Comparisons between ADD/ADHD diagnosed and non-diagnosed boys, pre-kindergarten through grade eight

Daniel Del Vecchio
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Comparisons Between ADD/ADHD Diagnosed and Non-Diagnosed Boys, Pre-Kindergarten Through Grade Eight

by

Daniel Del Vecchio

A Thesis

Submitted in partial fulfillment of the requirements of the Master of Arts Degree of The Graduate School at Rowan University

May 9, 2000

Approved by

[Signature]

Professor

Date Approved 5-9-00
ABSTRACT

Daniel Del Vecchio

Comparisons Between ADD/ADHD Diagnosed and Non-Diagnosed Boys, Pre-Kindergarten Through Grade Eight

2000

Dr. Roberta Dihoff
Dr. John Klanderman

School Psychology

The purpose of this study was to examine the validity of the Conners’ Teacher Rating Scale-Revised: Short Form (CTRS-R: S). The CTRS-R: S is an instrument used for the assessment of attention-deficit disorder and attention deficit hyperactivity disorder (ADD/ADHD) and related behavioral problems in children and adolescents. The study included 225 boys in grades Pre-Kindergarten through eight. The subjects were divided into two groups. Group one consisted of 165 boys who were not diagnosed with ADD/ADHD; Group two consisted of 61 boys who had been previously diagnosed with ADD/ADHD. A second analysis regrouped the sample by grade-groups that were consistent with the age scales for scoring the CTRS-R: S. The subjects were rated by teachers using the CTRS-R: S. A multivariate analysis of variance was performed for both groups across four behavioral conditions: ADHD, hyperactivity, cognitive and oppositional. The results of the analyses were significant for the large sample; however, the analyses of the subgroups were not significant.
MINI-ABSTRACT

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ACKNOWLEDGEMENTS

I would like to acknowledge and express my gratitude to Dr. Roberta Dihoff and Dr. John Klanderman for their guidance and counsel during this project and throughout the School Psychology Master of Arts program.

I would like to especially thank Dr. Dihoff for her assistance with the data-gathering and statistical analysis of this project.

I would like to also thank the following people who assisted me throughout this project: Beth Bragg, John Cafagna, Elizabeth Callahan, Theresa Docherty, Pam Eppleman, Mary Beth Holahan and the teachers who rated the subjects.
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Chapter I: The Problem

Need

The growing incidence of the diagnoses Attention Deficit Disorder and Attention Deficit Hyperactive Disorder (ADD/ADHD) in children, especially boys, has had a profound effect on the children who are diagnosed. The child's parents, community and society in general all share in the negative effects of this disorder. ADD/ADHD now has the distinction of being the leading psychiatric disorder among children. The drug most often prescribed for ADD/ADHD is Ritalin (methylphenidate). Sales of Ritalin have topped $350 million, with more than 1.3 million children ages five to fourteen years taking the drug on a regular basis (Hancock 1996).

Such a diagnosis can result in significant problems that have long-term psychological, educational, social, medical and financial implications. The undiagnosed and untreated ADD/ADHD children of today will have a tendency to become alcoholics, drug users and school dropouts in the future. While ADD/ADHD is a defined condition recognized by medical, psychological, sociological and educational professionals, there are no reliable or even near-perfect diagnostic instruments. This is due, in part, to the inability to identify definitive causes, symptoms or conditions, be they neurological, physiological, behavioral or psychological. Diagnosing ADD/ADHD remains an art since there is no blood test or any other objective and scientific method for uncovering the disorder.
There has been a dramatic rise over the last ten years in the incidence of ADD/ADHD, particularly in the United States, where Ritalin use is five times higher than in the rest of the world (Hancock 1996).

It is important to consider that the rise may be a function of the inaccuracy of the instruments that are used to diagnose ADD/ADHD.

One method for determining the quality of an instrument is to test the validity and reliability of the instrument. If it is found that the instruments are inadequate, we can improve or remove them and thus help to improve our ability to diagnose ADD/ADHD.

