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ABSTRACT

This paper reviews the literature on the ongoing effects of attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD) in adults. It notes that 66 percent of individuals diagnosed with ADD or ADHD as children continue to experience one or more symptoms as adults, most commonly restlessness, distractibility, and impulsiveness. The paper begins with a review of the history of ADD and methodological considerations including changing terminology, research designs, sample attributes, and assessment methods. Next, the impact of ADD in adulthood is directly addressed for the areas of academic and vocational adjustment, social adjustment, emotional adjustment, and long-term effects of stimulant treatment. Implications of the Americans with Disabilities Act are also discussed. The final section addresses further research needs. (Contains 52 references.) (DB)

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THE IMPACT OF ATTENTION DISORDERS DURING ADULTHOOD: A REVIEW OF THE CURRENT LITERATURE

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In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

C.S. DUNNING

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by

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May, 1998

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THE IMPACT OF ATTENTION DISORDERS DURING ADULTHOOD:

A REVIEW OF CURRENT LITERATURE

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ABSTRACT

THE IMPACT OF ATTENTION DISORDERS DURING ADULTHOOD:
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by

Carole Sue Dunning

Twenty-five years ago, researchers first began to study the impact of attention deficit difficulties in children and continued follow-up studies with these individuals through adolescence and into adulthood. Results indicate that 66% percent of these adults experience one or more symptoms of ADHD. The most frequent symptoms reported are restlessness, distractibility, and impulsiveness, which may impact the ability to adjust to adulthood. Following a brief history of the diagnoses of attention deficit disorders, research designs, attributes of the samples, and various assessment instruments used in these longitudinal studies will be reviewed and critiqued. In addition, the literature pertaining to the adult's adjustment in the following areas will be reviewed: (a) academic and vocational, (b) social, and (c) emotional. Long-term effects of stimulant treatment will also be discussed.

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THE IMPACT OF ATTENTION DISORDERS DURING ADULTHOOD: A REVIEW OF THE CURRENT LITERATURE

Introduction

Today's diagnosis of Attention-Deficit Disorder (ADD) or Attention-Deficit/Hyperactivity Disorder (ADHD) has evolved from the early recognition of ADD or ADHD symptoms as first described in 1902 to the most recent diagnostic symptoms as presented in the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV; American Psychiatric Association, 1994). Through the years, the symptoms have become more sharply defined and are currently expressed in clusters representing specific behavioral domains.

The earliest diagnostic literature focused on symptoms in children (Bakwin & Bakwin, 1966; Bradley, 1957; Eisenberg, 1966; Laufer & Denhoff, 1957). The belief that most children would outgrow ADD/ADHD as they reached puberty was also purported by early literature (Anderson & Plymate, 1962; Laufer, 1962). However, it has become apparent in the current literature that approximately 60% to 75% of children previously diagnosed with ADD/ADHD have continued to exhibit some of the same symptomology during adulthood (Barkley, Fischer, Edelbrock, & Smallish, 1990; Hechtman & Weiss, 1986). In the last 15 to 20 years, researchers have documented that many of the symptoms of those previously diagnosed with ADHD/ADD continue into adulthood, causing inattention and impulsivity as well as

significant psychiatric, social, and cognitive impairments in adulthood (Barkley, 1990; Hechtman, Weiss, & Perlman, 1984a, 1984b; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993; Shekim, Asarnow, Hess, Zaucha, & Wheeler, 1990; Weinstein, 1994; Hechtman & Weiss, 1986; Weiss, Hechtman, & Perlman, 1978).

A close examination of the earliest recognition of behaviors associated with this disorder helps elucidate the evolution of ADD/ADHD diagnosis. G. F. Still (1902) was the first to record a study of attention difficulties in his observation of children who displayed defects in moral control. He described these children as having behavioral problems that included hyperactivi y, poor attention, learning disorders, and conduct disorders.

The next documentation of ADD/ADHD symptoms followed a post-World War I outbreak of encephalitis lethargica. After the illness, many of the afflicted children displayed behavioral disorders that were similar to what Still had described (Ebaugh, 1923; Hohman, 1922; Still, 1902). Kahn and Cohen (1934) described the encephalic children as "organically driven." Believing that these children had sustained damage to the brain stem as a result of the encephalitis, doctors placed the children in a residential treatment center where they improved significantly. However, when the children returned home, many experienced a recurrence of behavioral problems. Kahn and Cohen concluded that the behaviors exhibited by some of these children involved both organic and environmental factors and that the relapse was due to maladjusted parents.

The research of Strauss and Kephart (1955) further suggested that there was a neurological component to hyperactive behavior and concluded that children with specific behavioral and cognitive problems probably suffered

from some type of brain damage. The authors proposed that early recognition of these symptoms enabled children to be placed in special educational settings designed to assist in the enhancement of their learning potential. For example, these children were often placed in special study cubicles which reduced external distractions. Early techniques such as this proved very effective in helping many of these children.

In addition, a significant number of hyperactive adults may not have been diagnosed with ADD/ADHD during their childhood years when the syndrome, as well as its defining symptom clusters, were less well known. Others may have escaped diagnosis simply because they did not act out or were not disruptive in school. Yet these individuals may have had difficulty paying attention and may have engaged in daydreaming or other inattentive behaviors. As adults, however, they may still meet the criteria for inattentive type ADD.

Much of the current literature regarding adults with ADD/ADHD has resulted from longitudinal studies of individuals who were diagnosed as children and followed through adolescence and into young adulthood. Adults not diagnosed as children have frequently been diagnosed at the time their own children have been referred for an evaluation of ADD/ADHD symptoms. As part of a child's evaluation, clinicians conduct a thorough background history of the child and his/her family. As parents discuss their child's behavior and read literature about ADD/ADHD, they may realize that they share the same symptoms and choose to have themselves evaluated as well.

Methodological Considerations

An examination of the literature reveals several significant issues surrounding current research on the attention disorders. Recognition of deficits in attention is fairly new: No documentation existed prior to 1902. As a result of its newness, the changing terminology, inadequate research designs, inconsistent attributes across samples studied, and the variety of assessment instruments used may add as much to the uncertainty as to the explication of the disorders.

Changing Terminology

As understanding of attention disorders has grown, so has the terminology with which they are defined. From Strauss's research during the early 1930s through the 1950s, the term Minimal Brain Damage Syndrome (MBD) was generated, a label that persisted well into the 1960s. However, in 1957, Laufer and Denhoff described the ADD/ADHD syndrome as Hyperkinetic Impulse Disorder, the core symptoms of which were restlessness and impulsivity.

Additional variations of the name have resulted from the work of the American Psychiatric Association (APA). The Diagnostic and Statistical Manual of Mental Disorders (2nd ed.; DSM-II; APA, 1968) changed the name to Hyperkinetic Reaction to Childhood. The change in labels from the DSM-II to the DSM-III (APA, 1980) resulted from the work of Dykman and Douglas, who focused their life work on researching and operationalizing this syndrome.

A study by Dykman, Acerman, Clements, and Peters (1971) as well as other studies done by Douglas between 1971 and 1980 also influenced a change

in terminology. Demonstrating that hyperactive individuals exhibited faulty attention and problems with inhibitory control, their research suggested the new name for this disorder in the DSM-III (APA, 1980): Attention Deficit Disorder with Hyperactivity (ADDH) and Attention Deficit Disorder without Hyperactivity (ADD). The criteria required for the ADDH diagnosis were: (a) inattention, with at least three of five symptoms endorsed; (b) impulsivity, with at least three of six symptoms endorsed; and (c) hyperactivity, with at least two of five symptoms endorsed. ADD was a category which included all criteria except hyperactivity. Attention Deficit Disorder could also have a third classification which applied to individuals who did not currently meet the criteria for ADDH, but had done so previously: Attention Deficit Disorder, Residual Type (ADD-RT).

When the DSM-III-R (APA, 1987) was released, ADHD was classified with Conduct Disorder and Oppositional Defiant Disorder under the heading Conduct Disruptive Behavior Disorders because the characterization of these behaviors is usually more socially disruptive to others than to the individuals themselves. In addition, ADD without hyperactivity was classified in the Other Category under Undifferentiated Attention Deficit Disorder. ADD-RT became Attention Deficit Hyperactivity Disorder-Residual State, and the diagnosing criteria also changed. Originally the DSM-III had required that hyperactivity be present, whereas the DSM-III-R stated that signs of hyperactivity were no longer required.

