" issue becomes elementary in its need to be "measured." To date, severity appears to be a guiding element for diagnostic classification. The question then arises, for example, as to how severe is LD or other comorbid symptomatology, and how much more severe need its behavioral manifestations be to classify it as ADHD. The same example applies to distinguishing ADHD from ODD and CD, which are further enhanced behavioral manifestations — in fact, to the point where they are highly disruptive.

Other studies that have attempted to address comorbidity and the issues of severity attempt to differentially diagnose ADHD to set it apart on its own. Waldman and Lilienfeld (1991) for example attempted to differentially diagnose ADHD apart from ODD.

Using teaching ratings of both ODD and ADHD symptomatology for 102 boys aged 8 to 12 years, they attempted differential diagnosis, and an examination of diagnostic efficiency.

Results point to the use of conditional probability indices as promising in diagnosis and differentiation not only between ADHD and ODD, but as a general method for differentiation of all childhood disorders. However, the establishment of ADHD and ODD symptoms still appears weak, and the researchers use these symptoms as a basis for

differentiation, when "normal" symptomatology may have provided a more "efficient" basis. Nevertheless, the superficial efficiency of the symptoms appears rooted in the basic question of what constitutes "normal" behavior, and as to how severe behavioral manifestations must be in order to classify ADHD and ODD type behaviors.

Differential diagnosis for ADHD has been examined by Weinberg and Emslie (1991) in their argument that ADHD may be overdiagnosed, wrongly diagnosed or that similar symptomatology may further complicate identification and later treatment programs. Comorbid symptomatology such as depression, mania, primary disorder of vigilance, narcolepsy, developmental-specific learning disorders, conduct disorders and acquired neurologic deficits are examined. They call for clinicians to be aware of these coexisting symptoms and for careful examination and awareness of these symptoms during the assessment process. It appears that when these "comorbid" symptoms occur, they are generally severe enough on their own to be detected as independent disorders. It too seems evident that rather than these disorders falling comorbid with ADHD, it would be vice versa, with ADHD symptoms coexisting with these more "severe" disorders. As a result, ADHD should possibly be eliminated completely, and these "coexisting" disorders diagnosed autonomously.

There have been a series of approaches aimed at differentiation and identification of ADHD, although, the issue of severity is not clearly addressed.

For example, Lufi, Cohen and Parish-Plass (1990) have compared ADHD with ED (Emotionally Disturbed) children and a non-disabled control group. However, there was little differentiation between the ADHD and the control group, and the ED group was shown to perform more effectively than the ADHD group.

As a result, it appears that ADHD and ED can be differentiated, but can this type of model be replicated? Furthermore, where does one draw the line between pre-diagnosed ED and ADHD groups? There are differential levels of severity in each group, and there may be other confounding factors, such as IQ, affecting performance in each group. It appears that conclusions cannot be drawn without extracting the "hidden" factors such as IQ — a time-consuming process.

Other approaches following the quest for differentiation, have been examined by Crawford and Barabasz (1996). Barkley (1996) further portrays this "hidden" evidence as his findings appear to suggest neurological differences between ADHD and non-ADHD groups.

Further differentiation has been attempted by Herkov, Gynther, Thomas and Myers (1996) and Paternite, Loney and Roberts (1995), examining potential ADHD manifestations such as ODD and CD, and potential for depression.

Underlying symptomatology such as IQ and performance abilities may further complicate the ability to differentiate on the basis of observable behavior. There are likely underlying issues driving the observable surface behaviors that are most easily measured. Personality attributes of each disorder may need to be more closely examined in conjunction with intelligence and possibly social factors.

ODD and CD children are likely to present as more disruptive than ADHD children. However, the additional underlying anatomy of each disorder would need to be studied closely, as by observational assessment, there is no cutoff point to distinguish the true symptoms of these manifesting disorders.

While assessment of cognition, attentional functioning, family functioning, and behavioral symptoms as tested by Paternite et al. (1995), were comprehensive approaches, they could not effectively distinguish ADHD apart from other groups. Once again, this calls for the need to micro-examine the hidden "inner-workings" of each set of symptoms — a more specific, but important process.

By building on simpler, basic diagnostic models, researchers can attempt to specify and duly create diagnostic barriers between comorbid symptomatology. These models presented are useful as templates from which more detailed, more specific research can be rooted, partialling out underlying factors in the quest for differentiation. The eventual result could potentially be the use of appropriate, specific and standardized "symptom cutoff scores" based on DSM-IV (American Psychiatric Association, 1994) criteria.

In the quest for diagnostic purity and appropriate categorization, it appears that a well balanced and planned multimethod battery is crucial. According to Cantwell (1996), a combined assessment battery based on both behavior rating scales as observed by parents and teachers, and psychometric tests to correlate the performance aspects with causal and resulting behaviors is essential. Furthermore, by holding these variables in close proximity, they can potentially be interrelated and applied directly to the ADHD diagnostic severity spectrum. As a result, the essential and defining features of ADHD and its comorbid behavioral counterparts may potentially be examined without interference from extraneous variables. No current research appears to have successfully accomplished this goal.

Essential observed behavioral characteristics, and tested performance of ADHD children, are the core symptoms of the disorder. Therefore, diagnosis should be based upon what is currently established and known. To attempt to measure the unknown and

incorporate these criteria, whether neurological attempts of classification or personality attributes, can appear positive, but in reality be detrimental and extraneously confound the diagnostic process. However, underlying symptomatology may potentially hold the key to our understanding of the inner workings of ADHD, allowing for a less confounded and more specific approach to diagnosis.

The call for concrete diagnosis is rooted in what researchers can establish as defining and differentiating symptoms along a spectrum. To harness these symptoms and produce concrete diagnostic results, the "balanced" assessment battery must be specific and directly focused upon the symptomatology in question.

As current models have focussed on one or two measurement aspects, the need for increasing the number of measurements seems apparent. The issue of "balance" in the study is essential as an overly detailed and large assessment battery may complicate diagnostic efficiency. As a result, it must be balanced to eliminate childhood boredom which would in turn cause attrition in the results.

The issue at stake is thus to determine which psychometric tests and behavior rating scales are likely to represent and highlight ADHD symptomatology. Once this is accomplished, these methods of assessment can be appropriately incorporated, and results correlated, in an attempt to measure ADHD symptoms. In effect, these results could yield an autonomous and unconfounded diagnosis of ADHD.

CHAPTER 6

METHODOLOGY AND STATISTICAL ANALYSIS

The range of assessment and diagnostic procedures were previously reviewed, setting the stage for a direct focus on, and specific measurement of ADHD symptoms. This study concerned itself with an attempt to formulate a clear diagnostic battery of tests which would be utilized to pinpoint ADHD. In this attempt to identify ADHD, one can use the analogy of detecting kidney stones through the use of X-Ray technology.

It is postulated that certain subtests will depict ADHD symptomatology through performance disparities. In addition, behavioral anomalies should also arise between normal and ADHD samples. The purpose is to use both psychometric tests and behavior rating scales in a combination format to determine clear ADHD — a "pure" diagnosis, if possible. A numerical strength factor could potentially be utilized in order to highlight the accumulated performance/behavior disparities. This could then be standardized, based on this battery, to achieve concrete evidence of ADHD symptomatology.

Future research could apply this system of using this strength factor, previously termed "NEI" (numerical equivalence factor) to finding comorbid disorders. Comorbidity will automatically arise based on the power or strength of the diagnosis. Therefore, weak ADHD diagnosis for one subject may indicate LD, dyslexia or simply ADD. Furthermore, an overly strong ADHD diagnosis for a given subject may indicate CD or ODD symptoms if the conduct/oppositional behavioral indices correlate highly.

As a result, this assessment battery is designed to be used not only for ADHD diagnosis, but as a platform for further research into comorbid disorders and their diagnostic classification. However, the assessment battery must initially be simple enough, concise and user friendly in order to be useful for future research.

In order to perform this essential function, this assessment battery is one of combined psychometric subtests and parent and teacher rating scales. To date, clinical observations, parent and teacher reporting, and behavior rating scales have been the most widely used components in determining a diagnostic entity. There has not yet been an effective psychometric diagnostic battery utilized (Arnold & Jensen, 1995; Barkley, 1990; Cantwell, 1996). Barkley (1996) tended to downplay the usage of psychometric batteries on the grounds that no clear patterns have been determined.

It is, however, possible to make the argument that there has never been an adequate determination of specific batteries to date. As reviewed earlier, a number of studies such as Anastopoulos et al. (1994), DuPaul et al. (1992), Halperin (1991) and Seidel and Joschko (1991) have utilized parts of various tests, or one or two psychometric tests, but not found a clear pattern of ADHD scores. Therefore, psychometric tests used alone may be too discreet, as are rating scales if used alone. However, if used in combination, in the form of a battery of tests and scales, they should prove more useful in detecting clear disparities.

It is also postulated that clinical determination of specific subtests has not to date been extensive enough, nor have sufficient comparative tests been utilized. Therefore, it can be noted that no test is designed and constructed specific to ADHD. For example, intelligence tests, such as the WISC-III (Wechsler, 1991) are not specific to ADHD, but are

merely a diagnostic "component". Consequently, interpretation of trends is the most important component.

To date, these trends do not appear to be adequately determined, and psychometric evaluation has not, as a result, been viewed as being the high potential diagnostic tool it should be.

While considerable diagnostic testing has been performed on the ADHD population, the results are largely focussed on general levels of educational and psychological performance rather than utilizing or regarding patterns as diagnostically useful.

In ADHD, it is proposed that subtest indicators will be significantly useful in determining ADHD, through problems in concentration, impulse, rapidity, integration of information and memory processes. Subtests measuring these would thus be useful in diagnostic patterns for ADHD measurement.

Barkley (1990, 1991a, 1996) views psychometric tests in the overall sense as having provided little specificity to diagnose ADHD. He thus appears to downplay the importance of subtest information in diagnosing ADHD.

These substantive findings thus reflect a lack of utility of psychometric assessment due to methodological considerations. For example, large multifactorial studies are not finding differential patterns. Therefore, the question that one should ask is — "How can they?" The tests are, in the overall sense, not constructed to do so. On the other hand, there should be much contemplation around clinical cognitive components dealing with memory, attention, concentration, information processing and impulse generated tasks. The criterion related components in these areas are more likely to be closer to clinical symptoms in the areas mentioned, and the tests should clearly provide adequate measurement in these areas.

Consequently, a sound argument on reliability of measurement can be postulated — that specific test components measure the variables/symptoms which are clinically, familiarly, or educationally noted.

The reliability of the measurement can be further extended to the argument that if there is agreement that the scores derived on the tests are specific, such as low/high scores; these would indicate strengths and weaknesses. In the research, for example, WISC-III areas clearly indicate that over a lengthy period, the Wechsler tests reliably measure intellectual components (Buros, 1992).

Criterion validity too can be easily established in that where specific diagnoses are made, subtest results will confirm these diagnoses. The battery indices or subtests will relate in terms of high or low scores to the clinical presentation of ADHD. The clinical component is consequently a construct, and the study attempts to find a series of measurement instruments to psychometrically define the diagnosis.

Combined with the behavior rating scales, namely, Conners (1990) and ACTeRS (Ullmann, Sleator, & Sprague, 1991), the psychometric tests used are integrated in order to further highlight, and attempt to strengthen, the group disparities to solidify the diagnosis. With both behavior and performance measures (rating scales and psychometric tests) scored in numerical form, certain measures can show disparities, while others are not as clear. However, it is generally believed that ADHD children behave and perform differently from normal (non-diagnosed) children, and these disparities can be highlighted by specific measures. These most indicative measures can then be effectively incorporated into a usable and comprehensive assessment battery. This would differentially diagnose ADHD children

apart from normal children, and potentially segregate comorbid confounds through eventual and defined specificity.

Hypotheses

It is expected that specific psychometric subtests will highlight ADHD symptomatology through performance differences. In addition, any differences in performance should be further strengthened by high correlations from behavior rating scales. With the dimensions combined, (including memory tests), it is postulated that ADHD children can effectively be detected. This would then, ultimately, erase the diagnostic confounds that have occurred in the previous diagnostic studies, and formulate a concrete assessment battery that can accurately diagnose ADHD.

In addition to standard anticipated performance and behavior differences between the control group and ADHD group, IQ differences and achievement differences will be noted with specific interest. This is due to research controversy. To date, it is questionable as to whether or not IQ can be used as a group distinguisher.

Should this occur, IQ can be more closely examined, and held constant, to determine as to whether or not it modifies the relationship between ADHD and performance. Furthermore, aside from using IQ scores simply to distinguish between the two groups, the IQ variable, if partialled out may potentially change the outcome of this study. Thus IQ could potentially have a two-fold use in this study, should it prevail as a dominant and significant distinguisher.

On the other hand, IQ differences may not occur at all, and if any do occur, may in fact be due in part to ADHD behavioral symptoms interfering with performance subtests on

the WISC-III IQ test. Furthermore, the primary focus of this study, to examine basic behavior and performance differences may not reveal any significant differences. It is hoped, however, that this battery of subtests and subscales will reveal significant group differences, and significant associations between ADHD symptoms and performance, in order to specifically differentiate, and, in turn, diagnose ADHD.

The sample is comprised of 64 male students aged between 7 and 16. A larger sample could potentially have been chosen, including female subjects, although, this would likely show greater significance in a follow up study on comorbidity. Female subjects have tended to be diagnosed primarily as LD comorbid with ADD, and potentially with some ADHD characteristics, although, primarily internalizing characteristics. For this reason, the male sample appears to have greater validity in providing a concise basis for what this study is essentially about. The specific characteristics of the population of interest are rare and unique. Therefore, it is more difficult to obtain a larger sample size within the scope of this study.

Complicating the sample selection would ultimately confound the study and possibly "blunt" the basal parameters for which this battery is designed to achieve. A male sample would therefore facilitate differentiation scores without confounding the diagnosis. Thus initial diagnostic clarity on the sample has been an essential ingredient.

The sample of students is of equal proportions. Thirty-two normal children comprise a control group, and 32 of these children have been pre-diagnosed with ADHD, providing an experimental group. Initial diagnosis shows no evidence of comorbidity, which would obviously cloud diagnostic parameters.

The ADHD (experimental) group was pre-diagnosed by a clinical psychologist. These are children who have demonstrated disruptive and inattentive behavior in daily classroom activities. The non-ADHD (control) group was extracted from applicants to this school, which is a large school drawing from all levels of socioeconomic status.

This non-ADHD group appeared to be free of any psychopathology, and can be easily matched to the ADHD group, which appeared to be, and was specifically chosen this way, to be free of significant comorbid psychopathology. The non-ADHD group appears to have been a highly motivated group, providing an ideal control platform from which to work from. In addition, the ADHD-diagnosed group, appearing to be free of comorbidity, provided a solid, non-confounded experimental platform.

These students attending Collingwood School in West Vancouver, Canada have provided a clear and concise experimental design for this project. This has facilitated the research into detecting diagnostic criteria for differentiation between the two pre-established groups.

To achieve this process, the study has been correlational in nature, with a cross-sectional design. Both clinical (ADHD) and control (normal) groups have been examined based on the data from the subtests and rating scales. The examination is based on differences between clinical and control groups by analysis of variance.

The initial assessment for the sample was based on DSM-IV (American Psychiatric Association, 1994) criteria. The control group was comprised of applicants to Collingwood School, West Vancouver, Canada. These applicants undertook the extensive battery of tests, and were diagnosed by the school psychologist to be free of psychopathology and comorbidity; and based on DSM-IV criteria, were placed as a control group.

The experimental group was comprised of students who were initially perceived by parents and teachers to be disruptive and inattentive. These students, some already in this school, while others were applicants who, based on DSM-IV criteria, met the ADHD diagnosis.

The school psychologist assessed and diagnosed the entire sample — control and ADHD groups based on the assessment battery of psychometric and behavioral measures, and classified them on the basis of DSM-IV criteria. These students were diagnosed between 1994 and 1996 by the school psychologist at Collingwood School.