Purpose

The purpose of this study was to examine the validity of the Conners' Teacher Rating Scale-Revised: Short Form (CTRS-R: S), a diagnostic instrument for identifying the presence of ADD/ADHD.

Hypothesis

The hypotheses to be examined are as follows:

1) There will be a significant difference in the CTRS-R: S ratings (scores) of boys, grades Pre-Kindergarten (Pre-K) through eight, with confirmed clinical diagnosis of ADD/ADHD, when compared with the CTRS-R: S scores of boys, grades Pre-K through eight, with no clinical diagnosis of ADD/ADHD.

2) There will be a significant difference in the CTRS-R: S scores of boys in grade-groups, from grades Pre-K through eight, with a confirmed clinical diagnosis of ADD/ADHD, when compared with the CTRS-R: S scores of boys in grade-groups, from grades Pre-K through eight, with no clinical diagnosis of ADD/ADHD.
3) There will be an interaction between grade and grade-group.

Theory

ADD/ADHD has received significant exposure and attention in the 1990s. The recent findings of The National Institutes of Health have confirmed the suspicion and speculation that ADD/ADHD is a disorder with serious short-term and long-term consequences. While the research is plentiful, there is a need for more funding for research directed at the causes and diagnoses of, and treatments for this disorder (NIH Consensus Statement Online 1998).

Like many mental disorders, ADD/ADHD can be easily ignored, overlooked or misinterpreted. Consequently, it often goes untreated or mistreated. Mistreatment from an ignorant parent, guardian, caregiver or educator can have serious consequences on the child's psychological health.

Handling and coping with the behavior of an ADD/ADHD child is, at best, frustrating and, at worst, impossible. As the frustration level of the caregiver increases, the potential for an inappropriate course of action also increases. The outcome is likely to be unjustified punishment. Unfortunately, punishment tends to be inconsistent in modifying a child's behavior. In addition, punishment may exacerbate the problem and confuse the child, because the child is unaware that his/her behavior is outside the norm; even if the child were aware of the abnormal behavior, he/she would not have intuitive methods and skills for modifying behavior.

When we consider this cycle of behavior followed by unjust punishment, it is no surprise that children who go untreated by professionals have a tendency to become
school dropouts, substance abusers, underachievers and juvenile offenders who are also likely to have depression, bipolar disorder and learning disabilities (Hancock 1996).

The significant demographics for ADD/ADHD appear to be gender and age. It is reported that ADD/ADHD is three to seven times more likely in boys and that symptoms decrease with age, meaning that if the condition does exist, it manifests itself at a younger age. There is a tendency for ADD/ADHD to run in families, especially those in which there is a history of alcoholism and/or depression.

The Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV) defines ADD/ADHD as a disorder that can include nine specific symptoms of inattention and nine symptoms of hyperactivity/impulsivity. The behavior generally appears in early childhood. Four types are defined: inattentive type, hyperactive/impulsive type, combined type and not otherwise specified.

Children and Adults with Attention Deficit Hyperactivity Disorder (CHADD), a nonprofit organization representing children and adults with ADD/ADHD, claims that one to three percent of the school-age population has full ADHD and another five to 10 percent of the school-age population has partial ADD or ADHD with anxiety or depression comorbid. In 30-50 percent of children with ADD/ADHD, symptoms persist into adulthood (http://www.chadd.org).

With such a high rate of continuance into adulthood, it is important to attend to the needs of the child early to prevent the disorder from continuing. The potential exists for children who have ADD/ADHD to live a normal adult life if the condition is properly diagnosed and treated early.
At this time it is difficult to pinpoint the cause(s) of ADD/ADHD. The common argument of genetics versus environment has been speculated upon, researched and debated. The cause of ADD/ADHD is not fully known. Research has been done within many disciplines. Genetic, biochemical, neurological and other areas of research show promise, but there are currently no overwhelming findings. Since the causes are not specific, the fact that ADD/ADHD appears gender and age related makes the search for answers more intriguing. Why are more boys than girls diagnosed? Why do children present at a young age? Are there genetic influences? Do children grow out of it? If so, which children and why?