In the DSM-IV (APA, 1994), additional changes were made. Since not all ADHD children are disruptive, such labels are inappropriate. Therefore, the revised category is now Attention Deficit and Disruptive Behavior Disorders. The DSM-IV further divides ADD/ADHD symptoms into two

groupings: inattention and hyperactivity-impulsivity. Six symptoms are listed for nyperactivity, and three are listed for impulsivity.

Additionally, the DSM-IV (APA, 1994) identifies three subtypes of ADHD. Attention-Deficit/Hyperactivity Disorder, Combined Type should be used if at least six symptoms of inattention and six of hyperactivity-impulsivity have persisted for at least 6 months. Most children and adolescents have the Combined Type; however, whether this type also applies to adults is not known. Attention Deficit/Hyperactivity Disorder, Predominantly Inattentive Type is used if at least six symptoms of inattention, but fewer than six symptoms of hyperactivity-impulsivity have persisted for at least 6 months. Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type is used if at least six symptoms of hyperactivity-impulsivity, but fewer than six symptoms of inattention, have persisted for at least 6 months. A coding note follows the above information: "For individuals (especially adolescents and adults) who currently have symptoms that no longer meet full criteria, 'In Partial Remission' should be specified" (p. 85).

Since the longitudinal studies on ADHD/ADD have been conducted over a 25-year period from 1963 to 1988, these frequent changes in definitions, symptoms, and diagnostic criteria of this disorder have created methodological problems in comparing various studies and limit the extent to which various diagnostic constructs can be compared and conclusions drawn.

Research Designs

The research reported in much of the literature on ADHD presents several methodological concerns. The majority of articles are based on a

single 20-year longitudinal study (e.g., Hechtman, Weiss, & Perlman, 1980; Weiss, Hechtman, Milroy, & Perlman, 1985). However, both retrospective studies and prospective studies have inherent weaknesses, which could impact the study outcomes.

Retrospective versus prospective studies. Problems arise when either retrospective or prospective studies are used to diagnose adult symptoms of a disorder that had been diagnosed in childhood. Some of the records used in retrospective studies may be incomplete, use out-dated data, or depend on the parent to remember details of the child's life even though the child is now an adult. These problems with retrospective studies could make the results methodologically questionable.

Prospective studies are potentially better because they can be more methodologically robust. However, the loss of subjects who either refuse to participate in follow-up studies or are lost by moving or other reasons is one difficulty that seriously interferes with the use of prospective studies. In the last follow-up study done by Weiss et al. (1985), only 65% of the original sample participated, a fact which may make the findings less trustworthy. These authors suggested that those who could not be traced for the follow-up study most likely constitute a more deviant group. If so, this could substantially change the conclusions drawn from the study. Mannuzza et al. (1993) were able to use 98% of their original subjects in their follow-up study, which may make their results more reliable.

Controls. Some studies did not have a matched control group or comparison group, which threatens internal validity or the ability to conclude that the observed changes are due to the disorder rather than other life events. Therefore, drawing conclusions from the data becomes more difficult.

In the literature reviewed, two studies did not have a control group (Menkes Rowe, & Menkes, 1967; Shekim et al., 1990). Although the initial study by Werry, Weiss, Douglas, & Martin (1966) did not have a control or comparison group, their 5-year through 15-year follow-up studies did have a control group; and during the 10-year follow-up study, they added more control subjects to the study.

Sample Attributes

Small sample sizes pose two concerns in research: the potential for reaching statistical significance and the limitation of generalizability of the data obtained. The sample sizes in the studies reviewed range from 18 subjects (Menkes et al., 1967) to 104 subjects (Werry et al., 1966). The wide variability in sample sizes renders their relative comparison questionable.

The age of the subjects, age classification, and the issue of low-IQ subjects poses concerns in other studies. Mannuzza et al. (1993) classified 16-year-old subjects as adults. This study made inferences about ADHD/ADD in adulthood, when, in essence, the data pertained to teenagers rather than adults. In the 10-year follow-up study by Weiss, Hechtman, Perlman, Hopkins, and Wener (1979), the mean age was 19.5, and at the 15-year follow-up study, the mean age was 25. Therefore, the results of most research to date cannot be appropriately generalized to individuals older than age 25. IQ may also confound the outcome by providing a poorer prognosis for adulthood, a fact that was overlooked in one study. In the Menkes et al. (1967) study, 4 subjects had IQs in the low 70s range, and 2 were later classified as mildly retarded. Inclusion of these subjects in this study could have skewed the results.

An over-representation of white male subjects is apparent in the literature. Most studies totally ignore the issue of ethnicity, and only one study (Shekim et al., 1990) included 8 women. These women were referred and met the rigorous research criteria that were set up for all the subjects in this study, and the resulting ratio of ADHD in boys to girls was 9:1, which is comparable to the reported ADHD gender ratio for general clinic referrals. However, current research (Barkley, 1995) shows that more girls have attention deficit (ADD) problems than was originally thought. Individuals with ADD are not as impulsive as those with ADHD, and, therefore, often go undiagnosed. Individuals with ADD are usually not included in studies and may have different difficulties and needs than those diagnosed with ADHD. If so, the life-long implications of their diagnosis may be quite different than those with ADHD. Therefore, the generalizability of results of these studies to different ethnic groups, women, and individuals with ADD is questionable.

Assessment Methods

Inconsistency in assessment methods presents additional methodological problems. Some prospective studies failed to utilize the same assessment instrument at both initial and follow-up studies, bringing into question the validity and reliability of results as well as the potential for making comparisons between studies. Other studies were inconsistent in determining who the respondent was. Sometimes the parents or the subject completed the information; at other times, information was given by a graduate student or the researcher.

A number of the studies used instruments that had been developed by the same researcher who authored the study. Some used others' new, untested instruments (e.g., Schedule for the Assessment of Conduct,

Hyperactivity, Anxiety, Mood, and Psychoactive Substances by Mannuzza & Klein, 1987; Brief Psychiatric Rating Scale by Overall & Gorham, 1962). When assessment instruments are used that lack adequate standardization, the reliability and the validity of the results are questionable.

The Impact of Attention Deficit in Adulthood

Until recently, ADD/ADHD was considered to be a childhood disorder which was outgrown when the child reached puberty and/or adolescence (Eisenberg, 1966; Laufer & Denhoff, 1957). However, current research does not support this belief. Several follow-up studies and one longitudinal study of adults have demonstrated that 60-75% of patients diagnosed with ADD/ADHD in childhood continue to experience many of the symptoms associated with ADD/ADHD in adulthood (Denckla & Loolian, 1988; Mannuzza et al., 1993; Shekim et al., 1990; Weiss et al., 1985; Weiss et al., 1979). The childhood symptoms frequently manifested are impulsivity, hyperactivity, poorly sustained attention, aggressiveness, poor peer relationships, and sometimes learning disabilities and/or conduct disorders. In adulthood, the symptoms frequently presented are a sense of under-achievement, difficulty paying attention or focusing, a need for high stimulation, risk-taking behaviors, impulsivity, restlessness, chronic self-esteem problems, impatience, and a tendency toward addictive behaviors (Barkley, DuPaul, McMurray, 1990; Weiss et al., 1979; Weiss et al., 1985).

Shekim et al. (1990) conducted a study of adults to report and determine the demographic and clinical profile of 56 individuals between the ages of 19 and 65 years (48 men, 8 women) who presented with adult ADD/ADHD and met the DSM-III-R (APA, 1987) criteria for the disorder. The

researchers reported that 91% of these adult subjects met the criteria for ADHD on the Wender Utah Rating Scale (Ward, Wender, & Reimherr, 1993); and 49 subjects had additional DSM-III-R diagnoses as well. Following is a review of the literature regarding the academic, vocational, social, and emotional adjustment of ADD/ADHD adults.

Academic and Vocational Adjustment

Although a negative impact of ADHD symptomatology in academic endeavors is apparent in the literature, research also supports the idea that symptoms have the potential for either negative or positive outcome in one's employment. Weiss et al. (1978) evaluated whether some of the behaviors typically displayed by hyperactive individuals, such as their high activity level, could be an asset in some work situations. A number of longitudinal studies have concluded that hyperactive adults do quite well in their work. They function just as competently as control subjects in their chosen vocations (Weiss et al., 1978), and some even own their own businesses (Mannuzza et al., 1993).