The sample is representative of a wide socioeconomic range in order to yield less biasing results. Both parent and teacher observations of behavior, on behavior questionnaires, as well as performance attributes, on psychometric tests, were noted and incorporated to validate the diagnosis, and effectively distinguish between control and ADHD groups.

Psychometric and Behavioral Measures

Each child was assessed on the following psychometric tests, and the data was then compared for differentiation purposes:

1. Wechsler Intelligence Scale for Children, 3rd Edition (WISC-III) (Wechsler, 1991).
2. Wechsler Individual Achievement Test (WIAT) (Wechsler, 1992).
3. Differential Ability Scales (DAS) (Elliott, 1990).
4. California Verbal Learning Test — Children's Version (CVLT-C) (Delis, Kramer, Kaplan, & Ober, 1994).

Matarazzo (1990, 1991) has recommended that psychometric test results be fully integrated with behavior rating scales. This would, in effect, provide a "balanced" assessment battery as this important dimension is integrated. This information is derived from parents and teachers, and has effectively provided greater insight into the situational context of the child.

As Salvia and Ysseldyke (1991) have suggested, the child's environment is an important, and vital aspect, in shaping behavioral manifestations. In addition, the manner in which a child performs can be directly or indirectly attributed to environmental aspects. To take these issues into account, the following behavior rating scales have been utilized:

1. Conners' Parent and Teacher Rating Scales, CPRS-48 and CTRS-28 (Conners, 1990).
2. ADD-H Comprehensive Teacher's Rating Scale (ACTeRS) (Ullmann, Sleator, & Sprague, 1991).

These rating scales were completed by independent observers, namely parents for the home situation, and teachers for the school situation. By making use of both Conners and ACTeRS scales, attempts have been made to reduce subjective biases. Both parent and teacher biases can effectively alter results, and bias the subjects' behavior in either positive or negative fashion. To override these biases, both Conners and ACTeRS have been correlated in numerical form in an attempt to achieve a certain degree of strength. This would effectively eliminate biases through this "balancing" of results within the rating scale portion of the assessment battery.

Finally, a third dimension of balance can be incorporated — that is actually integrated into the psychometric tests. Each test is designed with behavior observations in mind and

these observations can be applied directly to each subtest/task that the child completes. While this element is not vital to the success of the assessment battery, it is available if required, and could potentially be useful in providing greater insight into performance/behavior anomalies.

Further "balancing" against parent and teacher biases will also occur automatically in this study as both teacher and parent behavior ratings will be correlated together. In addition, their correlations with performance tests will effectively cancel out rater biases as associations will be drawn between ADHD symptoms (represented by the behavior rating scales) and performance tests consisting of ability, achievement, intelligence, and memory tasks.

1. The Wechsler Intelligence Scale for Children — Third Edition (WISC-III; Wechsler, 1991) is designed to measure intellectual ability in children aged 6 years to 16 years, 11 months. Verbal, Performance, and Full Scale IQs devised from the WISC-III are designed to estimate each child's intellectual abilities.

As an "intelligence test", Matarazzo (1990) and Wechsler (1991) point to cautions on the part of the researchers/clinicians in that intelligence cannot merely be measured in one set of tests. Instead, the subject's entire "life history", socioeconomic status, medical factors, and cultural factors must be incorporated. Therefore, a full assessment battery must be able to incorporate these "life aspects" in order to create a comprehensive understanding of the subject.

To further validate this scale, its 12 subtests are grouped into verbal and performance scales. The subtests that are utilized in this study are as follows:

Verbal	Performance
Information	Picture Completion
Similarities	Coding
Arithmetic	Picture Arrangement
Vocabulary	Block Design
Comprehension	Object Assembly
Digit Span	Symbol Search

Of these subtests, it should appear that the most pertinent as used in this battery would be Block Design, Coding, Digit Span, Symbol Search, Picture Arrangement and Arithmetic. These appear most likely to show signs of impulsivity, carelessness, attentional problems, and poor recall due to infiltration by extraneous stimuli. The latter would appear to impede concentration ability.

The 12 subtests used include the following:

Information — This subtest examines the child's general knowledge about people, places, objects and events. The child responds to a series of questions with no specific time limit set.

Picture Completion — Here the child is asked to identify which part of a presented picture is missing. The child is given 20 seconds in which to respond. This subtest is factored into the Perceptual Organization score.

Similarities — The child explains how two orally presented words are similar. This subtest is factored into the Verbal Comprehension index and examines reasoning ability to some extent.

Coding — The child must draw in corresponding shapes or numbers according to a given key. By looking at a special mark for each shape or number, the child must complete the exercise in 120 seconds, by drawing each corresponding shape. Processing speed and impulsivity are thus essential factors of this subtest.

Arithmetic — Here the child mentally solves a set of arithmetic problems, and must respond orally in a given time limit. Distractibility appears to be an important factor here, potentially impeding performance.

Picture Arrangement — Here the child must logically re-arrange a set of mixed-up pictures to make a story. A time limit is set in place, and the child is made aware of this. Often haste creates mistakes, and impulsivity appears to play a factor in this subtest.

Vocabulary — Here the child must define a series of words that are presented orally. This general knowledge, verbal comprehension factor would not likely play a role in the distinguishability between normal and ADHD children.

Block Design — In this subtest, the child must replicate a picture design using two-colored blocks. Under a time limit, the child rapidly places the blocks together to replicate the given pattern. When completed, the child must tell the psychometrist that he or she is "done". Impulsivity appears to play in as a factor in this exercise, as the subjects often think that they are complete, without actually verifying their accuracy.

Comprehension — Although this subtest falls under the "verbal comprehension" heading, it may, in fact, highlight problems that ADHD children may experience in day-to-day situations. Here the child must solve a series of questions that are presented orally. These involve solving everyday problems such as "What is the thing to do if a boy (girl) much smaller than yourself starts to fight with you?" Problems such as these represent

understanding social rules and concepts which ADHD children may not generally adhere to due to their apparent inability to filter out extraneous information.

Object Assembly — Here the child assembles a series of puzzles under a set time limit. These are puzzles representing common, known objects such as a horse, human face and a car. In this exercise, impulsivity and perceptual abilities appear to be important factors.

Digit Span — The child must repeat a series of orally presented number sequences by remembering the sequence. First, the digits are presented and the child repeats them verbatim, but then, must repeat the second part of the exercise backwards. Concentration and immediate recall ability appear to play a role in this exercise.

Symbol Search — In this subtest, the child must scan a target symbol and determine as to whether or not it is found in the search group. Often mistakes appear due to impulsivity and carelessness as this test is strictly timed. On the other hand, the child may lose awareness of the time limit and not perform well as he or she becomes "bogged down" in detail.

The WISC-III standardization sample was representative of the U.S. population of children and stratified to ensure equal demographic representation. One hundred males and 100 females were tested in each of 11 age groups ranging from 6 to 16 years. The entire sample consisted of 2200 subjects. Age, gender, race/ethnicity, geographic region and parent education were all accounted for (Wechsler, 1991).

Reliability — The average reliability coefficients for the subtests, IQ scales and factor-based scales are as follows:

Subtest/Scale	Average r_{XX}^A
Information	.84
Similarities	.81
Arithmetic	.78
Vocabulary	.87
Comprehension	.77
Digit Span	.85
Picture Completion	.77
Coding	.79
Picture Arrangement	.76
Block Design	.87
Object Assembly	.69
Symbol Search	.76
Scales - IQ	
Verbal	.95
Performance	.91
Full Scale	.96
Scales — Factor-Biased	
Verbal Comprehension	.94
Perceptual Organization	.90
Freedom from Distractibility	.87
Processing Speed	.85

Validity

Construct validity for the WISC-III was achieved by factor analysis. Each construct or "latent variable" was correlated with other intelligence tests. The "Full Scale IQ" scores (FSIQ), which are based on 10 WISC subtest scores correlated with other global ability

constructs. Scores were then derived from cognitive abilities ("constructs") such as memory, reasoning and comprehension once they were compared with other tests.

The importance of this type of testing is noted in its use in occupational, educational and academic arenas. These criteria related to the "global intelligence construct" and can be used to measure "global ability" in generalized situations.

Criterion or "predictive validity" was achieved by intercorrelating verbal, performance and full-scale IQ scores in a large sample of "normal" and special-education groups. These groups varied in age. Correlations were significant; including correlations between WISC-R and other measures of cognitive ability, which were also performed.

The result shows favorable evidence for global IQ estimates, and additional studies have demonstrated predictive validity on a global level.

Content validity does not appear to be achievable in this type of test, as intelligence is a global construct, and applies to such a large number of socio-academic aspects (Miller, 1987). Therefore, content validity will not necessarily apply in this type of test.

With all said, the WISC-III appears to be of great use as an integral component for testing children who present with behavioral and academic problems. As a result, the WISC-III can be useful for diagnosing cognitive aspects as related to symptoms such as inattention or conduct issues and the impacts of these problems on one another. This ultimately paves the way to concrete assessment and diagnosis.

2. The Wechsler Individual Achievement Test (WIAT) (Wechsler, 1992) was administered to both groups of students, and was utilized to measure achievement. It was designed to assess and diagnose learning disabilities, and appears to be useful as an integral

component for the assessment of ADHD and other related disorders. Its applicability appears useful in its attempt to parallel, and in effect, match classroom teaching. As a result, the WIAT was chosen as a seemingly relevant aspect in the assessment process.

The WIAT was designed for use in children aged between 5 and 19 years (grades K through 12), giving it an apparent high degree of flexibility and utility. Standardization of norms was achieved by using a stratified random sample to ensure proportionate representation. This was matched by age, grade, gender, race, geographic region and parent education. All demographic aspects have been accounted for and matched to age, specific sample size (n), gender, race and parent education level. Socioeconomic status, however, was not accounted for.

WIAT composite standard scores were derived from the sum of actual raw scores for each child tested. Linear transformations of average standard scores were based on the mean and standard deviation for each age and grade.

Reliability

Reliability coefficients for the WIAT were obtained by using two equivalent halves of each subtest, representing parallel forms with equal variances. Scores on half-tests were intercorrelated using the Spearman-Brown formula $\left[\frac{2r}{r+1} \right]$. Split-half reliability coefficients for each subtest were obtained in addition to composite scores. The latter are used to summarize a child's performance, and are not as specific as individual subtest scores which have been used in this assessment battery.

Average age-based (ages 5 to 17) reliability coefficients for WIAT subtests are as follows:

Subtest	Average r_{XX}^2
Basic Reading	.92
Mathematics Reasoning	.89
Spelling	.90
Numerical Operation	.85
Reading Comprehension	.88
Written Expression	.81

Validity

To achieve content-related evidence of validity for the WIAT and its subtests, both expert judgements and empirical item analysis were used. Item-total correlations were examined for each subtest and age, and item-bias studies pinpointed problematic items which could then be deleted. The subtests were then carefully balanced to address curriculum objectives. Final WIAT subtests are thus internally consistent and content-representative. Gender and ethnic biases have apparently been removed, resulting in content-homogeneous subtests.

To achieve construct-related evidence of validity, subtest intercorrelations, Wechsler scales correlations, group difference studies and a multitrait-multimethod study of WIAT and other achievement tests were conducted.

Finally, criterion-related evidence of validity is evident as correlations with other achievement tests were evaluated. In addition, school grades and child psychopathology classifications were accounted for. These classifications included gifted, mentally retarded, learning disabled and ADHD children. These established composite standard scores were based on the mean for each group.

In the case of their ADHD sample, the lowest mean scores occurred for "Basic Reading", "Spelling" and "Numerical Operations". Their resulting hypothesis is that these three subtests are representative of the highest concentration and attention to detail requirements, and should therefore be most relevant to use in the comprehensive assessment battery. It should be noted that 22 of their ADHD sample was taking Ritalin. This could have potentially altered or modified the findings, although, their ADHD sample size was 39 in total. WIAT scores for the 22 ADHD children (using Ritalin) were based on WISC-III IQ scores. Finally, comorbidity with LD, and other disorders could have potentially modified the standard scores, and the "Reading Comprehension" subtest failed to show significant results even though this test should show the greatest need for attention and concentration. Once again, the need for a greater number of assessment tools is called for to attempt to show significant differences and highlight ADHD as an independent classification.

The following WIAT Subtests have been incorporated into the assessment battery:

Basic Reading — In this subtest, the child decodes letters and words in order to read the words. This is beneficial as the child may attempt several strategies when presented with unfamiliar words. These may include guessing, sounding out the word, and/or breaking the word into syllables. Impulsivity could result as a "hidden" (2nd order) factor in this subtest, but primarily, this subtest examines reading ability.

Mathematics Reasoning — Here reasoning skills and strategies the child uses to solve arithmetic problems are accounted for. Spontaneity of responses and mental planning strategies can be taken into account — these could include guessing, checking and the elimination of extraneous information.

Spelling — This subtest is designed to evaluate the child's written responses and any possible skill deficits. Errors and invented spellings can be attributed to weaknesses in word-analysis and word-reading skills. Both poor visualization and phonetic sequencing problems indicate order errors which can then be further investigated through other written work.

Reading Comprehension — Here the child reads a short story and is required to answer a question pertaining to the story. This test is designed to identify sequencing, ability to state cause and effect relationships, ability to recognize implied cause and effect relationships, ability to make inferences such as predicting events and outcomes and finally to identify comparing and contrasting ability.

Of most value to the assessment battery, however, the hidden factor (2nd order factor) of this subtest should be its ability to show weakness in attention and storage problems for ADHD children. ADHD children should also be identified through their basic inability to concentrate and comprehend the given passages. Furthermore, basic cognitive interferences could also potentially be identified in this type of task — these blocking the ADHD child's ability to formulate responses to the questions.

Numerical Operations — This subtest measures basic mathematics skills, and the child is asked to work out math problems and arrive at a solution. The child must work out the problems presented, showing the workings. As problems can be solved in a number of

ways, the focus is on the solution, and the child's ability to utilize accepted methods for coming to a conclusion.

Written Expression — Here the child must write a letter describing his or her "ideal home" and provide details. Not only does this subtest examine writing skills, but it examines planning and organizational strategies. In addition, ideas and development, impulsivity, unity and coherence problems can be examined and identified. Vocabulary is also taken into account as part of the child's ability or inability to express him or herself.

The subtest may also potentially show secondary factors such as the child's interests and imagination. Although, these factors are not DSM-IV ADHD classification factors, they may potentially give insight into where and why the child is not a) concentrating; and b) attending to daily classroom activities. Possibly, through such "freedom of expression", the child may demonstrate breakthroughs in written expression, but may appear daydreamy and/or inattentive or disruptive when presented with daily monitoring.

Ability-Achievement Discrepancy Analysis — A major utility of the WIAT is its ability to compare a child's general ability level with that of achievement. Discrepancies between achievement and ability can be calculated by correlating the WIAT with the WISC-III and basing these correlations on a large sample. Reynolds (1990) has mentioned that samples collected for Wechsler scales are exceptional for such psychological assessment tools.

With this endorsement, there are, however, limitations. These limitations are rooted in the basic inability of one assessment tool to adequately identify learning disabilities or other childhood weaknesses. They call for a background and academic knowledge of each child who is tested.

Reynolds (1990) has further stated that severe discrepancies do not constitute an LD diagnosis, but only establish a primary symptom of LD. Secondary symptoms and comorbidity should be accounted for by establishing a comprehensive, balanced assessment battery. Essentially, he calls for a full understanding of the child in question, and in order to accomplish this, behavioral observations must form the balancing element.

3. The Differential Ability Scales (Elliott, 1990) is derived from the British Ability Scales (BAS) (Elliott, Murray, & Pearson, 1979), and consists of a large number of subtests. These subtests, 20 in total, measure verbal ability, nonverbal reasoning ability and spatial ability in children aged from 2 years 6 months to 17 years 11 months.