The diagnostic tools are limited and none are exact in their methods for detection. These tools are based primarily on observational ratings. Teachers, parents, caregivers and mental health professionals generally observe the subjects and rate their behavior. Some of the instruments also include a self-test for the child. A self-test is an important element and should be included in assessment whenever possible.

This study will examine one instrument designed to test for the presence of ADD/ADHD, the CTRS-R: S. The CTRS-R: S was designed for teachers, and is one of a battery developed by C. Keith Conners, Ph.D. Tests were also developed for parents, as well as children. There are short and long versions of each test. The CTRS-R: S is a flexible instrument, and, theoretically, the validity of the instrument should not be a concern.

The instrument will be examined by a comparison between the scores of boys in grades Pre-K through eight who were clinically diagnosed with ADD/ADHD and boys in
grades Pre-K through eight who were not clinically diagnosed. In addition, the study will compare the scores between grade groupings.

Definitions

Attention Deficit (Hyperactivity) Disorder (ADD/ADHD): persistent pattern of inattention and/or hyperactivity-impulsivity.

Axis I: Clinical disorders usually diagnosed in infancy, childhood or adolescence not including Mental Retardation.

Battery: a set of test instruments.

Classify: to identify specific needs of a child based on an assessment and evaluation of the child by a study team.

Comorbid: occur in conjunction with.

Compulsivity: repetitive behavior or mental acts designed to reduce anxiety.

Constitutional variability: different factors are responsible for the cause of a condition or behavior.

Criterion-related validity: external, independent factors that indicate the effectiveness of a test to measure what it is intended to measure.

Diagnostic Instrument: a test designed to predict the presence of a particular condition.

Demographic: the vital statistics, distribution and density of a population.

Externalizing: behavior that is overt and observable.

Factor Analysis: mathematical analysis used to determine common factors or traits in order to reduce the number of variables.
Flexible Instrument: part of a battery that may be used in conjunction with or separate from other instruments within the battery.

Inattention: inability to focus or attend to detail.

Internalizing: feelings (anxiety, depression) usually unobservable.

Methylphenidate (see also Ritalin): a prescription stimulant drug that regulates attention and impulsivity in the treatment of ADD/ADHD.

Neurocognitive: relationship between the brain and the process of acquiring knowledge/intelligence.

Non-shared environmental: factors unique to children reared together which cause different behavior.

Oppositional Defiant Disorder (ODD): pattern of defiant, disobedient, hostile behavior toward authority.

Polygenic multiple (based on the multifactorial model of disease transmission): different amounts of the same factors (i.e., genetic and environment) in combination contribute to the cause of a condition.

Post hoc analysis: after determining there is a difference in means, this test determines which means differ.

Reliability: the ability of a test to produce consistent results by the same person when re-tested.

Ritalin (methylphenidate): a prescription stimulant drug that regulates attention and impulsivity in the treatment of ADD/ADHD.
Shared environmental: factors common to children reared together which cause similar behavior.

Socio-Economic Status (SES): demographic measure of income and lifestyle.

Validity: the degree to which a test measures what it is intended to measure.

**Assumptions**

The most important assumption for this study was rater objectivity. Raters may differ in observations due to factors such as age, gender, experience, level of tolerance, and positive or negative bias toward individuals and willingness to participate in the study.

Another assumption was the raters' prior knowledge. It is assumed they had no prior knowledge about the nature of the study that could have influenced their ratings.

It was assumed the raters were not able to ascertain or infer anything by reading the instrument.

Also, it was assumed the raters were accurate in recording scores.

Finally, it was assumed the subjects who were diagnosed with ADD/ADHD had been identified by the raters and removed from the undiagnosed population.

**Limitations**

1) The quality of the new data. The raters were teachers who observed their male students for a period of four to six weeks and rated their behavior as instructed. Caution had been taken to screen the teachers from the purpose of the ratings; however, it was unknown if any teachers were familiar with or had prior experience with the instrument.
2) The quality of the previously collected data. The data gathered for the clinically diagnosed population in this study was existing data. It was used for comparison with the new data. It is impossible to know all of the conditions under which this data was collected. The assumption was that it was quality data.