In their 1978 study, Weiss et al. matched 75 hyperactive subjects and 44 control subjects for age and socioeconomic status as measured by the Hollingshead Four-Factor Index of Social status (Hollingshead & Redlich, 1958). Although hyperactive subjects had lower scores on the Wechsler Adult Intelligence Scale than the control subjects, the difference was not significant. Questionnaires comprised of seven Likert-style questions were sent to both the subjects high school teachers and their employers. Teachers were to base answers on the last grade completed by the subject.

The hyperactive subjects scored significantly lower than the control subjects on all seven questions and on the total score for the school

questionnaire. Both teachers and employers rated the hyperactive subjects in the following areas: punctuality, 3.36 (school) to 4.12 (employer), $p < .04$; fulfills assigned work, 2.63 to 4.32 ($p < .01$); gets along with classmates/coworkers, 3.32 to 4.42 ($p < .01$); gets along with teacher/supervisor, 3.16 to 4.42 ($p < .01$); works independently, 2.84 to 4.10 ($p < .01$); completes tasks, 2.94 to 4.10 ($p < .01$); and Would you want him in your class again/hire him again?, 2.58 to 4.05 ($p < .01$). The total score was 20.95 in school, and 29.53 at work ($p < .01$; Weiss et al., 1978).

Employers described the hyperactive subjects as functioning as competently as the normal matched control subjects, but the teachers described them as functioning significantly inferior to the control subjects. One possible explanation for the difference may be that hyperactive people have more choices in selecting the type of work they choose. For example, hyperactive individuals may select jobs that allow them to get up and be more physically active, whereas a school setting requires sitting still for longer periods of time. In addition, some demands placed on students may require personal qualities that hyperactive people may not readily display (e.g., neatness, concentration, prolonged sitting and listening; Weiss et al., 1978).

Evidence abounds for the difficulties a hyperactive individual encounters in academia. Another study by Weiss et al. (1979), indicated that hyperactive subjects completed significantly fewer years of education than the control subjects (10.5 years and 11.3 years, $p < .01$). Also, significantly more hyperactive subjects had failed grades (38.57) as compared to the control subjects (12.50, $p < .01$) and were expelled from school more frequently (27.14 and 9.76, $p < .05$). A 15-year follow-up study by Weiss et al. (1985) also demonstrated that there was a significant difference between the years of

education completed: Hyperactive subjects had completed less years of education than the control subjects ($p < .01$). Of the 41 control subjects, 17 had completed a university degree, 20 had completed high school, and 4 had not completed high school. Of the 61 hyperactive subjects, 3 had completed a university degree, 37 had completed high school, and 19 had not completed high school.

Social Adjustment

The social adjustment of the hyperactive adult has been explored in numerous longitudinal studies. Specific areas of interest have been social skills and self-esteem, social outcome, nonmedical drug use, and antisocial behaviors. Significant findings help elucidate the issues apparent in the lives of hyperactive adults.

Social skills and self-esteem. Hechtman and Weiss (1986) completed several studies with 75 hyperactive subjects and 44 control subjects over a 10 through 12-year follow-up period. Whereas the first part of the study examined school and employer evaluations, as discussed in the previous section, the second part of this longitudinal study evaluated the subjects' social skills and self-esteem (1978) using two self-rating scales: the California Personality Inventory (CPI), a measure of folkloric ideals of social living and interaction, and the Symptom Checklist-90 (SCL-90), a measure of self-ratings of psychopathology focusing on common psychopathological symptoms.

In 1978, 51 hyperactive subjects and 43 control subjects completed the CPI, which consists of 18 standard scales, such as self-control and sense of well being. The researchers postulated that the low percentage of hyperactive subjects (68%) that completed the form reflected the difficulty some subjects may have had in completing what they may have experienced as a tedious

task. These individuals scored lower than the control group on nine scales: sense of well being ($p < .01$), responsibility ($p < .01$), socialization ($p < .01$), self-control ($p < .02$), good impressions ($p < .03$), achievement (conformance; $p < .03$), achievement (independence; $p < .03$), intellectual efficiency ($p < .02$), and communality ($p < .08$). In general, the hyperactive subjects viewed themselves as socializing and interacting with others less well than the nonhyperactive subjects did. Results also indicated that hyperactive subjects may feel less positive about their personality strengths (Weiss et al., 1978).

Items on the SCL-90 include somatization, obsessive behavior, compulsive behavior, interpersonal relationships, sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The SCL-90 was designed to measure the type and degree of psychopathology in psychiatric outpatients and was originally standardized on a normal population. However, Weiss et al. (1978) used their own matched control groups in this study and found that none of the hyperactive subjects differed significantly from control subjects, therefore concluding that hyperactive subjects do not believe themselves to have more psychopathological traits than normal subjects.

Hechtman et al. (1980) designed another study to further measure the hyperactive subjects' self-esteem and social skills by trying: (a) to replicate the previous study; (b) to discover which social skills are deficient; and (c) to find a correlation between social skills and self-esteem. The two assessment instruments used were the Situational Social Skills Inventory (SSSI) and the Means End Test of Social Skills.

Eighteen matched pairs of hyperactive young male adults and normal controls, all of whom had been involved in the previous follow-up studies,

were given the SSSI, an instrument that requires a direct oral response. Subjects described how they thought they would react to a given situation, and their answers were tape recorded. In the written portion of the SSSI, subjects were given five possible responses and they had to choose the best response. In the Means End Test of Social Skills, which measures whether individuals have a good grasp of social sequencing, subjects were provided with information regarding the beginning and the end of a situation and had to supply the intervening steps (Hechtman et al., 1980).

Of the tests given to the subjects, only the SSSI oral response test demonstrated significant differences. Hyperactive subjects had significantly more difficulties than control subjects with responses in heterosocial situations ($p < .02$) and demonstrated a trend towards having more difficulty in situations where they needed to be assertive ($p < .09$). Both the written form of the SSSI and the Means-End test failed to show significant differences between hyperactive and control subjects (Hechtman et al., 1980).

Subjects were also given three self-esteem tests: the Davidson and Lang Test, the Ziller Self-Other Test, and the Area Test. The Davidson and Lang Test measures how individuals perceive themselves on a 5-point Likert scale ranging from <u>some of the time</u> to <u>almost never</u>. Compared to control subjects, hyperactive subjects rated themselves significantly worse on 8 of 30 adjectives: obedient/disobedient ($p < .03$); strong/weak ($p < .01$); calm/nervous ($p < .001$); nice/awful ($p < .017$); careless/ careful ($p < .02$); attentive/inattentive ($p < .02$); disorderly/orderly ($p < .028$); and ungrateful/grateful ($p < .027$). However, on one item, hyperactive subjects scored themselves better: sad/happy ($p < .05$). The other 21 items did not

indicate significant differences between the two groups (Hechtman et al., 1980).

The Ziller Self-Other Test required the subjects to place themselves and five other people in a series of circles that were linearly arranged. Self-esteem was then measured by the number of circles between the subjects and the negative person (i.e., someone who is cruel, unsuccessful, or failing). Results from this test did demonstrate some significant between group differences. Hyperactive subjects placed themselves closer to someone who was cruel more frequently than control subjects ($p < .03$). Results also demonstrated a trend for hyperactive subjects to place themselves near someone who was unhappy more frequently than control subjects ($p < .08$). On the remaining two items measured by this instrument, there were no significant differences between groups (Hechtman et al., 1980).

With the Area Test, individuals were given a 5-point scale and were required to score themselves in comparison to their peers (e.g., same, better, worse). The results of this test did not reveal significant differences between the two groups of subjects. Although, the authors looked for significant correlations between the social skills tests and the self-esteem tests, none were apparent (Hechtman et al., 1980).

Results of this study seem to imply that hyperactive subjects, when responding to an oral situation, do less well than control subjects, and although hyperactive subjects may know what to do in a social situation, they may have trouble doing it. It is unclear whether this problem is due to the many years of ostracism, problems with impulsivity, difficulty with self-motivation, or a combination of these factors that the hyperactive subjects have experienced in childhood. Whatever the reason, hyperactivity does

seem to have an impact on self-esteem. Furthermore, results from the Davidson and Lang Test reveal characteristics commonly attributed to hyperactive children, that is, they are disobedient, nervous, careless, inattentive, and ungrateful. This suggests that negative feedback received by hyperactive children throughout their childhood from both home and school makes a lasting impression on self-esteem that is carried into adulthood (Hechtman et al., 1980).