Learning and academic abilities are the key issues that DAS subtests examine, and due to a wide age range, all tasks are equalized for age and developmental level. As a result, the DAS is an essential assessment tool for use in research, clinical and school arenas.

Cognition and achievement sections of the DAS highlight problems in children's day-to-day academic functioning, but can also evaluate areas where these children excel. These sections are, in fact, divided, with the cognitive section examining reasoning and conceptual abilities. The achievement section examines issues of numerical and literal abilities.

With this type of balance — between cognition and achievement — examiners can note anomalies in both cognitive and achievement abilities. These are integral concerns in a child's ability to perform and function in a scholastic setting, and the DAS appears to account for each aspect that comprises academic performance.

In its ability to generalize across school populations, the DAS sample consisted of 3,475 children. The normative sample not only included several impairments such as

learning disabilities (LD), emotionally disturbed (ED), speech and language impaired, gifted and sensory and motor impaired children, but these were representative of the general population in a vast age range. This effectively yielded appropriate development of norms and equivalents for use in everyday testing. DAS results for its subjects are measured in standard T-scores. General conceptual ability norms (GCA norms), subtest norms, composite norms and grade norms were all established to yield appropriate and equivalent T-scores that can be generalized to any given demographic setting.

Reliability

Reliability was established by estimating the standard error of ability (SEA) for each subject and finding the mean of the error variances. Then the mean error variance was inserted into the standard reliability formula:

$$RELIABILITY = \frac{1 - SE_A^2}{S^2_X}$$

As a result, the reliability can measure each group member's ability by reflecting the average accuracy. However, the issue of "accuracy" is paramount in this type of test as the range of abilities is so vast, and reliability coefficients cannot show accuracy in testing ability extremes.

Nevertheless, reliability is considered, and the following shows mean internal reliability coefficients for each of the 13 DAS subtests that have been utilized. These are age-based for ages 5 to 17.

Subtest	Average r_{xx}^a
Ability Subtests:	
Recall of Designs	.84
Word Definitions	.83
Pattern Construction	.91
Matrices	.82
Recall of Objects (Immediate)	.76
Recall of Objects (Delayed)	N.A.
Similarities	.79
Sequential & Quantitative Reasoning	.85
Recall of Digits	.87
Speed of Information Processing	.91
Achievement Subtests:	
Basic Number Skills	.87
Spelling	.92
Word Reading	.92
Ability Scores:	
Verbal Ability	.88
Nonverbal Reasoning Ability	.90
Spatial Ability	.92
General Conceptual Ability	.95

Validity

Both internal and external validity were established for DAS subtests. Internal validity was established through intercorrelations of subtests and composites for each age range. In addition, factor analysis was used to confirm the structure for each ability that the DAS measures. This was also performed for each age range.

Results pointed to increases and greater differentiation in a child's ability due to age increases. This was confirmed through factor analysis.

External validity was established by correlating DAS subtests with similar subtests on other measures. Cognitive abilities and achievement were examined for select populations and specific age groups.

This was an extensive process, as issues of sex, race, parent education and demographics had to be accounted for. In addition, the selected samples ranged from mentally retarded to gifted children.

Results were promising, showing consistency with other psychometric measures for cognition and achievement. This portrays the DAS as a notable and useful measure for general ability in the realm of cognition. DAS scores for its subtests show convergent and discriminant validity when correlated with other batteries on cognition and achievement.

With this established, however, more research is called for in the area of "special" populations such as gifted, retarded and LD groups, as there was some variability in their scores. This may have been due in part to sample selection, which was based primarily on cognitive tests. A broader spectrum of diagnostic measures would thus be required in future research.

Subtests

The following DAS subtests have been an integral component in this assessment battery:

Recall of Designs — This subtest involves the child remembering, and copying a line drawing which is presented for 5 seconds. This subtest highlights problems of spatial perception, visual recall, retention of images and interference from other designs or stimuli.

In addition, memory and visual-spatial problems are potentially noted here, as well as motor-control problems and obsessional/compulsivity symptoms. The latter refers potentially more to ADD children, however; as they take time to perfect their drawings.

Attention and impulsivity may be hidden or secondary factors here as the ADHD child may experience initial concentration problems, creating poor recall, and eventual impulsivity due to frustration. Results in the study can potentially determine if these issues are of significance.

Word Definitions — Here the child must answer vocabulary questions by providing a concise oral response to each word in question. This subtest is untimed.

Verbal knowledge, vocabulary knowledge, general knowledge, uncertainty, expression of language and retrieval of information are measured here. Low scores for ADHD children are not necessarily anticipated, although, should they occur, may be due in part to basic educational developmental problems, which may be rooted in the attention problems.

Pattern Construction — In this timed subtest, the subject must arrange a set of colored blocks to match a pattern shown in the booklet.

Although visual/spatial orientation are portrayed here; nonverbal reasoning and analytical abilities, motor problems, anxiety, obsessional behavior and cautious behavior can potentially be exhibited. It may also be noted, that being a somewhat complex, timed task, impulsivity can play in as a secondary factor.

Matrices — This subtest, also a pattern-type task, measures cognitive abilities and nonverbal reasoning. The child is required to carefully select a missing design to complete a pattern.

Although this subtest is not timed, in addition to its primary purpose for measuring cognitive and reasoning skills, it can also measure impulsivity. This is reflected in the subject's ambiguous, rapid responses which are most likely to occur in ADHD children.

Similarities — This subtest measures verbal reasoning, as the child is required to explain how three items are similar or "alike". No strict time limit is incorporated in this task.

In addition to verbal reasoning, other measures potentially noted can be vocabulary, logical and abstract thought processes and possibly inattention and impulsivity. However, these latter two are not intentional symptoms to be measured, but may play a role in lowering ADHD scores.

Sequential and Quantitative Reasoning — This nonverbal reasoning subtest involves the child having to determine a "rule" that applies in order to find the answer to a number. The rule is based on a set of 3 number pairs, of which the third pair has a blank space. In order to find the answer, the child must determine the "rule" in the other 2 given pairs.

This task can potentially highlight analytical reasoning, inductive reasoning and pattern/relationship perceptual problems. It is also possible, that poor math skills can alter scores as this task is of mathematical content.

Inattention and impulsivity may result as tertiary factors possible due to a) low self-esteem, b) boredom and c) frustration with the task. These factors, however, are not intended to be measured, but may occur as a residual effect of poor outcome.

Recall of Digits — This is an immediate, auditory recall task (short-term memory). It is postulated that ADHD features may be primary in this subtest, as it portrays poor auditory memory, sequencing, and concentration and attention problems.

Distractibility and inattention may set in as storage and retrieval problems further serve to inhibit the child's responses. Numbers are read at 2 per second, and must be repeated by the subject in the correct sequence, often causing sequencing, concentration and other memory-related problems.

Recall of Objects — Immediate and Delayed — This subtest measures both short and intermediate-term verbal recall and requires the child to remember 20 colored picture objects on a card. These are presented for a given time limit (on three trials), and the child must then respond orally in a given time limit for each trial.

On the delayed recall subtest, there is no initial presentation of objects, but instead, a 20 minute delay in which the child completes other nonverbal subtests (as memory interference tasks).

This memory task is timed, and may potentially reflect attention and concentration, short and intermediate-term memory, storage and retrieval strategies, visual and verbal integration, encoding, rehearsal and interference issues.

Speed of Information Processing — This timed subtest measures mental speed as the child is required to mark off the circle in each row with the greatest number of squares. For older children, they simply mark the greatest number in each row.

As this subtest is timed, it potentially highlights impulsivity, mental speed, sequential strategies, ordinal strategies, place values and effects of time pressure (which may manifest upon the subject in a variety of symptoms — such as impulsivity). In addition, cautious

behavior (compulsivity) as well as attention and concentration problems may be reflected in low scores.

Basic Number Skills — This achievement subtest examines basic arithmetic skills. Here the child answers mathematics questions on a set of worksheets. There is no specific time-limit that is adhered to.

Scores may portray basic numerical ability, arithmetic operations skills, understanding of operand meanings and potentially ineffective motivational and attentional strategies. It is therefore possible, that ADHD symptoms will interfere with performance outcome on this task.

Spelling — This achievement subtest examines spelling ability. Words are read, used in a sentence, and then mentioned again, and the child writes the word at its corresponding number. Recall and knowledge of spelling, as well as visual, auditory-sequential memory and sound discrimination are noted issues that may be portrayed in these scores. It is not evident that ADHD symptoms will affect this task, nor be able to discriminate ADHD children. However, "hidden" ADHD symptoms may negatively alter the resulting achievement scores, although, no surface evidence exists.

Word Reading — This final achievement subtest administered in the DAS battery consists of a card of words which the child reads aloud. Basic educational issues are noted in this task.

Scores may indicate auditory and visual memory issues, phonetic segmentation and letter and vocabulary knowledge issues. No ADHD symptoms are present, although, they may serve to hinder the basic academic/educational processes that are represented in this reading task.

Ability Clusters

Verbal Ability — Scores here may indicate verbal, vocabulary, knowledge, expression and memory issues. "Word Definitions" and "Similarities" subtests, both verbal, comprise this cluster.

Nonverbal Reasoning Ability — This cluster score is comprised of "Matrices" and "Sequential and Quantitative Reasoning" subtests. Scores here are potentially indicative of inductive reasoning, understanding of rules and instructions and ability to form solutions. In addition, low scores may be reflective of impulsivity.

Spatial Ability — "Recall of Designs" and "Pattern Construction" subtests make up this nonverbal cluster score. Spatial orientation, visual perception, analytical ability and visual attention to detail, as well as hand-eye coordination issues, are potentially measured in these scores.

General Conceptual Ability — This is the overall cluster score, consisting of verbal, nonverbal reasoning, and spatial ability scores. It is based on DAS cognitive subtests, and is a composite score which examines reasoning and conceptual abilities. This cluster score is thus an overview of DAS performance, and can be globally applied across settings and populations to focus on intellectual ability.

4. **The California Verbal Learning Test — Children's version (CVLT-C)** (Delis, Kramer, Kaplan & Ober, 1994) measures memory and learning skills. It was designed to assess verbal learning and recall in children aged 5 to 16, and can potentially assist in the diagnosis of psychiatric and neurological impairments.

More specifically, the CVLT-C can potentially be of use in the assessment and diagnosis of learning disabilities, and attention-deficit disorders. As a result, it appears to be valid as an integral component in any assessment battery for diagnosis and evaluation of ADHD.

The development of the CVLT-C required that a normative sample of 920 children be divided into 3 groups: 5-8 year olds (n = 320), 9-12 year olds (n = 320), and 13-16 year olds (n = 280). The sample included 459 females and 461 males matched with demographic characteristics by age and ethnicity/race.

Analysis-of-variance found correlations with the WISC-R (Wechsler, 1974) to be significant, especially on the "Vocabulary" subtest on the WISC-R. As a result, it was deemed that the CVLT-C sample's IQ range closely paralleled that of the general U.S. population of children.

Reliability

Average reliability was established using the Spearman-Brown formula yielding an average coefficient of .85 for List A trials 1-5. This effectively demonstrates the CVLT-C to have significant internal consistency and reliability to evaluate recall ability.

Validity

Both content and criterion validity were established and related with several clinical groups. These include ADHD, LD and FAS (Fetal Alcohol Syndrome) children.

Construct validity, most importantly was established through factor analysis for the entire sample of 920 children. This paralleled the factor structure that is integral to the

CVLT (Adult Version; Delis, Kramer, Kaplan, & Ober, 1987). Consistency was thus established for both CVLT-C and CVLT general constructs.

Measurement

There are no actual subtests of the CVLT-C. However, this memory test is divided into "lists" for recall — the primary list, being "List A" — the "Monday list". "List B" is secondary and only consists of 1 trial, whereas the "Monday list" is more comprehensive with 5 trials. The "Monday list" (List A) was therefore seen as integral in this study.

The "Monday list" consists of asking the child to remember as many items purchased in a grocery store. This list is read aloud, and the child responds aloud with no specific time limit, although 20 seconds is given after the last word is mentioned.

Shopping lists are used in order to grasp the children's interest and effectively keep them motivated to perform with enthusiasm, so as not to invalidate the results. Boredom would be a significant detriment to this study.

For each of the five trials, the same list of items is read, and the child repeats them immediately afterward. Results usually improve with greater verbal recall. Semantic clustering and serial clustering as well as the "primacy" and "recency effects" are noted. These assess the specific recall areas and mental organization of recall — important aspects in the way learning occurs.

Of most importance to this study, however, is the CVLT-C's potential ability to highlight auditory attention-span problems and learning ability issues. These may potentially be of importance when correlated with ADHD symptoms on the behavioral rating scales.

5. The ADD-H Comprehensive Teacher's Rating Scale (ACTeRS) (Ullmann, Sleator, & Sprague, 1991) is designed to measure ADHD behavioral manifestations in the school classroom. This is particularly important, as the classroom is the arena where most behavior problems are noted.

ADHD primary symptoms of inattention and hyperactivity may not be as noticeable in the clinician's office, but manifestations are most easily detected in the classroom, possibly due to lack of personal attention, and the scope of independent academic exercises. As a result, teacher ratings are essential.

Teachers can, in effect, establish their own behavior norms based on general behavior in the classroom. This can be a vital component for basing the assessment of true ADHD behavior.

With this said, however, it is important that teachers guard against biases, which can offset the ratings. Biases may occur for a number of reasons, such as lack of experience on the teacher's part, lack of knowledge due to behavior norms (age expectancies for behavior), and often due to perceived parental pressure, or fear of creating diagnostic "stigmas" for certain children. Other less tolerant teachers may bias their ratings towards ADHD diagnosis, if the particular classroom is disruptive due to lack of discipline, or ineffective teaching methods.

The ACTeRS, however, attempts to guard against these biases with its standardized and specific format for teacher observations. Norms were established based on a final sample of 2,362 students in 23 schools, and rated by 84 teachers.

Both males and females were tested across ages, but most significant differences appeared between males and females in the sample. These were accounted for, and the

ACTeRS is noted to have good interrater, and test-retest reliability and high internal consistency.

Reliability

Reliability coefficients range from .51 to .97, and the median reliability coefficient is .87. These coefficients represent all ACTeRS subscales and reliability methods.

Validity

Actual validity is not discussed per se. However, the ACTeRS appears generalizable to several groups including ADHD, ADD, ODD and LD children.

Studies with these groups, with the emphasis on ADHD, show consistency, and significant differences between these disabled groups, even with small samples. This indicates that the ACTeRS is valid as a group distinguisher, at least as far as observable behavior is concerned.

Administration

The ACTeRS consists of 24 items that relate to typical classroom behavior. These items are divided into four separate factors or "subscales", namely, "Attention", "Hyperactivity", "Social Skills" and "Oppositional Behavior".

For each subscale, the teacher is asked to rate the child on a scale from "1" to "5". A "1" indicates "almost never" and a "5" indicates "almost always". If the child, for example, starts fights and defies authority quite often, the teacher may mark down a "3" or "4" on the "Oppositional" subscale.

ACTeRS scores are then converted into percentiles. For example, a child scoring near the 15th percentile on the "Attention" subscale, would, at least be diagnosable as ADD, according to the ACTeRS. If the same child scores low on the "Hyperactivity" subscale, ADD+H (ADHD) may be diagnosed. Scores above the 50th percentile, are not indicative of problems.

Caution needs to be taken here, however, as the ACTeRS, while simple and concise in its use, appears somewhat vague. Furthermore, teachers may bias their ratings, and not all teachers will feel the same way about the same child. In effect, certain children will respond well to certain teachers, further biasing results.

Because ACTeRS scales from 1 to 5 are worded "almost never" or "almost always", they are somewhat vague. A more specific type of rating scale that actually counts exactly how many times a child is "out of his/her seat", or "starts fights", would gain more autonomy as an independent rating scale.