3) Population. The sample size for the new data was small in comparison with the samples on which the test was normed. In addition, only one geographic region in the northeastern United States was represented. The clinically diagnosed sample was from the same metropolitan region as the non-diagnosed sample.

4) Poor observation skills. The raters were teachers. They may have been novice teachers, new to their school or students, and consequently they may not have been skilled at behavioral observation.

5) The disparity in the size of the two groups due to limited availability of diagnosed subjects.

While these limitations may not have had any impact on the outcome of the study, it is important that they be noted.

Overview

In Chapter I, the problem has been defined and the background presented in order to establish a foundation for the hypotheses to be tested. The hypothesis states that the behavior ratings of boys diagnosed with ADD/ADHD will differ significantly from the behavior ratings of boys not diagnosed with ADD/ADHD. In Chapter II, portions of the available and relevant research will be reviewed, summarized and presented. In
Chapter III the specific design of this study will be described, including the sample, the test instrument and a statement about the reported reliability and validity of the instrument. A description about the statistical analysis will also be included. Chapter IV will contain the complete statistical results, tables and charts. In Chapter V, a summary of the findings, comments about possible future research, a discussion and conclusion will be presented.
Chapter II: Review of the Literature

Overview

A significant amount of research was available on ADD/ADHD. The topics cover a wide range of issues related to the causes, diagnosis and treatment of the disorder. Much of the research was focused on gender differences and genetics. While this study was not concerned with the causal factors, it was important to have a foundation in this area. The research presented herein was organized to provide background in understanding ADD/ADHD and presented in the following subject areas: Conners, Gender, Genetics, Diagnosis, Behavior Ratings from Teachers and Parents, Medication Therapy and Follow up Studies. An attempt was made to find research that was closely related to the research topic.

Conners

Gender is a common factor indicated in ADD/ADHD research. Often, research using the Conners instruments is designed to test for gender factors. Gender, age, and parental ethnicity and occupation of 1068 Brazilian children were compared using the Conners’ Abbreviated Teacher Rating Scale (CATRS-10). The CATRS-10 is a 10-item scale used to screen for hyperactivity. Results indicated that boys were rated significantly higher (worse) than girls were. Also, there was a significant main effect for gender but no interaction with age. A three-way analysis of variance of parental ethnic group, parental occupational level and gender resulted in a significant
effect for gender. While there was no gender and age interaction, there were significant effects for age. Younger children scored higher than older children (Brito 1987).

ADD/ADHD seems to be comorbid with other conditions in special education children. A study comparing regular and special education children examined the effects of age, gender and race across four special education subgroups. The Conners’ Teacher Rating Scale (CTRS) was used to rate behavior across the four subscales (conduct disorder, ADD/hyperactivity, anxiety-passivity, and depression). The results showed a significant difference in all subscales when comparing regular and special education students. In addition, the emotionally disturbed (ED) group was significantly higher than the other groups for conduct disorder. The ED and behavior disorder (BD) groups were significantly higher for ADD/hyperactivity. The same results occurred for anxiety-passivity and depression. The four special education subgroups were analyzed for age/gender interaction. Results indicated a significant effect for age/group, gender/group and race/group. For ADD/hyperactivity, there was a significant effect for race/group. For anxiety-passivity there were no significant effects, and for depression there was significant interaction for age/group. ED and BD boys were significantly worse than girls for conduct disorder, and older children were rated higher for depression and conduct disorder than younger children (Cohen, DuRant & Cook 1988).

A similar study compared learning disabled (LD), low achieving (LA) and average (AVG) elementary school-age boys for hyperactivity and self-control using
teacher ratings. The CTRS and the Teacher’s Self Control Rating Scale (TSCRS) were the instruments used for this study, which yielded two main findings. First, LD and LA subjects differed significantly from AVG; however they did not have significant differences from each other. Second, the two instruments have a significant correlation (Merrell 1990).