Social outcome. How hyperactive adults have fared socially has been another area of concern. Weiss et al. (1979) measured various social outcome variables. All subjects were given open-ended psychiatric interviews. Of particular interest were: current living arrangements, sexual history, the number of moves in the previous 10 years, whether the subject was in school or working, whether or not the subject had a driver's license, the number of car accidents in which he/she had been involved. Results indicated that more hyperactive subjects were living with a wife or girlfriend ($p < .06$), had moved more frequently ($p < .01$), had significantly more car accidents ($p < .05$), and had a significantly higher average number of accidents (52) than the control group (28). The subjects' activity levels, possession of driver's licenses, or sexual history revealed no significant between-group differences.

Nonmedical drug use. In a 12-year follow-up study, Hechtman et al. (1984b) examined some of the 10-year follow-up results in greater depth and planned to re-interview a subgroup of subjects who had revealed nonmedical drug use. Although significantly more hyperactive subjects than control subjects had used nonmedical drugs in the 5 years preceding this study ($p < .04$), there were no significant difference between groups with regard to the type of drugs used. However, in the year immediately preceding the 12-year

follow-up, more hyperactive subjects had used hallucinogens ($p < .02$), and hyperactive subjects were more involved in selling nonmedical drugs than the control subjects (a trend, $p < .08$).

Hechtman et al. (1984b) developed a Scale of Severity that measured whether substance use or abuse was mild, moderate, abuse, or addiction. Most of subjects in both groups had used alcohol, with the age of heaviest use for both groups at approximately 18. More control subjects were found to have used alcohol earlier (mean age 14) than hyperactive subjects (mean age 16, $p < .035$), and more control subjects were in the moderate use category ($p < .05$). However, more hyperactive subjects were in the heavy use category ($p < .01$). Subjects in both groups reported having used marijuana to a slight extent at the time of this evaluation; however, the peak of marijuana use for both groups was around the age of 17 years. During this period of maximum use, more hyperactive subjects fell into the abuse category than control subjects ($p < .05$), and there was a trend for the hyperactive subjects to begin using marijuana at an earlier age than the control subjects (15.7 to 16.5, $p < .07$).

Very few subjects had used LSD or Mescaline in the 3 months prior to this study, but slightly more hyperactive than control subjects had used hallucinogens in the past. No significant differences were apparent at the time of maximum use; however, it does appear that hyperactive subjects had used hallucinogens for a longer period of time than control subjects ($p < .004$). The mean age at which the subjects stopped using hallucinogens was older for hyperactive subjects than for control subjects (18.6 and 17.0, respectively, $p<.024$). At the time of this study, 4 hyperactive subjects and 1 control subject were using cocaine. In the previous studies, the authors had reported that 7 hyperactive subjects and 2 control subjects had used cocaine. Although the

maximum extent of use for both groups was mild, more hyperactive subjects were significantly younger than control subjects when they started using cocaine. The mean age for the hyperactive subjects was 18 and 20 for the control subjects ($p < .02$; Hechtman et al., 1984b).

None of the control subjects had tried heroin, and only 1 hyperactive subject reported heroin use within the 3 months prior to this evaluation. In the year preceding this study, 5 subjects reported having tried heroin with the maximum extent of use in the mild range. Nevertheless, 2 hyperactive subjects rated in the abuse category and one in the addicted category. Differences between groups, however, were not statistically significant. At the time of the follow-up study, none of the subjects were abusing or addicted to this drug. One subject did report that he still occasionally used heroin (Hechtman et al., 1984b).

At the time of the study, none of the hyperactive or control subjects were using barbiturates or methaqualone, but 6 of the hyperactive subjects and 3 control subjects had histories of using these drugs to a mild extent in the past year. Although 2 of the hyperactive subjects qualified for the abuse category, between group differences were insignificant in usage, mean age when use began, mean age for maximum use, or mean age when use of these drugs stopped. The most frequent reasons given by both groups for discontinuing drug use were side effects, physical consequences, or cost. Legal or social consequences were a minor deterrent (Hechtman et al., 1984b).

Antisocial behavior. In the 10-year follow-up study, Hechtman et al. (1984b) rated antisocial behavior in terms of aggression, court referrals, and stealing. Twenty-nine of 53 hyperactive subjects (55%) and 12 of 38 control subjects (31%) stated that aggression had been a problem in the past.

Significantly more hyperactive than control subjects experienced moderate severity of this problem ($p < .05$). The mean age when aggression stopped being a problem was 15.1 years for hyperactive subjects and 16.5 years for control subjects, a difference which was not statistically significant. In the 5 years preceding the study, hyperactive subjects tended to have more court referrals than the control subjects ($p < .07$); however, no significant between group difference was apparent in the preceding year.

Hechtman et al. (1984b) also assessed antisocial behavior using information gleaned from semi-structured interviews that included more direct questions about stealing during elementary and/or high school as well as any incidents of antisocial behavior, drug abuse, and court or police involvement. The researchers were interested in the subjects' motivation, rationale, circumstances, and the frequency and consequences of stealing.

Examination of subjects' history of stealing at three levels of development (i.e., elementary school, high school, current) revealed an overall decline in theft as subjects got older. However, 6 hyperactive subjects and 4 control subjects stated that they still engaged in theft. Reported motivations for stealing were for gain and excitement, with no between group differences regarding motivation or circumstances of the theft. Although the majority of thefts were minor ($50 or less), more hyperactive subjects had been involved in serious thefts (items valued at $500 or more) while in high school ($p < .003$) and were involved with either police or court referrals, which became an incentive for not stealing again. There was a trend for more hyperactive subjects than control subjects to report feelings of fear during episodes of stealing as high school students ($p < .007$), and more hyperactive subjects reported that they stopped stealing due to fear of

consequences ($p < .05$). During elementary school years, no between group differences were apparent nor did subjects differ on whether or not stealing was wrong during any of these three developmental periods. Findings of this study suggest a more positive outcome than originally assumed for hyperactive subjects as they grow older (Hechtman et al., 1984b).

Hechtman and Weiss (1986) asked the question, "How often do hyperactive individuals become antisocial personality disordered as adults?" Results of this study revealed that 14 of the 61 hyperactive subjects and one of the 41 controls were diagnosed as having an antisocial personality disorder ($p < .01$) according to DSM-III (APA, 1980) criteria.

Emotional Adjustment

The emotional adjustment of the hyperactive adult is an important indicator of success during adulthood and has been the focus of numerous studies. For example, Weiss et al. (1979) assessed the emotional adjustment of each ADHD adult using the Psychiatric Rating Scale, an instrument that has 16 items rated on a 7-point Likert scale from not present to extremely severe. On four of these scales, the hyperactive subjects received significantly higher scores than the control subjects: anxiety ($p < .01$), tension ($p < .01$), grandiosity ($p < .03$), and hostility ($p < .03$). The sum of all the scores was also significantly higher for the hyperactive subjects than for the control subjects ($p < .02$). There were no differences between the two groups in the areas of somatic concern, emotional withdrawal, conceptual disorganization, guilt feelings, mannerisms, depressive mood, suspiciousness, hallucinatory behavior, motor retardation, uncooperativeness, or unusual thought content.

In the another study by Weiss et al. (1981), subjects were given a semi-structured interview, the Schedule for Affective Disorders and Schizophrenia

(SADS), Symptom Checklist-90 (SCL-90), and the California Psychological Inventory (CPI). Thirty-nine (66%) of the hyperactive subjects and only 3 (7%) of the control subjects reported experiencing at least one or more ADHD symptoms ($p < .0001$), with the most frequent symptoms being restlessness, distractibility, and impulsiveness. More hyperactive subjects complained that they felt restless ($p < .01$), and were observed to be restless during the interview than control subjects ($p < .0001$). The most frequent movements observed by the examiners were small muscle movements such as foot or finger tapping or frequent changes in position.

Psychiatric histories of indicated that fewer hyperactive subjects ($p < .0008$) were classified as normal (i.e., they did not have a psychiatric diagnosis, were functioning well in all areas, and were not experiencing any significant symptoms). More hyperactive subjects complained of symptoms not directly related to the hyperactive syndrome ($p < .07$), and more reported complaints regarding sexual problems such as, homosexuality, premature ejaculation, or occasional impotence ($p < .03$). Although they also reported more neurotic symptoms ($p < .01$) and interpersonal problems ($p < .05$), there were no significant differences between the groups with regard to psychotic symptoms, somatic symptoms, or symptoms that related to autonomy, self-esteem and direction. The hyperactive subjects had a greater total amount of neurotic, somatic, psychotic, interpersonal, and autonomy-related symptoms than the control group ($p < .002$). In the 3 years prior to this study, there were more suicide attempts in the hyperactive group ($p < .04$), and 1 hyperactive subject did commit suicide. Twenty-four hyperactive subjects compared to 11 control subjects had thoughts of suicide (Weiss et al., 1981).