To devise a rating scale that is highly specific is not practical, nor feasible, at this stage in ADHD research. As a stop-gap, however, the ACTeRS must be utilized in conjunction with at least one other behavior rating scale, and, if possible one that accounts for parental perceptions as well as teacher perceptions. This would, in effect, create "balance" in the crucial behavior ratings section of the comprehensive assessment battery.

6. The Conners' Rating Scales (Conners, 1990) includes Conners' Teacher Rating Scales (CTRS-28) and Conners' Parent Rating Scales (CPRS-48). Both rate child behaviors based on ADHD-type symptomatology, although, the Conners' subscales are somewhat more

comprehensive on their focus than ACTeRS, and cover a wider range of more specific symptoms.

With this established, however, it is still essential that parent and teacher scales are utilized. This allows for a balanced focus of the child in more than one setting. Home and school settings are also likely to promote easily observable and, in effect, ratable behavior manifestations. However, not all behavior symptoms rated here are external. Many are internal, not easily observed, anxiety based symptoms.

The Conners' Parent Rating Scales—48 (CPRS-48) covers the more "internalizing" behavior symptoms as noted in the home. These are specified by the "learning problem", "psychosomatic" and "anxiety" subscales which would likely appear characteristic of LD or ADD children.

In addition, the CPRS-48 includes the externalizing symptoms, more noted in ADHD, ODD, or CD children. These are the "conduct problem", "impulsive-hyperactive" and "hyperactivity index" subscales. The "hyperactivity index" is designed to be indicative of the extent of "hyperkinetic" or ADHD-type symptoms, and, in effect, aids in the diagnosis.

The Conners' Teacher Rating Scales—28 (CTRS-28) is a 28 question form for the teacher to fill out, and like the ACTeRS, has four similar subscales, namely, "conduct problem", "hyperactivity", "inattentive-passive" and the "hyperactivity index". These are easily observable in the classroom, and provide teachers with a user-friendly method of obtaining diagnostic criteria.

The classroom setting can effectively be used to detect behavioral problems. This is especially so due to the usually large group of children who each present with specific

behavioral symptoms. In effect, the teacher can establish classroom norms, and thus base his or her ratings upon these as is done in the ACTeRS.

Both parent and teacher ratings are naturally subject to biases. Parent biases may occur in the home due to a lack of what the parent deems "normal" behavior; and general perceptual issues may play a role, as parents each have developed their own "personal view" of their own children.

If parents did not rate their own children, some biases may diminish, but, at this point, it would be more effective for teachers to rate the children based on norms that they have observed in many children. However, this also creates problems, as teachers have their own "impression biases" as discussed in the ACTeRS.

The Conners' scales, however, to some extent serve to eliminate biases with both parent and teacher aspects. Furthermore, by using the shorter CPRS-48 and CTRS-28 scales, not only are these more concise, but were developed with the same behavioral norms, in effect, validating direct teacher and parent comparisons.

Teacher ratings can also set the stage for parent ratings as parents can further substantiate framework evidence detected by the teachers. Thus, a complementary approach works well here, and various situations can further enhance both parental and teacher understanding of behavioral occurrences.

To further eliminate any conflicting perceptual biases on the part of parents and teachers, both Conners' scales have established norms which were developed from the outset. These norms were established for children aged 3 to 17, and are applicable to both parent and teacher rating scales.

To establish these norms, children around the world were studied. For the CPRS-48, 578 children, male and female, aged 3 to 17 years were studied. For the CTRS-28, 383 children, male and female, aged 3 to 17 years comprised the normative data.

Reliability

Test-retest reliability has not been established for the CTRS-28, but a generally acceptable degree of reliability, ranging from .72 to .91, was noted for the CTRS-39, and that reliability results for the revised CTRS-28 would potentially be similar. The CPRS-48 test-retest reliability is also not yet calculated, but is hoped to be similar to the CPRS-93, from which it is derived from.

Inter-rater reliability and internal consistency ratings also have to be based upon earlier CPRS-93 (average of .85) and CTRS-39 established coefficients. The general consensus leans toward primarily elevated levels of reliability and consistency for all instruments.

Validity

Through various research studies, validity was established and appears to have useful predictability in the examination process of children's behavior. Predictive, Discriminant, Concurrent, and Construct validity were established for CTRS-39 and CPRS-93 scales. It is thus anticipated that through factor analysis, the revised CTRS-28 and CPRS-48 scales used in this study will also yield replicable and somewhat consistent results, as have the CTRS-39 and CPRS-93 scales that they are based upon.

Administration

Teachers fill out the CTRS-28's 28 items based on their perceptions for each child's behavior. They are asked to decide how much they believe each symptom has been a problem over a one month period.

Of the 28 items, certain symptoms such as "daydreams" or "disturbs other children" are designed to be representative of ADD, LD, CD, ODD or ADHD children. The teacher is obliged to carefully reflect upon his or her mental notations for each child's symptom and as to whether or not, and if so, how much it really applies.

Each item is rated for symptoms on a scale of 0 for "Not at all", through 1 "Just a Little", 2 "Pretty Much" and 3 "Very Much". These represent how much the behavior symptoms occur, and how significant they are. Each set of symptoms is divided into their factors or subscales, namely, "Conduct Problem", "Hyperactivity", "Inattentive-Passive" and "Hyperactivity index" in order to yield appropriate classification.

The CPRS-48 works the same way as the CTRS-28, although, parents rate the children according to 48 behavioral symptoms or "items". As with the CTRS-28, parents must carefully decide upon the severity of each symptom, and then circle a 0, 1, 2 or 3 accordingly. A "3" meaning the behavior is a regular occurrence ("very much").

These items, as with the ACTeRS and CTRS-28, are divided into factors or subscales, namely, "Conduct Problem", "Learning Problem", "Psychosomatic", "Impulsive-Hyperactive", "Anxiety" and "Hyperactivity index". It should, however, be noted that for each subscale, the level of severity from "0" to "3" is, as in the ACTeRS, somewhat vague.

While the ACTeRS was criticized for being vague, so must the Conners' as wordings for severity such as "not at all" or "pretty much" like the ACTeRS "almost never" and "almost

always" do not specifically account for the exact number of times a child becomes "frustrated" or "daydreams". For that matter, it can also be queried as to what stimulus, or lack of stimuli, trigger the behavior symptoms.

These issues as previously noted are practically immeasurable at this stage in research development. However, researchers such as Reid and Maag (1994) have examined these issues, but to date no reliable measurement tool could place a numerical value on exactly how many times a child "fidgets" or "fiddles".

What is important for current research, is the ability to correlate final scores and "balance" the assessment battery with other behavioral and psychometric measures.

Final scores for the Conners' scales are measured as "T-scores" and are converted from raw scores on the ratings forms. A T-score of 65 or higher would be indicative of a behavior problem. Conversely, a low T-score such as 30 or 40 would indicate fewer or no behavior problems.

Unlike the ACTeRS, elevated Conners' scores are clinically significant and highlight behavior problems, whereas on the ACTeRS, low percentiles are indicative of behavior problems. This is important to note, especially when correlating, and thus incorporating both measures in the comprehensive assessment battery.

Procedure

As previously mentioned, the sample consisted of a total of 64 male students aged between 7 and 16 years. This sample was selected from a large private school where an ADHD population was available.

The ADHD population consisted of 32 male students aged 7 to 16 years, and this comprised the "experimental group." This population was representative of cross-cultural and socioeconomic boundaries, as was the control group of non-diagnosed, normal functioning children.

The control group was drawn from the same population as the experimental group. Each group had an equal number of participants ($n = 32$). This was important, as the non-diagnosed control group would have to form the basis from which results would be deduced from, and compared with.

Both groups, control and experimental were selected on the basis of previous behavioral and psychometric testing by a school psychologist. Results would potentially show significant differences between these groups on certain subtests and behavior subscales, enabling future researchers and clinicians alike to utilize a more specific, concise assessment battery. Thus, it was hoped that differences would not be discrete, and would, in effect confirm the diagnostic classification of these groups.

The ADHD experimental group was compared with the non-diagnosed control group on data from a battery of psychometric tests and behavioral rating scales. Any differences between control and ADHD children would be a positive finding, thus confirming the diagnosis. This was a simple, straightforward process to examine the severity and specificity of ADHD symptoms, thus examining which specific psychometric subtests and behavioral rating scales the severity most applies to.

Once this essential differentiation component was established, the focus then moved toward association issues. Here the focus was on the relationship between ADHD symptoms and performance scores. This also led to associations between ADHD symptoms and

intelligence (IQ), which was not originally anticipated. It was thus anticipated and subsequently examined to determine as to whether or not children with elevated ADHD symptoms would score poorly on psychometric subtests.

The final step of this study, due to significant IQ associations, was to, in effect, partial out the effect of IQ. As a result, the true relationship between ADHD and performance could be examined, and thus it was determined as to whether or not the ADHD group was performing poorly on performance tasks due to IQ or ADHD symptom interference. The results section discusses these findings and implications in detail.

Statistical Analysis

T-tests, bivariate and partial correlations were utilized in this study to assess the degree of difference between the independent variables and the dependent measures. These were augmented to highlight and associate differences in ADHD and control group behavior and performance. A large number of variables were required to specify these differences.

Analyses of the differences between the ADHD and control group mean scores on psychometric and behavioral ratings scales were performed. Specifically, t-tests were employed to quantify the differences between the ADHD group and the control group on the WISC-III, WIAT, DAS, CVLT-C, ACTeRS and Conners. Scores on each psychometric subtest and behavior rating scale were compared between the control and ADHD group. The determination that the groups differed, prompted further exploration of the association between ADHD symptoms and behavioral and psychometric subtests.

In order to assess the degree of association between performance and ADHD symptoms, bivariate correlations were conducted. These analyses allowed for an

examination of the specific subtests on which ADHD children perform poorly. Statistical analyses of the quantification of the degree of association between the variables were conducted. These analyses provided a more detailed understanding of the underlying dynamics, and the specific relationship between subtests and ADHD symptoms. To accomplish this, a large number of variables were required to specify and highlight the relationships.

Several academic aspects ranging from memory to achievement were correlated with ADHD symptoms to show their impact on performance. Anticipated psychometric subtests and behavior problems were clustered in order to highlight specific, hypothesized associations. Bivariate correlations provided significant associations between these predicted behavior-performance clusters.

Finally, partial correlations were utilized to partial out the WISC-III — "Full Scale IQ" factor as a third variable. In order to minimize the moderating influence intelligence played on the psychometric test scores, it was necessary to examine the relationship between the two primary variables of interest, namely ADHD and performance.

Intelligence may have been a moderating variable in that it alters the relationship between the predictor variable and the criterion. In order to accurately assess the association between the primary variables of interest, a correlation of the residuals was performed. This procedure provided a more detailed analysis of the degree to which ADHD symptomatology affected performance on psychometric test scores, and behavioral ratings, in comparison to the control group.

In using this process, the effect of IQ could be closely examined and accounted for in its relationship to academic results. It was thought possible that IQ scores may have

altered the significant relationship between elevated ADHD symptoms and decreased academic/performance scores. These results and implications are discussed in Chapter 7.

CHAPTER 7

RESULTS AND DISCUSSION

The data analysis was performed to yield results pointing to basic differences between the control group and the ADHD group. However, as expected differences were established, more specific aspects were examined. These include the essential examination, via correlations, of "clustered" subtest scores with specific scored items from the behavioral rating scales. It was originally hoped that by performing such analysis, a "strength factor" based on the correlated significance could be achieved for use in later studies. This intends to set a foundation or "template" from which future studies could be evolved from.

In order to achieve this process, subtests from WIAT, WISC-III and DAS were clustered with expected (hypothesized) behavioral rating scales items from both Conners-parent and teacher scales, and ACTeRS items. Those behavior items and performance items (subtests) which should portray ADHD symptomatology were thus clustered and correlated to determine their significance, if any.

The results point to a successful degree of significance in these pre-determined "clusters." However, some unexpected significances also appear to have occurred. To attempt to further explain these unusual phenomena, IQ scores have been further examined in an attempt to decipher these achievement-behavior significances.

It is important that one is also aware of the fact that the battery of tests used is generally non-specific to ADHD diagnosis or for use in the diagnosis, with the exception of the behavioral rating scales. What is of interest, however, and importance, is the ability

to correlate and thus assess the degree of utility of the psychometric measures for diagnostic purposes. Psychometric measures have, as the literature suggests, been used for some time as an integral component in the diagnostic process (Barkley, 1990). The question thus arises as to exactly how integral they are and which subtests are going to be most usable for achieving diagnostic purity. These questions have been answered as the behavior component is "matched" to the performance component, but this time in a specific manner to see exactly which aspects are potentially meaningful and useful for diagnosing ADHD. By specifying these aspects, future researchers will have a more precise framework from which to follow for diagnosis, eradicating extraneous criteria. To date, psychometric tests are known to be useful in their ability to assess performance difficulties in children. These may be aspects of a wide range of learning disabilities, or possibly attention/concentration problems. By adding in the behavioral and memory dimensions and specifically correlating them along pre-anticipated lines, the "real" symptoms both behavioral and performance can then be accounted for and then placed into a more concise assessment battery for the diagnosis and evaluation of ADHD.

Results

The following results point to the statistical findings from the collected data for the ADHD and CONTROL groups. To begin with, descriptive statistics have yielded a mean age of 10.57 for the control group, while the ADHD group's mean age was slightly higher at 11.13. Each group was equalized to consist of 32 subjects.

Unequal t-tests were used as the P-value (standard deviation) was significantly different. This is indicative of larger differences between the youngest and oldest in the ADHD group, as seen in Table 1.

The actual mean age differences between the two groups were not significant. However, all rating scales and performance tests are age-equalized, so had there been significant differences, the study would not be adversely affected. It is, however, noted that the ages and number of cases were proportionate for the study.

From age differences examined, the focus was shifted onto a comparison between control and ADHD groups on "ADHD symptoms." These "ADHD symptoms" are represented by the behavior rating scales which have specifically been designed to be indicative of ADHD behavioral symptoms.

Table 2 shows specific ADHD symptomatology as represented by the Conners' Parent Rating Scales - 48 (CPRS-48) subscales. Mean differences between the control (non-diagnosed) group and ADHD-diagnosed group are highlighted to show the extent of differentiation between the groups.

Results indicate a mean T-score of 69.88 for the ADHD group on the "conduct problem" subscale. According to the Conners' scales manual, "T-scores of 65 or greater are considered to be clinically significant" (Conners, 1990, p. 11). The mean T-score of 39.75 for the control group was significantly lower. Other subscales, namely "learning problem," "psychosomatic," "impulsive-hyperactive" and the "hyperactivity index" yielded significant differences between the ADHD and control children. However, the "anxiety" subscale failed to show significant differences between the two groups as the ADHD groups' mean T-score of 50.28 was only slightly higher than the control groups' mean T-score of 47.47.

Table 3 shows teacher ratings between control and ADHD children. Here mean differences on specific ADHD symptomatology as represented by the Conners' Teacher Rating Scales - 28 (CTRS-28) subscales are highlighted.

As expected the ADHD group scored higher on all four CTRS-28 subscales, namely, "conduct problem," "hyperactivity," "inattentive-passive" and the "hyperactivity index." All scores were significantly different between the two groups, thus being indicative of heightened conduct issues, inattention, and hyperactivity in the ADHD group. In fact, all subscale scores for the ADHD group were elevated well into the "clinically significant" boundary of a T-score of 65 or greater.

Table 4 is indicative of mean differences between the control and ADHD groups on the ADD-H Comprehensive Teacher's Rating Scale (ACTeRS) subscales. These scores are measured as percentiles, thus low scores are indicative of elevated ADHD symptomatology. The results are also congruent with the pre-established indicators, as the ADHD group scored significantly lower on all four behavior subscales.

These ACTeRS subscales, namely, "attention problem," "hyperactivity," "social skills problem" and "oppositional" behavior are designed to be representative of ADHD behavior; and scores which fall below the 40th percentile are most likely to be indicative of attentional and behavioral problems. Scores above the 50th percentile, do not indicate problems as seen in the control group in Table 4. Results here are congruent with the initial expectations.

In Table 5, the focus shifts towards intelligence, and as to whether or not this could be a distinguishing factor between the two groups. Here the t-tests for the independent

samples were run to determine mean differences between ADHD and control groups on the Wechsler Intelligence Scale for Children — Third Edition (WISC-III).

Results show differences between the two groups, but not significant differences on the "Information," "Similarities," "Comprehension," "Picture Arrangement," "Digit Span" and "Object Assembly" subtests. However, significant differences did appear on the "Coding," "Arithmetic," "Vocabulary," "Block Design" and "Symbol Search" subtests.

On each WISC-III subtest, the mean scores for the ADHD group were lower, although, as seen in Table 5, many were only slightly lower. In addition, all mean calculated percentile scores for Verbal IQ, Performance IQ, Full Scale IQ, Verbal Comprehension, Perceptual Organization, Freedom from Distractibility, Processing Speed, Standard Deviation and Percentile Rank were lower for the ADHD group. This is congruent with the original subtest results and these were calculated based on each child's subtest scores. These mean percentiles were all significant — below the alpha level of .05.

As intelligence scores were lower for the ADHD group, so were achievement scores on the Wechsler Individual Achievement Test (WIAT) which follows after the WISC-III. These mean differences between control and ADHD groups on the WIAT are seen in Table 6. All of these scores are significantly different, showing poor achievement on reading, writing, spelling, comprehension and mathematical tasks for the ADHD group.

Both ability as well as achievement were examined on the Differential Ability Scales (DAS). Here, as seen in Table 7, mean differences between control and ADHD groups' subtest scores were not quite as defined as in the previous tests and rating scales. Most subtest scores, however, were lower for the ADHD group; in fact, significantly so below the alpha level of .10.

However, the "Recall of Objects (immediate)" subtest shows the ADHD group performing marginally better on the whole. This result is echoed in the "Recall of Objects (delayed)" subtest, although, the control group shows a marginal improvement over the ADHD group.

Significant differences below alpha level .05 also appeared on the final calculated ability scores, thus highlighting improved verbal, reasoning, spatial and conceptual abilities in the control group.

While the control group and ADHD group failed to show much distinguishability on the DAS-Recall of Objects picture recall subtests, results on the California Verbal Learning Test — Children's Version (CVLT-C) were more promising in the quest for group differentiation. In this case, the ADHD group did not perform as well as the control group; in fact, significantly less so, below alpha level .01. These mean differences on the CVLT-C are highlighted in Table 8.

Bivariate correlations were used in addition to T-tests in order to provide a potentially more useful dimension. This process involved the examination of specific clustered behavioral symptoms of ADHD in relation to other specific clustered ADHD symptoms and performance subtests. These specific clustered subtests and subscales were proposed to be indicative of ADHD symptoms. The result of this process would effectively highlight which subtests are representative of ADHD behavior, and, in effect, potentially used in a concise assessment battery. Further manifestations of this process would also lead to the use of partial correlations which will be examined later, as IQ became an important factor to be considered.

It was presumed that elevated levels of ADHD behavior (represented by rating scales) would be associated with decreased scores on performance subscales. Table 9 demonstrates this process in practice.

Hyperactivity and impulsivity symptoms represented by specific Conners' and ACTeRS subscales were correlated to specific DAS subtests, namely "Pattern Construction" and "Matrices." These subtests were anticipated to be representative of heightened impulsivity; and Conners' Parent Rating Scales - 48 (CPRS-48) "impulsive-hyperactive" and "hyperactivity index" were negatively correlated with the DAS subtests and were significant all below alpha level .01. It is important to note that these correlations were negative, as elevated scores on the CPRS-48 are indicative of ADHD behavioral symptomatology, and, it appears that low DAS scores, on those specific subtests could also have been associated with increased ADHD symptoms.

The same result occurred for the Conners' Parent Rating Scales (CTRS-28) as elevated subscale scores on "hyperactivity" and "hyperactivity index" were associated with decreased performance scores on DAS "Matrices" and "Pattern Construction." This appears to have been as expected, and correlations were significant, below alpha level .10.

Positive correlations appeared between the ADD-H Comprehensive Teachers' Rating Scale (ACTeRS) "hyperactivity" subscale and the DAS "Matrices" and "Pattern Construction." This was due to decreased ACTeRS scores being represented by the ADHD group and their decreased performance (lower scores) on the DAS subtests. These were significant below alpha level .01 as seen in Table 9.

The result here shows that ADHD-type behavior has been able to be associated and linked with poor performance on DAS pattern-type, impulse-driven tasks.

Table 10 shows correlations between other specific ACTeRS and Conners' behavior subscales and recall type tasks on the DAS. As inattention was expected to play a role in distractibility of recall, these specific subtests from the DAS were correlated with the ACTeRS and Conners' subscales.

The ACTeRS "attention problem" subscale was positively correlated with the DAS "Recall of Designs" and "Recall of Digits" subtests below alpha level .05. This significant result shows that decreased ACTeRS scores on the "attention problem" subscale were associated with decreased DAS scores on the recall subtests.

The Conners CPRS-48 "learning problem" subscale scores were elevated and indicative of ADHD behavior, and were thus negatively correlated with the DAS "Recall of Designs" and "Recall of Digits" subtests. These were significant, below .01 and point to decreased scores on the DAS subtests. This also occurred on the CTRS-28 "inattentive-passive" subscale, and were significant below .01.

It was expected that hyperactivity and inattention would affect information processing ability, and the speed at which this occurs. As a result, the ACTeRS "hyperactivity" subscale, and Conners' teacher scales (CTRS-28) "hyperactivity," "inattentive-passive" and "hyperactivity index" subscales were correlated with the DAS "Speed of Information Processing" subtest as seen in Table 11.

Results show a significant positive correlation between the ACTeRS and DAS, and significant below .05. This result of increased hyperactivity on the ACTeRS (a low score) correlates with a low score on the DAS, indicative of performance problems on this particular DAS subtest.

Conversely, elevated Conners scores which are indicative of ADHD symptoms were negatively correlated with this DAS subtest. This indicates that increased ADHD symptoms are associated with poor performance on the DAS "Speed of Information Processing" subtest. These results as seen in Table 11 were significant below .05.

The behavior rating scales were also correlated with IQ as seen in Table 12. Here specific Conners' and ACTeRS scores were correlated with specific Wechsler Intelligence Scale for Children — Third Edition (WISC-III) scores.

Specific WISC-III subtests used were "Coding" and "Symbol Search" which are potentially reflective of impulsivity. These were positively correlated with the ACTeRS "attention problem" subscale, $P < .10$. This indicates that children who scored low on the ACTeRS (indicative of attention problems) also scored poorly on the WISC-III (indicative of elevated impulsivity, carelessness, or inattentive behavior).

Negative correlations occurred between the CPRS-48 (parent ratings) "impulsive-hyperactive" subscale and WISC-III "Coding" and "Symbol Search" subtests. In addition, the same phenomenon occurred between CTRS-28 (teacher ratings) "hyperactivity," "hyperactivity index" and "inattentive-passive" with $P < .10$.

High scores on the Conners, indicative of elevated inattention and hyperactivity were associated with low scores on the WISC-III subtests, indicating heightened impulsivity and poor performance.

Fewer significant correlations occurred when WISC-III "Arithmetic and "Digit-Span" subtests were correlated with ADHD symptoms on Conners' and ACTeRS scales.

Table 13 shows the ACTeRS "attention problem" subscale significantly correlating only with "Arithmetic" $P < .001$, but not significantly with "Digit Span." The same

occurred for the CTRS-28 "inattentive-passive" subscale at $P < .001$, although negatively correlated due to elevated Conners' scores being indicative of ADHD behavior. Those children, most likely the ADHD group, scored poorly on the "Arithmetic" subtest.

Scores for the CPRS-48 (parent ratings) on the "learning problem," "impulsive-hyperactive" and "hyperactivity indexes" also paralleled those of the CTRS-28 (teacher ratings), with the exception of some significance ($P > .10$) between learning problems and digit span.

Other WISC-III subtests that showed significant association with ADHD behavior symptoms are "Picture Completion," "Picture Arrangement," "Block Design" and "Object Assembly." These are seen in Table 14, and are correlated with ACTeRS and Conners' hyperactivity and impulsivity symptom subscales.

Significant positive correlations occurred between all four represented WISC-III subtests and the ACTeRS "hyperactivity" subscale, indicating a significant relationship between increased hyperactivity (low ACTeRS scores) and decreased WISC-III scores ($P < .10$ on all subtests).

The Conners' (CPRS-48) "impulsive-hyperactivity" subscale significantly correlated with only 2 WISC-III subtests: "Picture Completion" and "Block Design" ($P < .10$). These were not overly elevated correlations, but nevertheless, show some association between increased impulsivity and hyperactivity symptoms and decreased ability to maintain focus on these timed completion/assembly-type tasks.

The Conners' (CPRS-48) "hyperactivity index" was only significantly correlated with the WISC-III "Block Design" subtest, $p < .05$, showing an apparent degree of association

between elevated hyperactivity and poor performance outcome on this speeded, impulse-driven task.

The Conners' teacher scale (CTRS-28) "hyperactivity" subscale was negatively correlated with WISC-III "Picture Completion," "Picture Arrangement" and "Block Design," $p < .10$. "Object Assembly" was not significantly correlated on any Conners' ratings.

The CTRS-28 "hyperactivity index" was negatively correlated with WISC-III "Picture Completion" and "Block Design" subtests, $p < .05$. This indicates that teacher ratings of increased hyperactivity symptoms (an elevated Conners' score) were associated with decreased performance on the "Picture Completion" and "Block Design" subtests (low scores on the WISC-III). "Picture Arrangement" did not, however, present as highly correlated with the "hyperactivity index," nor did "Object Assembly" as seen in Table 14.

Table 15 shows correlations between the behavior ratings scales. In this case, it was important to examine the relationship between the teacher ratings, as represented by ACTeRS and Conners' CTRS-28 scales, and the parent ratings, represented by the Conners' CPRS-48 scale.

The result in Table 15, was significant ($P < .001$) on the impulsivity and hyperactivity symptom subscales. Specifically, these are the ACTeRS "hyperactivity" subscale which negatively correlated significantly with the CPRS-48 "impulsive-hyperactive" and "hyperactivity" subscales. Negative correlations appear as the ACTeRS is scored in an opposite direction from Conners'. Low ACTeRS scores are thus representative of increased ADHD-type symptoms (percentiles) while elevated Conners' scores represent increased ADHD-type symptoms (T-scores).

The Conners' (CTRS-28) teacher ratings on both "hyperactivity" and "hyperactivity index" subscales were positively correlated with Conners' (CPRS-48) parent ratings on both "impulsive-hyperactive" and "hyperactivity" subscales ($p < .001$). This is indicative of elevated scores from teacher ratings corresponding with parent ratings. This shows favorable congruencies between the teacher and parent ratings, allowing for a more effective and usable assessment battery.

Table 16 shows correlations between ACTeRS and Conners' behavior rating scales and subtests of the WIAT (Wechsler Individual Achievement Test). All correlations between behavior and achievement were significant ($p < .05$) showing a strong association between behavior and learning problems and achievement.

As a result, children scoring low on the ACTeRS (high ADHD symptoms) are scoring low on all six WIAT subtests that were used. This indicates poor performance on the following WIAT achievement subtests: "Numerical Operations," "Written Expression," "Basic Reading," "Math Reasoning," "Spelling" and "Reading Comprehension."

Conners' scores, negatively correlated with WIAT scores, are indicative of high ADHD symptoms (an elevated Conners' T-score) and associated with low achievement scores (poor performance) on the WIAT subtests. All WIAT subtests are thus well suited for use with the behavioral rating scales reflecting hyperactivity, inattention, impulsivity and learning problem symptomatology.

Because of the significance between WIAT scores and the ADHD symptom scales, the possibility of the third factor, namely, IQ had to be further examined. IQ was noted earlier when WISC-III subtests, seen in Table 5 were compared on both ADHD and control groups.

Results in Table 5 show lower scores on all WISC-III (IQ) subtests, and significantly so on "Full Scale IQ." This finding has led to further manifestations in this study. Furthermore, WIAT results (achievement scores) follow the same pattern, with significantly decreased scores for the ADHD group.

As a result of these findings, it was deemed worthwhile to further examine IQ as a third factor; either partialling out the ADHD factor, or, more efficiently the influence of IQ. Partial correlations controlling for the WISC-III "Full Scale IQ" held IQ constant, to determine the true relationship between ADHD symptoms and performance.

Table 17 shows partial correlations between significant WIAT subtests, DAS subtests, and the CVLT-C, and CPRS-48 (parent ratings) subscales. Reflected in Table 17 are only those that remained significant once the effect of the third variable, IQ, was partialled out.

Significant differences remaining between CPRS-48 subscales were noted between "conduct problem," "learning problem," "impulsive-hyperactive" and "hyperactivity index" and WIAT "Basic Reading," "Numerical Operations" and "Written Expression." "Math Reasoning" and "Spelling" still correlated with the "learning problem" subscale, and "Math Reasoning" also correlated with the "conduct problem" subscale.

Changes which were no longer significant were the "psychosomatic" and "anxiety" subscales no longer significantly correlating with any WIAT subtests. In addition, IQ voided significant correlations between "spelling" and "conduct problem," "psychosomatic," "impulsive-hyperactive," "anxiety" and "hyperactivity index." Furthermore, "Math Reasoning" was no longer significant with the "psychosomatic," "impulsive-hyperactive," and "hyperactivity index." "Reading Comprehension" was no longer significant with any CPRS-48 subscales.

Changes between DAS subtests and CPRS-48 subscale scores were less noticeable. However, some changes occurred between DAS "Recall of Designs" and "Recall of Digits" no longer significantly correlating with the "learning problem" subscale. Other changes occurred between DAS "Pattern Construction" and "Matrices" and the Conners' "impulsive-hyperactive" and "hyperactivity index" subscales. Finally, the CVLT-C remained significant with "learning problem" but slightly less so than prior to partialling out IQ.

The remaining DAS significant correlations are reflected in Table 17. Positive correlations appeared between DAS "Recall of Objects" subtests and Conners' "psychosomatic," "anxiety" and "hyperactivity index" subscales — indicating that elevated recall/memory scores are associated with increased levels of anxiety, stress and hyperactivity. All other significant DAS and Conners' correlations are negative as expected.

In Table 18 Conners' teacher ratings (CTRS-28) subscales and ACTeRS (teacher ratings) were partially correlated with WIAT, DAS and CVLT-C subtests. By partialling out IQ, the relationship has changed between certain ADHD symptoms on the teacher ratings, and achievement and performance scores. Memory generally appears to have been unaffected, however, as represented by a positive association between the CVLT-C and "oppositional behavior" on the Conners' teacher behavior rating scale. This indicates that increased oppositional behavior is associated with an elevated CVLT-C score.

Changes that occurred were on the DAS "Recall of Designs" subtest and ACTeRS "attention problem" subscale — no longer an association once intelligence is accounted for. In addition, the DAS "Pattern Construction" subtest no longer correlated significantly with both ACTeRS and Conners' "hyperactivity" subscales. The same result occurred for DAS "Matrices."

Other changes also occurred between DAS "Recall of Digits" and the ACTeRS "attention problem" subscale, and DAS "Speed of Information Processing" and both ACTeRS and Conners' "hyperactivity" subscales.

Also noted are the significant, but negative correlations between the "Recall of Objects" memory/recall subtests and ACTeRS "attention problem" and "hyperactivity" subscales, $P < .10$. This indicates that low ACTeRS scores (elevated and clinically significant inattention and hyperactivity levels) are associated with promising scores on the object recall tasks (picture recall). The same result occurs for Conners' "conduct problem" and "hyperactivity" subscales, as high Conners' scores (clinically significant conduct/hyperactivity problems) are associated with increased scores on object recall performance, hence the positive correlations as seen in Table 18, $P < .05$.