Results of a semi-structured psychiatric interview showed a trend for more hyperactive subjects than control subjects to receive one DSM-III diagnosis, ($p < .09$) as well as more than one DSM-III diagnosis, ($p < .01$). Hyperactive subjects also scored lower on the Global Assessment Scale (GAS) than did controls subjects ($p < .0007$). The authors administered a modified version of the SADS-L, which included information obtained from others about behaviors they had witnessed. With the modifications to this instrument, significantly more of the hyperactive subjects were given the diagnosis of Antisocial Personality Disorder ($p < .01$). The California Personality Inventory (CPI) demonstrated a number of significant differences between the two groups. On the 18 items, hyperactive subjects scored themselves more negatively on 8: self-control ($p < .01$), tolerance ($p < .001$), achievement conformance ($p < .003$), independence ($p < .002$), intellectual efficiency ($p < .001$), sense of well being ($p < .00$), responsibility ($p < .00$), and socialization ($p < .00$). Another 5 < .06), good impression ($p < 0.1$), community ($p < 0.1$), and psychological mindedness ($p < .09$). No significant differences between the two groups were observed on the remaining 5 items: dominance, social pressure, self-acceptance, flexibility, and feminine/masculine (Weiss et al., 1981).

On the SCL-90, the hyperactive subjects scored themselves more negatively on three items: somatization ($p < .04$), phobic anxiety ($p < .03$), and overall psychopathology ($p < .004$). No differences between the two groups were revealed regarding obsessive compulsiveness, interpersonal sensitivity, depression, anxiety, hostility, paranoid ideation, and psychoticism (Weiss et al., 1981).

The results of this 15-year follow-up study do demonstrate that the hyperactive subjects were doing less well than the control subjects. They had less education, more symptoms unrelated to ADHD, and more DSM-III diagnoses than the control subjects. Twenty-three percent of the hyperactive subjects and 2.4% of the control subjects were given a diagnosis of Antisocial Personality Disorder, and hyperactive subjects had made more suicide attempts. Results also indicated that 44% of the hyperactive subjects appeared to have outgrown the symptoms of ADHD whereas 66% continued to have some disabling symptoms that seemed to lead to increased psychopathology. The symptoms also predisposed the adult to various kinds of maladjustments. In comparing the 10-year and 15-year follow-up studies, it appears that the adults showed some increase in psychiatric difficulties; however, the majority of the findings remained stable (Weiss et al., 1981).

Shekim et al. (1990) conducted a study with 56 adults (48 men and 8 women) between the ages of 19 and 65, a substantial number of whom had been diagnosed as hyperactive as children. The purpose of this study was to examine the demographic and clinical variables of this sample of adults with ADHD, residual state (RS) to assess issues of comorbidity. Subjects included in this study had been referred for a diagnostic work-up at the University of California, Los Angeles (UCLA) Neuropsychiatric Institute and had met criteria for ADHD as presented in the DSM-III-R. Work-ups included obtaining a past history, interviewing and assessing mental status, and, if possible, an interview with a significant other, parent or spouse of the individual. The interviewer conducted a structured interview and administered the Schedule for Affective Disorder and Schizophrenia-Lifetime Version (SADS-L; Endicott & Spitzer, 1978). The SADS-L is a semi-structured

diagnostic interview that systematically elicits information concerning all of the diagnoses contained within axis I of the DSM-III (APA, 1980). In addition, the SCL-90R was given. The SCL-90R is a self-report instrument that measures the intensity of symptoms.

Three ADHD scales that are usually given to children were revised to make them more applicable to adults. ADHD, RS (Residual State) is a self-report scale that deals with information pertaining to problems of attention, hyperactivity and impulsivity. Conners' ADHD self-report scale (Conners, 1985) rates the severity of problems in the following areas: concentration, restlessness, self-control, anger, friends, confidence, learning, and feelings. The third scale was a modified Structured Interview for ADHD symptoms. A computerized continuous performance test (CPT) of attention, distractibility, and impulsivity was also administered. Finally, The Utah Criteria scale (Wender, 1985) was used. This scale lists a series of behaviors that the subject or others have observed about the subject. These behaviors may be persistent motor hyperactivity, attention deficits, affective lability, inability to complete tasks, hot temper, impulsivity, or stress intolerance.

Also used were three global indices of distress. The General Severity Index (GSI) of the SCL-90-R, combines information on numbers of symptoms and the intensity of distress. The second index is the Positive Symptom Total (PSI), which reflects only numbers of symptoms. The third is the Positive Symptom Distress Index, which is an intensity measure that is adjusted for numbers of symptoms present. The subjects were also administered the Global Assessment Scale of Functioning from the DSM-III-R to assesses psychological, social, and occupational functioning on a continuum of mental health or mental illness.

Upon completion of the work-up, subjects were placed on psychotropic medication according to their clinical condition and comorbidity. The majority were placed on methylphenidate (Ritalin) or dextroamphetamine (Dexedrine) if they had responded favorably to either one of these medications in the past. Those that were placed on Ritalin were those who were diagnosed as having ADHD, RS only, or had ADHD, RS and an additional diagnosis of either dysthymic disorder, cyclothymic disorder, generalized anxiety disorder, or substance abuse. The rest were placed on imipramine or desmethyl imipramine if they had a past history of substance abuse or in the presence of a phobic or panic disorder. One subject who had a history of obsessive-compulsive disorder was placed on fluoxetine.

The medication was titrated until the maximum improvement was obtained or until the subject began to experience side effects from the medication. The average dose of Ritalin was 40 mg a day (divided up and taken three times a day).

The clinical results from the SADS-L interview and the clinical work-up demonstrate that the ADHD-RS subjects endorsed items that show multiple DSM-III-R diagnoses. Fourteen percent of the subjects were diagnosed with ADHD alone. Twenty percent had ADHD plus one other diagnosis. Twenty-nine percent had ADHD plus two other diagnoses. Eleven percent had ADHD plus three other diagnoses. Thirty-three percent (one third) had ADHD plus four other diagnoses. It would appear that the additional diagnoses would increase the severity of psychopathology and decrease level of functioning. As a result of the multiple diagnoses, the percentages total greater than 100. The following diagnoses were given: Attention deficit disorder, 100%; ADD as verified by the Utah criteria, 91%;

generalized anxiety, 53%; alcoholic, 34%; drug abuse or dependence, 30%; dysthymia, 25%; cyclothymic affective disorder, 25%; separation anxiety (< age 16), 18%; panic disorder, 15%; obsessive compulsive disorder, 13%; major depression, by history, 10%; phobias, 8%; hypo-manic disorder, by history, 4%; bulimia, 4%; Briquettes disorder, 2%; anorexia nervosa, 0%; and psychosis, 0%.

The subjects who scored 10% or higher on the SADS-L were compared to the factor scores on the SCL-90R. Subjects with dysthymia scored the highest on the depression factor scale and subjects with cyclothymia scored the highest on the obsessive-compulsive factor. In addition, the subjects with generalized anxiety scored the highest on the anxiety and hostility factors. The subjects with obsessive-compulsive diagnoses tended to score higher on the depression and anxiety factors. The subjects with panic disorder scored higher than the rest of the subjects on all the SCL-90R factors and scales with the exception of the hostility and paranoid ideation factors. The GSI and GAF correlated negatively, which was expected by the authors. The GAF score ($\underline{M}$ = 69.59) suggested mild to moderate outpatient psychopathology.

In this study, the authors wanted to find out if there was a difference between those subjects who were diagnosed with ADHD as a child and those who were not diagnosed with ADHD until adulthood. There was one significant difference. Those that were not diagnosed with ADHD in childhood had more dysthymia diagnoses. The authors suggested that a chronic sense of failure and low self-esteem may have resulted in causing the depression in the subjects who were never diagnosed and treated for ADHD in childhood.

The authors stated that there is considerable controversy about the existence and validity of the diagnosis of ADHD in adults and whether adults meet the criteria for the entire syndrome of ADHD or if they have a residual type or residual state of this disorder. Along with the above controversy, there is a bigger controversy over the use of stimulant medication in adults. The authors stated that the majority of the subjects in this study who were placed on Ritalin responded well to this medication and many of the ADHD symptoms lessened. Mattes, Boswell, and Oliver (1984) suggested that stimulant medication was ineffective in treating the symptoms of ADHD, residual type. They also stated that a number of ADHD subjects had a higher prevalence of alcohol and drug problems. When the subjects took stimulant medication they did report improvement. Mattes et al. attribute this improvement to the subject receiving a euphoriant psychostimulant.