Conners' teacher ratings for the "inattentive-passive" and "hyperactivity index" subscales were partially correlated with the WIAT, DAS and CVLT-C in Table 19. Changes due to controlling for WISC-III (Full Scale IQ) as an influence occurred between DAS "Recall of Designs" and the CTRS-28 "inattentive-passive" subscale — no longer significant.

Other changes due to IQ also occurred between the Conners' "hyperactivity index" subscale and DAS "Pattern Construction" and "Matrices" subtests, no longer being significantly correlated. In addition, the DAS "Speed of Information Processing" subtest was no longer associated with Conners' "inattentive-passive" and "hyperactivity index" subscales, ruling out the combined use of these scales for assessment if IQ is the distinguishing variable in these groups.

The DAS "Recall of Objects" — both "immediate" and "delayed" once again positively correlated, $P < .10$, with these Conners' subscales measuring inattention,

passivity, and hyperactivity symptoms. Elevated Recall of Objects scores are thus associated with elevated ADHD symptomatology in these results. IQ did not appear to impede on these results, as they remain significant below alpha .10. The remaining WIAT, DAS, and CVLT-C correlations follow as expected — all representative of decreased achievement/performance/memory scores due to increased ADHD symptomatology.

WIAT correlations in the original bivariate correlational study were all significant. Table 20 presents only the remaining correlations of significance after the IQ variable effect was partialled out.

In this scenario, the greatest number of changes occurred, once again leaning toward the importance of WIAT and WISC-III as distinguishers and ultimately evaluators of ADHD behavior and performance in comparison to a control group. Correlations in Table 20 were as expected, with ACTeRS positively correlating with the WIAT and both parent and teacher Conners' scales negatively correlating with the WIAT subtests. These results are indicative of elevated ADHD symptoms being associated with decreased levels of achievement on the WIAT subtests.

There were no actual direction changes noted when IQ was partialled out as a third variable, but nevertheless a number of changes occurred.

To begin with, the CPRS-48 "impulsive-hyperactive" subscale no longer significantly correlated with WIAT "Math Reasoning," "Spelling" and "Reading Comprehension," nor did the CPRS-48 "hyperactivity index" correlate significantly on these WIAT subtests. The CPRS-48 "learning problem" subscale no longer was significantly associated with "Reading Comprehension" problems on the WIAT.

ACTeRS changes include the loss of significance between the "attention problem" subscale and WIAT "Spelling" and "Reading Comprehension." The ACTeRS "hyperactivity" subscale was no longer significantly correlated with WIAT "Math Reasoning," "Spelling" and "Reading Comprehension."

Conners' teacher ratings correlations with WIAT subtests also became insignificant when IQ was partialled out. Here loss of significance is reflected between CTRS-28 "hyperactivity" and WIAT "Spelling," "Math Reasoning" and "Reading Comprehension." Both CTRS-28 "hyperactivity index" and "inattentive-passive" subscales lost significance when partially correlated with both WIAT "Math Reasoning" and "Spelling" subtests.

These results point to the importance of verifying extraneous variables, such as IQ in this case, which completely changes the result. It is therefore apparent that IQ is the contributing factor for changing the relationship between ADHD symptoms and achievement/performance results. The final result is that in this sample, it is not necessarily ADHD symptomatology that is interfering with these children's achievement and performance results, but intelligence.

Descriptive Statistics

Table 1

Mean age differences between control and ADHD groups

AGE	CONTROL (n = 32)	ADHD (n = 32)	+ (df)
AGE	<u>M(SD)</u>	<u>M(SD)</u>	
	10.57(1.70)	11.13(2.23)	-1.14(57.80)

Note: M = mean
SD = standard deviation

Table 2

Mean differences between control and ADHD groups on the Conners' Parent RatingScales — 48 subscales

Conners'-48 (CPRS-48) Subscales	CONTROL (n = 32)	ADHD (n = 32)	+(df)
Conduct Problem	39.75(16.16)	69.88(18.47)	-6.94(62)
Learning Problem	36.97(14.02)	79.91(8.55)	-14.79(51.26)
Psychosomatic	44.22(13.41)	54.75(11.19)	-3.41(62)
Impulsive-Hyperactive	44.88(12.70)	71.06(12.08)	-8.45(62)
Anxiety	47.47(10.18)	50.28(10.33)	-1.10(62)
Hyperactivity (index)	47.41(12.60)	77.00(10.30)	-10.29(62)

Note: M = mean
SD = standard deviation

Table 3

Mean differences between control and ADHD groups on the Conners' Teacher RatingScales — 28 subscales

Conners'-28 (CTRS-28) Subscales	CONTROL (n = 32)	ADHD (n = 32)	+ (df)
	<u>M(SD)</u>	<u>M(SD)</u>	
Conduct Problem	43.09(15.36)	77.97(13.45)	-9.67(62)
Hyperactivity	45.09(13.29)	75.63(10.23)	-10.30(58.18)
Inattentive-Passive	41.38(17.12)	76.06(8.52)	-10.26(45.46)
Hyperactivity (index)	47.44(12.82)	80.91(10.75)	-11.32(62)

Table 4

Mean differences between control and ADHD groups on the ADD-H ComprehensiveTeacher's Rating Scale subscales (Measured as percentiles)

ACTeRS Subscales	CONTROL (n = 32)	ADHD (n = 32)	+ (df)
	<u>M(SD)</u>	<u>M(SD)</u>	
Attention Problem	.59(.15)	.18(.11)	12.30(57.34)
Hyperactivity	.59(.14)	.23(.12)	10.90(62)
Social Skills Problem	.54(.17)	.32(.18)	5.24(62)
Oppositional	.58(.16)	.24(.17)	8.20(62)

Note: M = mean

SD = standard deviation

Table 5

Mean differences between control and ADHD groups on the Wechsler Intelligence Scale for Children — Third Edition (WISC-III) subtests

WISC-III Subscales	CONTROL (n = 32)	ADHD (n = 32)	+ (df)
	<u>M(SD)</u>	<u>M(SD)</u>	
Information	11.25(2.53)	10.97(2.62)	.44(62)
Similarities	12.97(2.86)	12.34(2.72)	.90(62)
Arithmetic	12.25(2.60)	10.41(2.38)	2.96(62)
Vocabulary	12.50(2.40)	10.91(2.72)	2.49(62)
Comprehension	12.97(3.15)	11.69(3.05)	1.65(62)
Digit Span	10.84(2.86)	10.03(3.03)	1.10(62)
Picture Completion	12.41(2.33)	11.50(2.29)	1.57(62)
Coding	11.91(3.71)	9.56(2.97)	2.79(62)
Picture Arrangement	12.06(3.33)	10.91(4.26)	1.21(58.59)
Block Design	13.06(3.41)	11.13(3.58)	2.22(62)
Object Assembly	11.50(2.50)	11.13(3.44)	.50(56.60)
Symbol Search	13.00(2.87)	11.13(3.12)	2.50(62)
Verbal IQ	.78(.17)	.65(.23)	2.45(56.90)
Performance IQ	.78(.21)	.59(.26)	3.16(62)
Full Scale IQ	.81(.15)	.64(.23)	3.51(54.06)
Verbal Comprehension	.78(.17)	.68(.23)	2.06(56.91)
Perceptual Organization	.78(.21)	.64(.26)	2.29(59.43)
Freedom from Distractibility	.69(.23)	.56(.27)	2.15(62)
Processing Speed	.74(.25)	.55(.27)	2.80(62)
Standard Deviation	1.06(.64)	.53(.89)	2.74(62)
Percentile Rank	.81(.15)	.64(.23)	3.44(53.92)

Note: M = mean

SD = standard deviation

Table 6

Mean differences between control and ADHD groups on the Wechsler Individual Achievement Test (WIAT)

WIAT subtests	CONTROL (n = 32)	ADHD (n = 32)	+ (df)
	<u>M(SD)</u>	<u>M(SD)</u>	
Basic Reading	113.78(8.65)	101.31(12.42)	4.66(62)
Math Reasoning	112.59(13.31)	103.31(14.63)	2.66(62)
Spelling	106.16(20.54)	94.56(11.44)	2.79(62)
Reading Comprehension	108.41(6.05)	98.53(14.24)	3.61(41.84)
Numerical Operations	112.03(9.47)	96.44(12.08)	5.75(62)
Written Expression	107.53(9.39)	89.44(9.07)	7.84(62)

Note: M = mean

SD = standard deviation

Table 7

Mean differences between control and ADHD groups on the Differential Ability Scales(DAS) subtests

DAS Subscales	CONTROL (n = 32)	ADHD (n = 32)	+ (df)
	<u>M(SD)</u>	<u>M(SD)</u>	
Recall of Designs	53.66(9.77)	49.50(9.07)	1.76(62)
Word Definitions	59.59(4.38)	54.59(9.81)	2.63(42.90)
Pattern Construction	58.91(12.04)	51.72(11.41)	2.45(62)
Matrices	54.97(10.06)	50.06(11.61)	1.81(62)
Recall of Objects (Immediate)	53.59(8.96)	53.81(9.47)	-.09(62)
Recall of Objects (Delayed)	50.63(9.57)	50.28(10.86)	.13(62)
Similarities	61.66(9.90)	56.47(10.84)	2.00(62)
Sequential & Quantitative Reasoning	57.72(8.83)	52.94(8.39)	2.22(62)
Recall of Digits	57.13(8.42)	51.44(10.62)	2.37(62)
Speed of Information Processing	57.72(10.27)	52.72(10.81)	1.90(62)
Basic Number Skills	109.03(14.00)	95.91(14.71)	3.66(62)
Spelling	109.50(13.62)	90.16(13.40)	5.73(62)
Word Reading	111.31(11.22)	97.06(14.91)	4.32(62)
Verbal Ability	117.22(10.90)	108.97(16.05)	2.41(62)
Nonverbal Reasoning Ability	110.41(12.66)	101.28(15.10)	2.62(62)
Spatial Ability	110.25(16.35)	100.78(15.55)	2.37(62)
General Conceptual Ability	115.34(13.27)	104.50(15.71)	2.98(62)

Note: M = mean

SD = standard deviation

Table 8

Mean differences between control and ADHD groups on the California Verbal Learning Test— Children's Version (CVLT-C)

CVLT-C	CONTROL (n = 32)	ADHD (n = 32)	+(df)
	<u>M(SD)</u>	<u>M(SD)</u>	
CVLT-C	49.75(5.61)	41.88(11.24)	3.55(45.53)

Note: M = mean

SD = standard deviation

Correlation Tables

Table 9

Correlations between specific hyperactivity and impulsivity symptoms from both Conners' and ACTeRS and specific DAS subtest scores.

Behavior Rating Scales	DAS Subtests:	
	Pattern Construction	Matrices
<u>Conners' Parent Rating Scales (CPRS-48)</u>	r (n=64)	r (n=64)
Impulsive-Hyperactive	-.38 ***	-.22 *
Hyperactivity Index	-.35 ***	-.21 *
<u>Conners' Teacher Rating Scales (CTRS-28)</u>		
Hyperactivity	-.33 **	-.29 **
Hyperactivity Index	-.40 ****	-.35 ***
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>		
Hyperactivity	.37 ***	.34 ***

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 10

Correlations between specific ACTeRS and Conners' subscales and specific DAS subtest scores.

Behavior Rating Scales	DAS Subtests	
	Recall of Designs	Recall of Digits
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n=64)	r (n=64)
Attention Problem	.25 **	.22 *
<u>Conners' Parent Rating Scales (CPRS-48)</u>		
Learning Problem	-.30 **	-.32 ***
<u>Conners' Teacher Rating Scales (CTRS-28)</u>		
Inattentive-Passive	-.32 ***	-.32 ***

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 11

Correlations between specific ACTeRS and Conners' subscales and DAS "Speed of Information Processing" subtest scores.

Behavior Rating Scales	DAS Subtest: Speed of Information Processing
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n = 64)
Hyperactivity	.29 **
<u>Conners' Teacher Rating Scales (CTRS-28)</u>	
Hyperactivity	-.26 **
Inattentive-Passive	-.31 **
Hyperactivity Index	-.29 **

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 12

Correlations between specific WISC-III subtest scores and Conners' and ACTeRS subscale scores.

Behavior Rating Scales	WISC-III Subtests:	
	Coding	Symbol Search
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n=64)	r (n=64)
Attention Problem	.42 ****	.40 ****
<u>Conners' Parent Rating Scales (CPRS-48)</u>		
Impulsive Hyperactive	-.34 ***	-.31 **
<u>Conners' Teacher Rating Scales (CTRS-28)</u>		
Hyperactivity	-.42 ****	-.39 ****
Hyperactivity Index	-.44 ****	-.42 ****
Inattentive-Passive	-.46 ****	-.43 ****

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 13

Correlations between specific WISC-III subtest scores and Conners' and ACTeRS subscale scores.

Behavior Rating Scales	WISC-III Subtests:	
	Arithmetic	Digit Span
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n=64)	r (n=64)
Attention Problem	.44 ****	
<u>Conners' Teacher Rating Scales (CTRS-28)</u>		
Inattentive-Passive	-.41 ****	
<u>Conners' Parent Rating Scales (CPRS-48)</u>		
Learning Problem	-.45 ****	-.21 *
Impulsive-Hyperactive	-.36 ***	
Hyperactivity Index	-.39 ****	

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 14

Correlations between specific WISC-III subtest scores and Conners' and ACTeRS subscale scores.

Behavior Rating Scales	WISC-III Subtests:			
	Picture Completion	Picture Arrangement	Block Design	Object Assembly
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n=64)	r (n=64)	r (n=64)	r (n=64)
Hyperactivity	.27 **	.22 **	.42 **	.22 *
<u>Conners' Parent Rating Scales (CPRS-48)</u>				
Impulsive-Hyperactive	-.23 *		-.34 *	
Hyperactivity Index			-.32 **	
<u>Conners' Teacher Rating Scales (CTRS-28)</u>				
Hyperactivity	-.28 **	-.23 *	-.38 ***	
Hyperactivity Index	-.30 **		-.44 ****	

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 15

Correlations between specific Conners' Parent Rating Scales scores and specific ACTeRS and Conners' Teacher Rating Scales scores.

Behavior Rating Scales	Behavior Rating Scales: CPRS-48 Subscales	
	Impulsive- Hyperactive	Hyperactivity
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n = 64)	r (n = 64)
Hyperactivity	-.80 ****	-.84 ****
<u>Conners' Teacher Rating Scales (CTRS-28)</u>		
Hyperactivity	.81 ****	.84 ****
Hyperactivity Index	.76 ****	.83 ****

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 16

Correlations between WIAT (Wechsler Individual Achievement Test) scores and specific hyperactivity and impulsivity and learning symptoms in ACTeRS and Conners' scales.

Behavior Rating Scales	WIAT Subtests:					
	Numerical Operations	Written Expression	Basic Reading	Math Reasoning	Spelling	Reading Comprehension
<u>ADD-H Comprehensive Teacher's Rating Scale (ACTeRS)</u>	r (n=64)	r (n=64)	r (n=64)	r (n=64)	r (n=64)	r (n=64)
Attention Problem	.59 ****	.61 ****	.46 ****	.43 ****	.30 **	.39 ****
Hyperactivity	.51 ****	.56 ****	.52 ****	.42 ****	.31 **	.43 ****
<u>Conners' Parent Rating Scales (CPRS-48)</u>						
Impulsive-Hyperactive	-.45 ****	-.41 ****	-.43 ****	-.36 ***	-.26 **	-.30 **
Hyperactivity Index	-.49 ****	-.49 ****	-.45 ****	-.34 ***	-.25 **	-.29 **
Learning Problem	-.62 ****	-.63 ****	-.56 ****	-.46 ****	-.33 ***	-.40 ****
<u>Conners' Teacher Rating Scales (CTRS-28)</u>						
Hyperactivity	-.52 ****	-.53 ****	-.48 ****	-.43 ****	-.32 **	-.40 ****
Hyperactivity Index	-.57 ****	-.62 ****	-.51 ****	-.44 ****	-.31 **	-.45 ****
Inattentive-Passive	-.57 ****	-.60 ****	-.51 ****	-.45 ****	-.32 ***	-.43 ****

- * = $p < .10$
 ** = $p < .05$
 *** = $p < .01$
 **** = $p < .001$

Partial Correlation Tables

Table 17

Partial correlations controlling for WISC-III (Full Scale IQ) between CPRS subscales and WIAT, DAS, and CVLT-C tests.

Achievement, Ability, and Memory scales	Conners' Parent Rating Scales (CPRS-48):					
	Conduct Problem	Learning Problem	Psychosomatic	Impulsive-Hyperactive	Anxiety	Hyperactivity Index
<u>Wechsler Individual Achievement subtests (WIAT):</u>	<i>r</i> (n=61)	<i>r</i> (n=61)	<i>r</i> (n=61)	<i>r</i> (n=61)	<i>r</i> (n=61)	<i>r</i> (n=61)
Basic Reading	-.27 **	-.42 ****		-.31 **		-.33 ***
Numerical Operations	-.39 ***	-.46 ****		-.31 **		-.37 ***
Written Expression	-.31 **	-.50 ****		-.28 **		-.38 ***
Math Reasoning	-.24 *	-.21 *				
Spelling		-.21 *				
<u>Differential Ability Scales (DAS) subtests</u>						
Recall of Objects			.31 **		.36 **	
Recall of Objects (Delayed)			.28 **		.41 ****	.22 *
Similarities					-.23 *	
Recall of Digits			-.24 *	-.27 **		-.24 *
Basic Number Skills	-.28 **	-.30 **				-.30 **
Spelling	-.35 ***	-.50 ****	-.26 **	-.41 ****		-.43 ****
Word Reading	-.34 ***	-.40 ****		-.37 ***		-.38 ***
<u>California Verbal Learning Test (CVLT-C)</u>						
CVLT-C		-.25 *				

* = $p < .10$ ** = $p < .05$ *** = $p < .01$ **** = $p < .001$

Table 18

Partial correlations controlling for WISC-III (Full Scale IQ) between specific ACTeRS and Conners' behavioral rating subscales and WIAT, DAS, and CVLT-C subtests.

Achievement, Ability, and Memory Tests	Behavior Rating Scales:					
	ACTeRS			Conners' (CTRS-28)		
	Attention Problem	Hyperactivity	Social Skills Problem	Oppositional	Conduct Problem	Hyperactivity
<u>WIAT</u>	r (n=61)	r (n=61)	r (n=61)	r (n=61)	r (n=61)	r (n=61)
Basic Reading	.33 *	.36 **	.24 *	.26 **	-.24 *	-.32 **
Math Reasoning	.24 *				-.23 *	
Spelling						
Reading Comprehension	.21 *					
Numerical Operations	.46 ****	.30 **		.33 **	-.41 ****	-.34 **
Written Expression	.51 ****	.42 ****	.33 ***	.33 ***	-.40 ****	-.38 ***

Table 18, Continued:

Achievement, Ability, and Memory Tests	Behavior Rating Scales:					
	Attention Problem	ACTeRS		Oppositional	Conduct Problem	Conners' (CTRS-28) Hyperactivity
<u>DAS</u>						
Word Definitions						-.23 *
Recall of Objects	-.27 **	-.26 **			.27 **	.25 **
Recall of Objects (Delayed)	-.21 *	-.30 **			.25 **	.34 ***
Basic Number Skills	.37 ***	.21 *		.24 *	-.41 ****	-.31 **
Spelling	.44 ****	.39 ***		.34 ***	-.38 ***	-.44 ****
Word Reading	.29 **	.30 **		.24 *	-.24 *	-.31 **
Verbal Ability						-.21 *
<u>CVLT-C</u>						
CVLT-C				.24 *		

* - $p < .10$ ** - $p < .05$ *** - $p < .01$ **** - $p < .001$

Table 19

Partial Correlations controlling for WISC-III (Full Scale IQ) between specific Conners' Teacher Ratings (CTRS-28) subscale scores and WIAT, DAS, and CVLT-C subtest scores.

Achievement, Ability and Memory Tests:	Behavior Rating Scales Conners' (CTRS-28) subscales	
	Inattentive-Passive	Hyperactivity Index
<u>WIAT</u>	$r(n=61)$	$r(n=61)$
Basic Reading	-.35***	-.34***
Reading Comprehension	-.22*	-.24*
Numerical Operations	-.41****	-.40****
Written Expression	-.47****	-.50****
<u>DAS</u>		
Recall of Objects (Immediate)	.22*	.22*
Recall of Objects (Delayed)	.25**	.27**
Recall of Digits	-.22*	—
Basic Number Skills	-.36***	-.40****
Spelling	-.46****	-.47****
Word Reading	-.39****	-.35***
<u>CVLT-C</u>		
CVLT-C		-.21*

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Table 20

Partial Correlations controlling for WISC-III (Full Scale IQ) between WIAT (Wechsler Individual Achievement Test) scores and specific hyperactivity, impulsivity, and learning symptoms on ACTeRS and Conners' scales.

Behavior Rating Scales	WIAT Subtests:					
	Basic Reading	Math Reasoning	Spelling	Reading Comprehension	Numerical Operations	Written Expression
<u>ACTeRS</u>	$r(n=61)$	$r(n=61)$	$r(n=61)$	$r(n=61)$	$r(n=61)$	$r(n=61)$
Attention Problem	.33***	.24*			.46****	.51****
Hyperactivity	.36***				.30**	.42****
<u>Conners' CPRS-48</u>						
Impulsive-Hyperactive	-.31**				-.31**	-.28**
Hyperactivity Index	-.33***				-.37***	-.38***
Learning Problem	-.42****	-.21*	-.21*		-.46****	-.50****
<u>Conners' CTRS-28</u>						
Hyperactivity	-.32**				-.34***	-.38***
Hyperactivity Index	-.34***			-.24*	-.40****	-.50****
Inattentive-Passive	-.35***			-.22*	-.41****	-.47****

* = $p < .10$

** = $p < .05$

*** = $p < .01$

**** = $p < .001$

Discussion

It was expected from these results that an ADHD group of children would perform differently than a control group, on a battery of psychometric tests and behavior rating scales. Furthermore, these results were designed to specifically highlight those particular subtests and subscales that are indicative of ADHD symptomatology.

The original goal was to devise an assessment battery based on only those tests that appear promising in diagnosing ADHD. Only certain subtests and subscales would portray ADHD symptomatology, and, in effect could potentially be able to be incorporated into a new assessment battery. An assessment battery that is concise, yet comprehensive enough to specifically identify problems unique to the ADHD child. This result would then aid in creating barriers between ADHD, other comorbid disorders, and non-diagnosed children in the classroom and at home. A concrete assessment battery would establish and maintain these boundaries, and in future years to come, be widely used to assess, diagnose, and evaluate all aspects of ADHD.

Results appear somewhat promising, and especially so, in their manifestations towards unexpected IQ differences in the chosen sample. However, prior to these manifestations, the initial step, which was proposed to be the sole focus of this study, was to examine group differences.

Any significant differences between the ADHD and control group would be an important discovery. Although differences were expected, it was essential to verify precisely where they occurred, and how significant these differences were. The result would be to utilize these combined psychometric and behavioral measures in an attempt to confirm and develop diagnostic purity.

Initial results on the behavioral rating scales were promising, as expected noticeable group differences occurred on Conners' parent and Conners' teacher ratings. The ADHD group's results on these hyperactivity, impulsivity, inattention, anxiety and oppositional/conduct behavior subscales show the ADHD group well into the "clinically significant" area. T-scores above 65 are representative of ADHD symptomatology on the Conners' scales (Conners, 1990).

With significant differences noted, the ADHD diagnosed group is congruent with the diagnostic intentions of the parent and teacher Conners' behavior ratings. Furthermore, this is an early indicator of a well chosen ADHD sample. In addition, the control group sample results appear only somewhat elevated, and this appears to effectively represent their non-diagnosed symptomatology.

Parent and teacher behavior ratings are an integral aspect of ADHD diagnosis, as ADHD symptoms, the predominant ones being hyperactivity and inattention, are easily noted by both parents and teachers alike. However, because of potential parent and teacher observation biases, it was necessary to incorporate another behavior rating scale, the ACTeRS which is also specifically designed to detect ADHD symptoms.

As expected, the ACTeRS results were congruent with Conners' results, and to further verify the congruencies, was in fact examined later in the study through correlations. However, prior to the correlations, the T-tests revealed significant differences between the ADHD and control groups. Decreased ACTeRS scores, which are measured in percentiles, are most indicative of ADHD symptoms.

ACTeRS scores below the 10th percentile are confident indicators of an "ADD" diagnosis (Ullmann, Sleator, & Sprague, 1991), although, many ACTeRS symptoms point

more clearly to hyperactive ADD, or ADHD. Nevertheless, the ACTeRS well represents problem behavior symptoms, and the results in this study show congruencies with ACTeRS diagnostic score cutoffs.

Any ACTeRS percentile score below the 25th percentile (.25) in a restless, fidgety child could be a confident diagnostic indicator for ADHD symptoms. It is also important to note that ACTeRS scores, being percentiles, run in the opposite direction to the Conners' scores, creating some initial confusion in the research process. However, this was accounted for, and effectively integrated to yield these concretely evident results.

While both Conners' and ACTeRS scales are shown to effectively yield concrete diagnostic results for ADHD symptoms, their role as group distinguishers becomes limited as they are restricted to noting behavior problems. As a result, the next step was to examine intelligence on the WISC-III.

WISC-III subtests are likely a vital aspect in measuring ADHD symptoms when stressed to perform and yield performance results in the form of IQ. This statement is not, however, supported by researchers such as Barkley (1996), who has stated that intelligence is not a noteworthy aspect in diagnosing ADHD. He notes that intelligence is not a plausible distinguisher between ADHD and non-ADHD (control) groups. In many cases, however, the ADHD child may be more intelligent than his or her peers in the control group, but he or she may perform worse due to ADHD symptoms impeding his or her academic and social functioning.

An argument can be made, however, as was in the Anastopoulos et al. (1994) study that WISC-III "Freedom from Distractibility" factors can potentially show association with teacher ratings, and potentially be incorporated as an integral

component in the diagnostic and assessment process. Although not all of their results show promise, they could yield some degree of focus as an aspect in the broad focus of the multimethod assessment battery.

WISC-III results in this study were significant, and caused the study to manifest into an entirely new realm. This was not anticipated, as the WISC-III was expected to show limited diagnostic utility as in the previous research. This may have, in fact, been the case, had only aspects of the WISC-III been used with a lesser number of behavior ratings and other psychometric measures.

Most noted, was the significant difference between the ADHD and control group on "Full Scale IQ." This was the catalyst in furthering the research to a new realm. This was to determine as to whether or not the group differences were due to ADHD symptoms or IQ — a significant question that will be discussed in greater detail.

After WISC-III differences were noted, differences between control and ADHD groups on the WIAT also occurred. In fact, these were all significant group differences, showing ADHD achievement scores to be lower. The question here then arose as to whether these differences may have been due to IQ, or was the ADHD group distracted enough to perform significantly worse on reading, spelling, mathematics, comprehension and written tasks. These tasks are important as they also parallel typical school academic tasks, and correlated with behavior ratings, could show a potential degree of association.

DAS results generally followed the same anticipated pattern of ADHD's performing worse than the control group, although, there were surprises. To begin, the ADHD group performed marginally better than the control group on the "Recall of

Objects" immediate recall subtest. This result potentially depicts the ability of the ADHD group to perform well on interesting pictures which may grasp their full attention, but over time, this tends to fade. Furthermore, it can potentially be argued that there is little time for infiltration of extraneous stimuli to impede the ADHD group's memory processes.

The delayed object recall subtest shows marginally decreased ADHD memory of objects when compared with the control group, but, in effect, little memory "fading" has occurred.

On the other hand, the other memory recall tests "Recall of Designs" and CVLT-C showed results that were more in line with initial expectations. It was expected that ADHD memory is less effective on less colorful and interesting objects, such as line drawings, and, even more defined on word recall of objects as seen on the CVLT-C.

These results could, in effect, aid treatment options, as it seems apparent in this examination that ADHD children are highly responsive to overt picture stimuli. It appears that they may have been able to identify effectively with these pictures, thus storing them in their memory. This is an important consideration for classroom behavior and academic management of ADHD children.

Once direct comparisons were established between the two groups, it was decided to manipulate bivariate correlations in an attempt to portray the relationships between the severity of ADHD symptoms and psychometric tests. Correlations use the entire sample, $n=64$, and as a result can yield more intensive and accurate results.

By examining specific (clustered) behavioral symptoms of ADHD (represented by the Conners' and ACTeRS scales), it was now possible to examine how they relate to

performance problems. This provides the urgently required "second dimension," namely psychometric tests, which cannot be used alone, to balance the study and account for ADHD symptomatology as a whole. In this scenario, researchers compiling an assessment battery would also find these results useful as they point to only the most significant, and thus "useful" associations. Only those specific subtests that interrelate well would then be incorporated, thus simplifying the assessment process.

Correlations between the DAS subtests and represented specific behavioral symptoms not only depict heightened impulsive-hyperactive behavior symptoms as associated with low performance scores on DAS impulse-driven tasks, but due to these significant associations, hyperactive and impulsive behavior can now effectively be examined with its direct performance outcome, and thus be well integrated in the quest to create a level of behavior-performance "balance" in the assessment process. Behavior and its effects on performance can then be equated and further studied once concrete associations are established, as in this case.

To clarify the correlations, it is important to note that elevated Conners' scores are indicative of ADHD symptoms, while low scores (measured as percentiles) on the ACTeRS indicate increased ADHD symptoms. As a result, ACTeRS correlations on the DAS appear positive as low ACTeRS scores (elevated hyperactivity) are associated with low DAS scores. The vice versa occurs on the Conners' teacher and parent ratings where increased Conners' scores (elevated hyperactivity and impulsivity) are associated with low DAS scores, hence the negative correlations.

Behavior rating scale correlations which also were associated with DAS "Recall of Designs" and "Recall of Digits" subtests were as expected. These recall-type subtests

are unlike the "object" recall mentioned earlier. It appears that, although, these are immediate recall subtests, line drawings and numbers respectively, inattention rapidly sets in to impede upon ADHD performance. As a result, attention problems are well equated with poor line and digit recall ability.

Other bivariate correlations such as those between ACTeRS and Conners' inattention, passivity, impulsivity and hyperactivity show significant association on DAS and WISC-III "speeded" tasks such as DAS "Speed of Information Processing" and WISC-III "Coding" and "Symbol Search."

While these results appear obvious, it is important to note that on speeded tasks, the ADHD group did not simply score poorly. Lower scores here may have been specific results of impulsivity, "carelessness" and inattention which are linked with their hyperactivity.

As a result, low ADHD scores are not necessarily because ADHD's are slower, but simply that they make more careless errors, resulting in diminished scores. Furthermore, the argument that ADHD children and adults are more responsive, as a group, to rapid stimuli, can potentially hold true here, as ADHD speed and impulse-responses are extremely high, but the level of careless errors may outweigh their overall level of performance, decreasing their final scores.

As a result, this area could potentially benefit from more research into the specific dynamics of impulsivity and its advantages and disadvantages in speeded tasks. Furthermore, researchers need to exercise caution in simply scoring these timed tasks, as a low score may not necessarily be the true representation of the ADHD child's ability.