There is still considerable controversy about adults with ADHD taking Ritalin. It will take more research studies over a number of years to provide data for the efficacy of this medication for this particular population.

Hechtman (1991) completed a separate study where she used data from her previous articles in the follow-up studies over a 20-year period to assess hyperactive subjects as they grew into adulthood. This last study discusses resilience and vulnerability in the long term outcome of ADHD.

The author divided the ADHD subjects into the three categories: mild, moderate, and severe (Hechtman, Weiss, Perlman, & Amsel, 1984). She then reviewed the data from past studies which she had co-authored to assess if there was information from the initial assessment and the follow-up studies that looked at the factors which may affect adult outcome. These predictor measures were personal characteristics of the child (e.g., IQ, hyperactivity,

aggressiveness, emotional stability, and ability to tolerate frustration), social/ academic measures (academic performance, relationships with peers, and antisocial behavior), and family parameters (e.g., SES, mental health of the family members, emotional climate in the home, child rearing practices, overall family rating).

The outcome measures were emotional adjustment (Brief Psychiatric Rating Scale, personality trait disorder, and relationships with friends), academic achievement (grades completed, academic standing, and the number of grades failed), employment record (number of full time jobs, percentage of jobs where the subject was fired, percentage of jobs where the subject was laid off, longest full-time job), police involvement (number of offenses and the severity of the offenses), accidents (number of accidents, accidents with physical injury, and cost of damage), and measures of nonmedical drug or alcohol use (present use, past use, degree of current use, maximum use, number of drugs used).

The author stated that there are many adult outcome variables, such as individual personal characteristics, family parameters, and social environment measures, that influence outcome in adulthood. One factor that is just beginning to be studied is the resilience of children. Children who are resilient appear to have better health, temperament, intelligence, and psychological qualities such as positive coping skills, empathy, sense of humor, and good peer relationships. They also have an adequate family structure, SES (the socioeconomic status is also an important variable, the higher the socioeconomic status of the family, the greater the opportunities and advantages for the child). Poverty presents a significant risk for the

hyperactive child along with the emotional and psychological stability in the family.

The key factor concerning the outcome of hyperactive adults, which kept appearing in the study by Hechtman et al. (1984) was the need for a warm, affectionate, cohesive, supportive family in influencing the outcome of the hyperactive child. The authors gave an example of a comment made by one hyperactive subject. When he was asked if there was any one thing that had been the most helpful growing up, he remarked "a parent, teacher or coach who believed in me." This person made him feel worthwhile and optimistic about his future.

Hechtman et al. (1984) stated that the success of the hyperactive individual in adulthood depends on many variables, all of which play an important part throughout the individual's life. It is not just personal characteristics, family parameters, physical or emotional health, although these all play an important part. It is also the environment, opportunities and support from all sources.

In the area of emotional adjustment, researchers have frequently differed in their approaches to the problems of attention disorders in adulthood. In an attempt to provide a framework for evaluation, Hechtman et al. (1984) identified three levels or categories of hyperactive adults. The first was those hyperactive adults whose functioning was fairly normal in many areas of their lives. The second category consisted of those hyperactive adults who continued to have significantly more problems than the control subjects. Although these difficulties were not severe enough to cause debilitating problems in the areas of psychiatric or antisocial pathology, they often resulted in difficulties with work, interpersonal relationships, low self-

esteem, impulsive behavior, irritability, anxiety, emotional lability, and other social and emotional difficulties. The third category were those hyperactive subjects who constituted a small but significantly disturbed group requiring psychiatric hospitalizations and/or incarceration. This group of hyperactive adults may be extremely depressed, possibly even suicidal, heavily involved in alcohol or drug abuse, or exhibit antisocial behaviors such as assault, armed robbery, breaking and entering, or drug dealing.

Greenfield, Hechtman, and Weiss (1988) completed a relationship study based on the study by Hechtman et al. (1984) and the three categories presented, looking for a relationship between the ADHD symptoms and antisocial behavior, substance use, and other emotional difficulties. Subjects were divided into two groups: One group had either no symptoms or mild ADHD symptoms ($n = 39$), and the second group had moderate to severe ADHD symptoms ($n = 22$). Hyperactive subjects who demonstrated moderate to severe ADHD symptoms had a significantly higher incidence of alcohol use ($p < .01$), antisocial behavior ($p < .001$), and emotional problems ($p < .02$) than the control subjects. The hyperactive subjects who had either no or mild ADHD symptoms did not differ from the normal control subjects with regard to antisocial behavior.

Others have offered their own models for evaluating emotional adjustment. Psychiatric assessments done by Weiss et al. (1979) were used to determine the subject's perception of childhood, ability to relate to the examiner, verbal ability, the number of spontaneous complaints made during the interview, reported feelings of restlessness and appearance of restless during the interview, number and quality of current friendships, problems of adjustment, personality trait disorders, and the presence or absence of

psychosis or borderline personality disorder. The hyperactive and control groups were significantly different regarding the number of problems of adjustment as noted by the psychiatrists; however, the types of problems were not different.

Significantly more hyperactive subjects reported feeling restless during the interview ($p < .01$) and were observed to be restless ($p < .01$) than those individuals in the control group. The hyperactive subjects were also diagnosed with more personality disorder traits than the control subjects ($p < .02$). The two most frequent traits reported by the hyperactive subjects were impulsivity and immature/dependency; control subjects reported more depressive and obsessive/compulsive traits. Only 2 of the hyperactive subjects were diagnosed as borderline psychotic, and no subjects from either the hyperactive or the control group were diagnosed as psychotic (Weiss et al., 1979).

As the interview concluded, the psychiatrist asked each hyperactive subject what had helped the most during childhood. The most frequent response given by hyperactive subjects was that there had been someone who believed in them (e.g., a parent, a teacher, a coach) and had encouraged them to turn their failures into successes or by helping them discover a special talent. Nevertheless, a significantly higher number of hyperactive subjects rated their childhood as unhappy as compared to the reports of the control subjects. The authors concluded that self-esteem problems hyperactive subjects developed as children do continue to impact them and they continue their struggle as adults. Impulsivity seems to be a trait that is frequently carried over into adulthood and causes problems in relationships, an issue that may often bring these individuals into psychotherapy (Weiss et al., 1979).

Long-Term Effects of Stimulant Treatment

In addition to the studies done to compare hyperactive subjects with non-hyperactive control groups, Hechtman et al. (1984a) studied a group that had received long-term stimulant treatment. This study included 67 hyperactive subjects from the original study and another group of 20 hyperactive subjects who had received sustained treatment of methylphenidate (Ritalin) for a period of 3 years between the ages of 6 and 12. Since the hyperactive subjects who received Ritalin grew up in the late 1960s and early 1970s, when Ritalin was just beginning to be used to treat ADHD, and the original group of hyperactive subjects grew up in the early to mid 1960s, 20 subjects for a new control group were selected and matched on age, sex, IQ, and SES.

Academic and vocational adjustment. Comparison of the three groups on school performance and work record revealed several significant differences. Significantly more control group subjects were attending junior colleges and universities ($p < .05$), and more of the stimulant-treated hyperactive subjects were not in school. The stimulant-treated hyperactive subjects failed more grades in high school ($p < 0.1$), dropped out of school as a result of poor grades ($p < .08$), and were expelled from school more frequently ($p < .07$) than the control group. These differences were not observed between the stimulant-treated hyperactive subjects and the untreated hyperactive subjects. However, more untreated hyperactive subjects were attending junior colleges ($p < .03$) or were not in school due to lack of interest ($p < .05$) than those who had received treatment; no significant differences existed in the subjects' academic standing, failing of grades, or frequency of expulsion or suspension from school (Hechtman et al., 1984a).

The employer questionnaire contained items similar to those on the school questionnaire. Comparison of the groups revealed that the stimulant-treated hyperactive subjects left school earlier ($p < .028$), spent more time doing nothing ($p < .01$), started working at an earlier age ($p < .05$), and had more jobs ($p < .01$) than those in the control group. Although the incomes for these two groups were not significantly different, the stimulant-treated hyperactive subjects tended to be in greater debt ($p < .06$) than the individuals in the control group. No significant differences were observed on any employment-related items between the stimulant-treated hyperactive subjects and the untreated hyperactive subjects. Compared to the control group, more Ritalin-treated subjects reported satisfaction with present employment and had no future vocational plans as compared to the control group ($p < .05$), but also reported more debt ($p < .02$). Nonetheless, more of the untreated hyperactive subjects were in debt than those in both the control and Ritalin-treated groups (Hechtman et al., 1984a).