With this argument made, the net results in this study point to decreased WISC-III results for increased ADHD behavior symptoms, once again depicting lower IQ results for the ADHD group. This is congruent with the earlier T-tests showing mean group differences in IQ.

From this result, it can also be deduced that certain WISC-III subtests will parallel, reflect upon, and in effect co-exist effectively with behavioral rating scale symptoms. This would aid in balancing the assessment battery in accounting for both behavior and academic performance aspects in ADHD school children. The WISC-III "Digit Span" subtest, a digit recall task as that of the DAS (Recall of Digits), was not significantly associated with most behavioral symptoms, save for, the Conners' "learning problem." Why this significant correlation occurred is unclear, but it is possible that learning problems are encompassing of all ADHD behavioral and performance problems, and as a result, may easily correlate with most problematic symptoms — symptoms of all kinds which are in some way related to learning disabilities.

These "learning problems" may incorporate both attention and memory problems as well as anxiety, thus increasing the probability of a correlation occurring randomly with aspects of the academic school performance arena.

Other WISC-III significant correlations that occurred in timed subtests were noted in puzzle and block assembly tasks, as well as picture tasks involving attention to detail and comprehension of picture stories. These correlations are represented in WISC-III "Picture Completion," "Picture Arrangement," "Block Design" and "Object Assembly."

Only specific significant correlations occurred here, thus narrowing the focus to those behavior and performance (IQ) ratings that are associated, and could be included for use in the assessment process.

This degree of variability between the three behavior rating scales highlights the importance of incorporating both teacher and parent ratings. Parent ratings, as expected, correlated differently from teacher ratings, but both teacher ratings (ACTeRS and CTRS-28) correlated in similar ways. But why the variability between parent and teacher ratings?

The obvious answer would be to point to the individual biases of both parents and teachers, as previously discussed. However, the situational differences between home and school arenas is important to account for. The ADHD child will behave and interact differently at home than at school, and behavioral and interactional variability will also likely occur with different teachers and parents and respective levels of discipline and understanding of ADHD children.

As a result, the primary ADHD symptoms of inattention, impulsivity and hyperactivity, the latter most observable, were focussed upon on three behavior rating scales to attempt to balance out both observer and situational biases. This appears to have been effective, at least to a limited degree, in highlighting specific behavioral and associated performance problems, and eventually how IQ affects these problems.

Strong associations appeared between teacher and parent ratings when correlated, indicating that behavioral problems on teacher scales were associated with similar levels of behavioral problems on the parent ratings. These favorable associations provided a significant degree of strength between these behavior rating scales.

This not only makes them a useful combined behavior rating component, but because the associations are significant, the issue of situational variability can be well accounted for, reducing the biases between school behavior and performance problems, and those in the home.

Impulsivity and hyperactivity levels represent elevated ADHD symptoms that were noted by both parents and teachers without a great degree of discrepancy. This portrays rater biases as being quite low, and highly effective. As a result, the behavioral ratings component in this study appears to be a reliable determiner in its ability to examine and distinguish specific differences in performance for each subtest and subscale.

With this noted, achievement results on the WIAT were all significant, with little or insignificant distinguishability between specific WIAT subtests and rating scales. The result of low achievement scores being associated with increased ADHD symptoms was expected, although, these were all significant, and total significance had to be further explored.

At this point, it became apparent that the ADHD group may have been achieving lower scores due to the lower IQ results in the ADHD group. However, intelligence if used as a third factor to distinguish the two groups would have to be examined on all performance-behavior aspects to note the degree of changes occurring.

Because WIAT results were so "clear-cut", it became apparent of the importance of incorporating other performance subtests such as the DAS. It was originally hypothesized that specific subtests would represent ADHD symptomatology, so the goal was to use IQ in an attempt to decipher the true group differences and where they are

occurring. DAS results were specific to begin with, but ADHD children should not necessarily perform poorly on all academic-type tasks. Was there another explanation?

As a result, partial correlations were able to withdraw the effect of this third variable — IQ. This occurred by holding IQ constant to determine the specific changes in the relationship between ADHD and performance; thus assuming that all the children in the group have the same IQ.

Partial correlations controlled for WISC-III (Full Scale IQ) with resulting marked changes between behavioral ratings and WIAT scores. As seen, many WIAT correlations became less or insignificant, indicating that IQ scores have changed the relationship between ADHD symptoms and the WIAT scores.

This result was less marked for the DAS subtests, although, there were changes here too. It is therefore apparent that achievement is affected by intelligence on certain subtests, and that ADHD symptoms may not have been the primary factors.

WIAT changes appear to be the most noted due to the original total significance of WIAT scores in relation to ADHD symptoms. DAS scores were initially less significant when associated with ADHD symptoms, hence the fewer changes due to intelligence.

Nevertheless, it is now apparent that the ADHD group was of lower intelligence than the control group. This is likely due to ADHD symptoms interfering with WISC-III performance outcome. However, lower performance scores did not necessarily occur on all performance subtests due to ADHD symptomatology, but, in many cases IQ. This indicates that assuming both groups are of the same intelligence, there was less significance between increased ADHD behavior and decreased performance scores.

From this result, one can deduce that because intelligence was held constant, the results gravitate towards intelligence increasing the ADHD scores, so in effect both the control and ADHD groups are held constant — the same intelligence. This only becomes apparent, however, when you then remove IQ as a factor, and you are left with greater significance between ADHD symptoms and performance scores — the true result of the original study.

This result was, however, altered due to IQ, as decreased performance on ADHD symptoms (for the ADHD group) was due to decreased intelligence levels in the ADHD group. Therefore the significance was due to IQ.

The notion of IQ being the catalyst for significance was not known, nor intended. However, as T-test results rapidly revealed vast IQ differences, notably on WISC-III "Full Scale IQ," it became apparent that IQ could potentially be the true distinguisher in the group, and thus accounting for the large number of significant differences in behavior, and especially performance, between the control and ADHD groups.

As this result of IQ as the "hidden" but true group distinguisher was not anticipated until well into the research, no concrete conclusion can be drawn here.

What we do know, however, is that the battery of behavior and performance subscales, and subtests has been successful in identifying specific performance weaknesses associated with ADHD behavior, but more importantly been able to distinguish an ADHD group apart from a control group, with significant differences. This result was congruent with initial hopes and expectations, setting a strong foundation for further study.

This assessment battery can potentially contribute to future research, as it specifically indicates useful subscales for behavior, and subtests for performance. This concise set of tasks can potentially show success when attempting to identify specific ADHD related problems. Obvious beneficial treatment approaches could result.

This study resolves many previous queries into the actual dynamics of ADHD behavior problems. In addition, previous diagnostic attempts have failed to provide clear-cut, significant boundaries between ADHD and non-ADHD children.

This attempt for concrete diagnosis has incorporated positive aspects of previous research, and in a concise manner, reformulated these aspects for use in a workable set of measures which can actually highlight problems. These problems can then be effectively dealt with.

Where this study has come short is in its inability to pinpoint comorbid diagnosis, although, from this research foundation, future studies could manifest and examine comorbidity based on this "simple" concise model. Furthermore, as comorbidity becomes an issue, the IQ issue at the end of this study becomes an important consideration.

As a specific contribution, since IQ has aided in truly distinguishing the ADHD sample from the control sample, it may be used as a beneficial distinguisher for comorbidity. Possibly, if manipulated effectively, IQ may resurface as the primary method for differential diagnosis — or as a useful "hidden" component as seen here.

Needless to say, if IQ is not anticipated as the primary distinguisher in the initial outlay of the study, not only could it surprise the researcher, but potentially confound

the results. To guard against this, future research will need to examine the conundrum of IQ implications — especially when selecting the research samples.

Future research would have to question as to whether or not intelligence problems can be associated with ADHD symptoms. Or is this result an isolated case?

Furthermore, if this is the case, as in this study, a significantly larger sample, spanning several demographic zones — possibly several population-regions would have to be collected.

Only then would further questions into IQ effects on ADHD and other comorbid disorders attempt to be answered. Until that point, this study, and its unexpected manifestation into the IQ realm may potentially lay an effective foundation for the concrete and purposeful assessment, diagnosis and evaluation of ADHD.

Although the generalizability of this study is limited by the sample size, it proposes to make a significant contribution to the larger body of literature on this topic. Several factors contributed to the limited subject pool available, including the unique characteristics of the population of interest, and time considerations due to the extensive nature of the psychometric and behavioral rating scales employed.

In spite of these limitations, the findings of this study are meritorious, as they help to reveal and specify the symptomatology of ADHD for this specific population. This study is therefore a preliminary exploration into the specific symptomatology of ADHD, and may provide the theoretical and practical foundations for future research.

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APPENDIX A1

CONNERS' TEACHER RATING SCALE — 28 (CTRS-28)

Child Name: John Smith Child Age: 11 Child Sex: M Teacher: A. Wilson

Instructions: Read each item below carefully, and decide how much you think the child has been bothered by this problem during the past month.

				CTRS-28
Not at All	Just a Little	Pretty Much	Very Much	
0	1	2	3	1. Restless in the "squirmy" sense
0	1	2	3	2. Makes inappropriate noises when s/he shouldn't
0	1	2	3	3. Demands must be met immediately
0	1	2	3	4. Acts "smart" (impudent or sassy)
0	1	2	3	5. Temper outbursts and unpredictable behavior
0	1	2	3	6. Overly sensitive to criticism
0	1	2	3	7. Distractibility or attention span a problem
0	1	2	3	8. Disturbs other children
0	1	2	3	9. Daydreams
0	1	2	3	10. Pouts and sulks
0	1	2	3	11. Mood changes quickly and drastically
0	1	2	3	12. Quarrelsome
0	1	2	3	13. Submissive attitude toward authority
0	1	2	3	14. Restless, always up and on the go
0	1	2	3	15. Excitable, impulsive
0	1	2	3	16. Excessive demands for teacher's attention
0	1	2	3	17. Appears to be unaccepted by group
0	1	2	3	18. Appears to be easily led by other children
0	1	2	3	19. No sense of fair play
0	1	2	3	20. Appears to lack leadership
0	1	2	3	21. Fails to finish things that s/he starts
0	1	2	3	22. Childish and immature
0	1	2	3	23. Denies mistakes or blames others
0	1	2	3	24. Does not get along well with other children
0	1	2	3	25. Uncooperative with classmates
0	1	2	3	26. Easily frustrated in efforts
0	1	2	3	27. Uncooperative with teacher
0	1	2	3	28. Difficulty in learning
Not at All	Just a Little	Pretty Much	Very Much	

APPENDIX A2

CONNERS' PARENT RATING SCALE — 48 (CPRS-48)

Child Name: Susan White Child Age: 7 Child Sex: F Parent Name: Karen White

Instructions: Read each item below carefully, and decide how much you think your child has been bothered by this problem during the past month.

				CPRS-48
Not at All	Just a Little	Pretty Much	Very Much	
0	1	2	3	1. Picks at things (nails, fingers, hair, clothing)
0	1	2	3	2. Sassy to grown-ups
0	1	2	3	3. Problems with making or keeping friends
0	1	2	3	4. Excitable, impulsive
0	1	2	3	5. Wants to run things
0	1	2	3	6. Sucks or chews (thumb, clothing, blankets)
0	1	2	3	7. Cries easily or often
0	1	2	3	8. Carries a chip on his/her shoulder
0	1	2	3	9. Daydreams
0	1	2	3	10. Difficulty in learning
0	1	2	3	11. Restless in the "squirmy" sense
0	1	2	3	12. Fearful (of new situations, new people or places, going to school)
0	1	2	3	13. Restless, always up and on the go
0	1	2	3	14. Destructive
0	1	2	3	15. Tells lies or stories that aren't true
0	1	2	3	16. Shy
0	1	2	3	17. Gets into more trouble than others same age
0	1	2	3	18. Speaks differently from others same age (baby talk, stuttering, hard to understand)
0	1	2	3	19. Denies mistakes or blames others
0	1	2	3	20. Quarrelsome
0	1	2	3	21. Pouts and sulks
0	1	2	3	22. Steals
0	1	2	3	23. Disobedient or obeys but resentfully
0	1	2	3	24. Worries more than others (about being alone, illness or death)
0	1	2	3	25. Falls to finish things
0	1	2	3	26. Feelings easily hurt
0	1	2	3	27. Bullies others
0	1	2	3	28. Unable to stop a repetitive activity
0	1	2	3	29. Cruel
0	1	2	3	30. Childish or immature (wants help s/he shouldn't need, clings, needs constant reassurance)
0	1	2	3	31. Distractibility or attention span a problem
0	1	2	3	32. Headaches
0	1	2	3	33. Mood changes quickly and drastically
0	1	2	3	34. Doesn't like or doesn't follow rules or restrictions
0	1	2	3	35. Fights constantly
0	1	2	3	36. Doesn't get along well with brothers or sisters
0	1	2	3	37. Easily frustrated in efforts
0	1	2	3	38. Disturbs other children
0	1	2	3	39. Basically an unhappy child
0	1	2	3	40. Problems with eating (poor appetite, up between bites)
0	1	2	3	41. Stomach aches
0	1	2	3	42. Problems with sleep (can't fall asleep, up too early, up in the night)
0	1	2	3	43. Other aches and pains
0	1	2	3	44. Vomiting or nausea
0	1	2	3	45. Feels cheated in family circle
0	1	2	3	46. Boasts and brags
0	1	2	3	47. Lets self be pushed around
0	1	2	3	48. Bowel problems (frequently loose, irregular habits, constipation)

APPENDIX B

ADD-H COMPREHENSIVE TEACHER'S RATING SCALE (ACTERS)



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Robert L. Sprague, Ph.D.

2nd Edition

Below are descriptions of behavior. Please read each item and compare the child's behavior with that of his or her classmates. Circle the number that most closely corresponds with your evaluation. Transfer the total raw score for each of the four sections to the profile sheet to determine normative percentile scores.

Child's Name: Chris Student
Rater: Mrs. Anderson
ID #: 71245
Date: 2-5-91

ATTENTION

	Almost Never			Almost Always
1. Works well independently	1	②	3	4 5
2. Persists with task for reasonable amount of time	①	2	3	4 5
3. Completes assigned task satisfactorily with little additional assistance	1	②	3	4 5
4. Follows simple directions accurately	1	2	③	4 5
5. Follows a sequence of instructions	1	②	3	4 5
6. Functions well in the classroom	1	②	3	4 5

ADD ITEMS 1-6 AND PLACE TOTAL HERE 12

HYPERACTIVITY

	Almost Never			Almost Always
7. Extremely overactive (out of seat, "on the go")	1	2	3	④ 5
8. Overreacts	1	②	3	4 5
9. Fidgety (hands always busy)	1	2	③	4 5
10. Impulsive (acts or talks without thinking)	1	②	3	4 5
11. Restless (squirms in seat)	1	2	3	④ 5

ADD ITEMS 7-11 AND PLACE TOTAL HERE 15

SOCIAL SKILLS

	Almost Never			Almost Always
12. Behaves positively with peers/classmates	1	2	③	4 5
13. Verbal communication clear and "connected"	1	2	3	④ 5
14. Nonverbal communication accurate	1	2	3	④ 5
15. Follows group norms and social rules	1	②	3	4 5
16. Cites general rule when criticizing ("We aren't supposed to do that")	1	2	3	④ 5
17. Skillful at making new friends	1	②	3	4 5
18. Approaches situations confidently	1	2	3	4 ⑤

ADD ITEMS 12-18 AND PLACE TOTAL HERE 24

OPPOSITIONAL

	Almost Never			Almost Always
19. Tries to get others into trouble	1	②	3	4 5
20. Starts fights over nothing	①	2	3	4 5
21. Makes malicious fun of people	1	②	3	4 5
22. Defies authority	1	②	3	4 5
23. Picks on others	1	②	3	4 5
24. Mean and cruel to other children	1	②	3	4 5

ADD ITEMS 19-24 AND PLACE TOTAL HERE 11