Mannuzza et al. (1993) also studied the effectiveness of pharmacotherapy in a follow-up study of White males in late adolescence to early adulthood (ages 16-23; mean age 18). One hundred (98%) of the original subjects participated and were matched with 100 control subjects for age and SES. Researchers did a semi-structured psychiatric interview and administered the Schedule for the Assessment of Conduct, Hyperactivity, Anxiety, Mood, and Psychoactive Substances (Mannuzza & Klein, 1987).

Results revealed that the ADHD probands had completed 2.5 less years of schooling than the controls ($p < .0001$), and nearly 25% of the ADHD probands had dropped out of school by the 11th grade as compared to 2% of the control subjects ($p < .001$). Twelve percent of the ADHD probands versus

almost half of the control subjects had completed a bachelor's degree or higher ($p < .001$). Ninety percent of the subjects in both groups were employed at the time of the study; however, the ADHD probands had significantly lower occupational rankings than the control subjects ($p < .0001$). The ADHD probands also held significantly fewer professional positions (e.g., lawyers, scientists, accountants, stockbrokers) than the control subjects (4% to 21%, $p < .001$); nonetheless, 18% of the ADHD probands were owners of small businesses versus 5% of the control subjects ($p < .01$), whereas 17% of the control subjects were accountants or stockbrokers compared to 4% of the ADHD probands ($p < .01$; Mannuzza et al., 1993).

Although admitting that more in-depth study should be done, Mannuzza et al. (1993) suggest that the reasons a number of hyperactive subjects own their own small business could be their non-traditional setting: employment that does not require close supervision, sedentary activity, or a typical "9 to 5" schedule (Mannuzza et al., 1993).

A number of researchers (Weiss et al., 1978; Weiss et al., 1979; Weiss et al., 1984; Hechtman et al., 1984; Mannuzza et al., 1993) indicate that the majority of men were gainfully employed at the time follow-up studies were conducted. In the Weiss et al. (1978) study, employers stated that the hyperactive subjects were functioning as competently as the normal matched control subjects. The Mannuzza et al. (1993) study showed that 18% of the hyperactive subjects owned their own businesses, which would suggest that the hyperactive individuals may have chosen jobs where hyperactive symptoms had become an asset or their jobs may minimized the hyperactive traits (e.g., a job where one could be up and move around more). All studies demonstrated that the level of education completed was less for the

hyperactive subjects than for the control subjects, which could suggest that the school environment had been aversive to them as children: an aversion that may have continued throughout life.

Social adjustment. Hechtman et al. (1984a) found that Ritalin-treated subjects had moved more in the previous 10 years than their matched control subjects ($p < .05$), and more of them lived with girlfriends or wives than either the untreated hyperactive subjects ($p < .01$) or control subjects ($p < .02$). The three groups did not differ significantly in other types of living arrangements. More untreated hyperactive subjects had significantly more automobile crashes than Ritalin-treated subjects ($p < .004$); however, no significant differences were reported in the cost or damage of the accidents or extent of bodily injury.

In the year prior to this study, all groups were similar regarding antisocial behaviors, police records, types of police involvement. The Ritalin-treated subjects, however, had more problems with aggression than the control group ($p < .05$), and the untreated hyperactive group had more difficulty with aggression than the treated hyperactive subjects ($p < .06$). Whereas more untreated hyperactive subjects stole in grade school than the treated subjects ($p < .05$), stealing did not differ either in high school or in the present (Hechtman et al., 1984).

At the time of follow-up, current use of alcohol was similar across groups even though both Ritalin treated subjects and control subjects began using alcohol at 14.8 years and nontreated hyperactive subjects at 16.2 years old ($p < .03$). The mean age for maximum use of alcohol for all three groups was 18 years old; the duration of maximum use was 25 months for the Ritalin-treated hyperactive group, 10.8 months for the nontreated hyperactive

group ($p < .05$), and 28 months for the control group, the only significant difference being between the nontreated group and the other two groups (Hechtman et al., 1984a).

Evaluation of nonmedical drug use revealed no significant differences between the three groups in use of marijuana or hallucinogens. Six of the Ritalin-treated hyperactive subjects and 1 control subject had abused stimulant medication ($p < .04$). The treated hyperactive subjects tended to be older than the nontreated hyperactive subjects ($p < .02$) when cocaine use began. The period of maximum use for the nontreated hyperactive subjects was 3.2 months to 12 to 14 months for both the treated hyperactive subjects and the control group. These were not significant nor were there differences between all three subject groups for the use of heroin or barbiturates. All three groups stated they stopped using drugs because of the consequences, the cost or social or legal consequences caused by the drug use (Hechtman et al., 1984a).

When the oral or behavioral version of the SSSI was given, the control group did better than the Ritalin-treated group on situations that required assertion. However, there were no differences between the Ritalin-treated subjects and the non-Ritalin-treated subjects on any of the behavioral situations. On the written version of this instrument, the Ritalin-treated subjects tended to do somewhat better than the controls ($p < .06$) and much better than the untreated hyperactive subjects ($p < .01$; Hechtman et al., 1984a).

Results of the self-esteem tests revealed no significant differences between the control group and the Ritalin-treated hyperactive group; however, differences were observed between the Ritalin-treated hyperactive group and the non-treated hyperactive group. On the Ziller Self-Other Test,

the Ritalin-treated hyperactive subjects did better than the non-treated hyperactive group ($p < .08$). The Davidson-Lang Test demonstrated that the treated hyperactive group rated themselves significantly better than the untreated hyperactive group on some items: intelligent/unintelligent ($p < .001$); fast/slow ($p < .05$); kind/cruel ($p < .04$); friendly/unfriendly ($p < .004$); curious/indifferent ($p < .04$); and respectful/disrespectful (a trend, $p < .06$). No significant differences between the Ritalin-treated hyperactive group and the control group were observed using this instrument (Hechtman et al., 1984a).

Young adults who had been treated with stimulant medication as children and the untreated hyperactive subjects had similar results, but significant differences existed between these two groups and the control group. Hyperactive subjects had more educational and vocational problems, more moves, more job changes, and greater debts, all of which may be reflective of impulsivity, one of the most frequent complaints of adults who experience continuing ADHD symptomology. This study found that ADHD adults have more problems with emotions and aggression, but not usually enough for them to be conspicuous within the mental health system. ADHD children who had been treated with stimulant medication were less isolated, less ostracized by peers and adults, and had higher self-esteem. Furthermore, they appear to have experience no lasting negative effects from Ritalin (Hechtman et al., 1984a).

The Americans with Disabilities Act and Section 504

In 1973, the United States Congress passed Section 504 of the Rehabilitation Act of 1973, which has had an impact on adults diagnosed with

ADHD, especially regarding post-secondary education and employment. This civil rights statute was designed to prevent discrimination against individuals with disabilities. It states that:

> No otherwise qualified individual with disabilities in the United States . . . shall, solely by reason of his/her disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance . . . (Americans With Disabilities Act, 1980)

This statute further defines an individual with a handicap as "any person who has a physical or mental impairment which substantially limits one or more major life activities" (Americans With Disabilities Act, 1980, p. 30944). Included in major life activities are caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working. Individuals with "hidden disabilities" (i.e., physical or mental impairments that are not visible by others) are also included. Conditions which are chronic, such as diabetes, epilepsy, learning disabilities, and attention deficit disorder, are just a few of the illnesses or chronic conditions that fall under this category.

Post-Secondary Education

Under Subpart E of Section 504, a qualified handicapped student who meets the academic or technical standards required may apply for admission to a post-secondary institution. Although the institution cannot legally make inquiry regarding handicaps during the application period, it is required to inform all applicants of any services, aids, or adjustments available for students with special needs. At the post-secondary level, the student is responsible for contacting the dean, faculty advisor, or handicapped

coordinator who works with handicapped students to request academic adjustments or accommodations. Verification of the handicap may be required and can include results of medical, psychological, or emotional diagnostic tests.

Several common accommodations are allowing more time and having a quiet place for exams, assistance with note-taking or the use of a tape recorder for lectures, provision of tutors, and assistance in planning and organizing school work. However, the post-secondary institution is not required to make any accommodations that would alter the program regarding academic requirements of the program of study or where licensure is necessary, nor is the provision of an auxiliary aid required if the cost of the aid would place an "undue burden" (i.e., significant difficulty or expense) on the institution.

Employment

Under Subpart B of Section 504, an employer cannot discriminate against physically or mentally handicapped persons in recruitment, advertising, or processing applications for employment. If a physical examination is required, it must be required of all employees and done only after the job has been offered. This regulation prevents discrimination against those with hidden disabilities (e.g., heart disease, diabetes, epilepsy, ADHD) who may not have been able to pass the examination. Additionally, employers are not to discriminate in hiring, promotion, award of tenure, demotion, transfer, layoff, termination, re-hire, or in the provision of benefits that are offered to employees (e.g., leaves of absence, sick leave, training programs).

Employers may be required to make reasonable accommodations for a person with a disability. Examples of such accommodations might be: providing a reader for a blind employee, providing an interpreter for a deaf employee, allowing adequate work space for someone who uses a wheelchair, or a minor adjustment in working hours to allow for necessary daily medical treatment.

Clearly, the Americans with Disabilities Act has provided opportunities that had not previously been available. ADHD individuals may request accommodations in post-secondary education which could allow class substitution, more time for assignments or exams, and tutors to assist with homework, scheduling, planning, and organization. Much of the research has revealed that individuals with ADHD completed less education than the control subjects. With the guidelines set forth in Section 504, more opportunities are open to these individuals.

Research has also revealed that many hyperactive subjects had found employment where this disability was not a major factor. They were able to find jobs where they could be "up and around" rather than sitting all day at a desk. ADHD symptomology may not play as significant a role in vocation as it does in education because the individuals have more choices in types of work available.

Implications for Further Research

New techniques, such as the SPECT Scan, provide definitive evidence that ADHD affects the executive functioning of the brain. In the future, these scans may help clinicians with more accurate and timely diagnoses of ADHD. Earlier diagnosis may decrease the experiences of symptoms, frustration, and

failure. However, the scans are very expensive and may be cost-prohibitive. At present, a number of insurance plans will not pay for ADHD evaluations, perhaps due in part to the lack of a specific set of diagnostic instruments. Often, third-party payers believe that ADHD is being overly diagnosed when children demonstrate behavior problems; however, brain scans would eliminate such misdiagnoses and be more cost-effective in the long run. Further research is needed in the clarification of diagnostic criteria, continuation of longitudinal studies, refinement of assessment instruments, use of more inclusive research samples, investigation into brain functioning, and innovative techniques in physiology.

Diagnostic Criteria

Future research should correct methodological errors apparent in previous investigations. Since the majority of the studies to date have been done over a 20-year period during which definitions and diagnostic criteria have changed, use of consistent definitions are needed to properly diagnose ADHD. Consistent terminology would also increase the potential for accurate comparisons of data and resulting implications for application of the research to clinical populations.

Longitudinal Studies

A continuation of the longitudinal studies begun by Hechtman and Weiss (e.g., Hechtman et al., 1980; Weiss et al., 1981) could provide additional information on the effects of ADHD throughout the life span. Whereas some of those formerly diagnosed with ADHD are no longer bothered by symptoms in adulthood and seem to be functioning normally, others have experienced moderate to severe symptomology, and a few have met criteria for antisocial personality disorder. Additional longitudinal studies would enable

assessment of various factors or circumstances which indicate the degree of symptomology experienced, thereby assisting researchers and clinicians in the development of various treatment modalities (e.g., psychotherapy, medication) that could potentially enable a more positive prognosis.

Assessment Instruments

Many instruments used thus far in the assessment of attention deficit disorders have not been standardized, which limits the reliability and validity of the obtained data. Although no instrument currently in use can definitively identify ADHD in either children or adults, the use of standardized testing procedures and empirically proven instruments are increasing. The Wechsler Intelligence Scale for Children-Third Edition (WISC-III) or the Wechsler Adult Intelligence Scale-Revised (WAIS-R) are frequently used in addition to a diagnostic history, the continuous performance test (CPT), behavior rating scales, and several questionnaires.

Barkley (1990), has suggested that an assessment should also include a thorough medical examination and consider biological, cognitive, neuropsychological, behavioral, environmental, social-familial, and socioeconomic factors. Information about parent-child interactions should be gathered, behavior rating scales completed by parents and teachers, and a vigilance or continuous-performance test (CPT) administered. Tools such as Barkley's (1990, 1991) instruments, the Conners (1985), and the Computerized Continuous Performance Test (CPT) are newer instruments that have established norms, making interpretation of results both easier and more reliable.

Sample Attributes

Few females and minorities have been included in early studies, an issues which may disguise potential differences between genders or cultures. Although many studies have assigned girls the same norms as the same age boys, which resulted in less frequent diagnoses of ADHD although all DSM-III-R criteria had been met, Barkley's (1990) inclusion of females revealed that girls need to have their own set of norms. Very few girls were as aggressive as the boys; however, they were more socially withdrawn and experienced more anxiety and depression (Barkley, 1990). Use of different norms for girls increases the likelihood that they will be diagnosed correctly and receive appropriate treatment.

Brain Functioning

In the last 10 years, brain functioning and its relationship to ADHD has become a focus of study. Executive brain functioning, which is believed to be located in the frontal lobe, is of primary interest in that it involves one's ability to initiate, sustain, inhibit, and shift attention. A dysfunction in this area can lead to problems in attention, production, impulse control, and/or cognition (Barkley, Grodzinksy, & DuPaul, 1992; Chelune, Ferguson, Koon, & Dickey, 1986).

Whereas Barkley (1995) has posited that ADHD is better viewed as a problem of deficient self-regulation, or goal-directed persistence, he has also stated that individuals with ADHD have no trouble sustaining attention to tasks that are interesting, novel, or for which they receive rewards or consequences, unless the delay of gratification is long (Barkley, 1990, 1995). Continued research in the area of executive brain functioning may provide

the basis for developing techniques to help individuals take advantage of the assets they do possess.

Innovative Research

In some of the most fascinating and exciting research in brain metabolism, Zametkin et al. (1990) studied hyperactive adults who also had a biological child who was hyperactive. A Positron-EmissionTomography (PET) scan done on each adult measured glucose metabolism during the performance of an auditory attention activity. Compared to control subjects, adults with ADHD had lower glucose metabolism, with the greatest reduction in the premotor and superior prefrontal cortices, areas thought to be crucial in the control of attention and motor activity. This study provided further evidence that the frontal lobes play a major role in the attentional system.

Sieg, Gaffney, Preston, and Hellings (1995), used Iodine-123 imaging to examine left frontal and parietal lobe activity in ADHD subjects, which proved to be significantly less than that of the control group. Findings were consistent with other physiological studies that have implied metabolic abnormalities in areas associated with attentional processes. Sophisticated instruments, such as the PET and Magnetic Resonance Imaging (MRI) scans, that measure brain functioning can be used in future research to increase understanding of brain processes and ADHD symptoms.

Conclusion

Although the earliest documentation of behaviors now described as ADHD symptomology was in 1902, it has taken most of this century to describe, refine, and operationalize the criteria used by today's clinicians in the diagnosis of ADHD. The results of early research are currently being

examined to find clinical applications aimed at lessening the impact of symptomology which still plagues 66% of adults who were diagnosed with ADHD as children.

When the most intensive research on ADHD began in the 1950s, this disorder was known as Minimal Brain Dysfunction. However, in 1963, Canadians Hechtman and Weiss began the first known longitudinal study of children who presented with symptoms of inattention, poor concentration, and impulsivity. Their studies have provided a plethora of information that has inspired further research. Although their early studies had flaws, Hechtman and Weiss were pioneers in the study of ADHD children and the continuing impact the symptomology through early adulthood.

Using these early studies as a starting point, researchers have continued the quest for better diagnostic criteria as well as better medications to assist ADHD individuals in focusing and concentrating more fully on a given task. Medication and behavioral training have also been shown to lessen the impulsivity that is frequently a part of the symptomology experienced by these individuals.

Future longitudinal studies are needed to provide information on how ADHD affects individuals throughout the life span. As information such as this is obtained, other measures might be developed to assist ADHD individuals in adapting to life. An understanding of differences in problems at various ages may suggest that interventions or measures be taken to assist the ADHD individual during these specific times, thereby enhancing the quality of life by lessening frustrations, failures, and symptomology.

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