In another study, five instruments were used to differentiate between children with ADD, children with specific learning disabilities (SLD) and normal children. There were 90 male subjects in three groups of 30. The observational instruments were the Conners’ Parent Questionnaire-Revised (CPQ) and the Conners’ Teacher Questionnaire-Revised (CTQ). The CPQ and the CTQ were able to discriminate between all three groups, and they were the best predictive measures of the five instruments (Kuehne, Kehle & McMahon 1987).

**Gender**

A study using two theoretical models to explain male predominance of ADHD was conducted in order to provide more reliable results compared with previous research on the significance of gender as it relates to ADHD. There was no significant difference between boys and girls on the impairment/pervasiveness measures. There also were no gender effects on the measures of ADHD symptom severity or on the conduct problem measures. There was significance in paternal history. Fifty-three percent of boys with ADHD had fathers with childhood histories of ADHD compared with 20 percent of the fathers of girls with ADHD. A maternal history was not significantly associated with the gender of the child. The data did not show consistent
differences across gender on measures of family history of ADHD or on measures of neurological and cognitive status (Silverthorn, Frick, Kuper & Ott 1996).

An interesting conclusion drawn by Silverthorn et al. (1996) was that even though there are no significant gender differences, parents have a lower tolerance for the symptom manifested in girls. As a result of this low tolerance, they refer girls for evaluation at younger ages than boys.

Tests of gender differences suggested that the magnitude of genetic and shared environmental influences on ADHD was different for boys and girls. Separate analyses for boys and girls suggested that shared environmental influences may affect ADHD slightly in girls but not in boys, whereas tests of sex moderation in the dominance model suggested dominant genetic influences on ADHD for boys but not girls (Rhee, Waldman, Hay & Levy 1999).

Rhee et al. (1999) conclude that the results suggest ADHD is influenced largely by additive genetic influences and non-shared environmental influences. There was little evidence of shared environmental influences or non-additive genetic influences in the unselected sample.

Comparisons between the results of the polygenic multiple threshold model and the constitutional variability model revealed evidence in support of the polygenic multiple threshold model but none for the constitutional variability model. This suggests that boys are more likely to be affected by ADHD than girls because they have a lower threshold for the liability needed to express the disorder of ADHD (Rhee, Waldman, Hay & Levy 1999).
A 1999 study examined ADHD ratings by parents and teachers using the 18 DSM-IV symptoms. The study examined gender and age differences, in addition to other factors. The results for both parent and teacher ratings on both the inattention and hyperactivity/impulsivity subscales showed a main effect for gender. For parent and teacher ratings, boys were rated higher than girls for inattention and hyperactivity/impulsivity. None of the gender/age interactions were significant. In addition, there was no main effect for age in parent and teacher ratings on the inattention subscale. Both parent and teacher ratings of the hyperactivity/impulsivity subscale showed significant main effects for age. For parent ratings of this subscale, post hoc analyses indicated significantly higher ratings for six-year-olds than for ten and eleven-year-olds. Across all age groups for boys, paired t-tests indicated significantly higher parent than teacher ratings for the inattention subscale and the hyperactivity/impulsivity subscale. On the basis of parent-teacher agreement for a diagnosis, the prevalence rate of all types of ADHD for both gender groups together was 2.4%, with a sex ratio of about five to one in favor of boys (Gomez, Harvey, Quick, Scharer & Harris 1999).

In another study, gender differences were examined using clinically identified boys and girls. The subjects were diagnosed with ADHD. Primary and secondary symptoms were compared; among the symptoms were overactivity, attention deficits, neurocognitive and learning difficulties, aggression, internalizing and externalizing psychopathology and social competence. Demographic measures, including chronological age, grade in school, race, and parents’ marital status and education
level were analyzed by a series of one-way analysis of variance (anova). A significant main effect occurred for grade level. Boys attained higher grade placement than their female counterparts. A significant main effect was reported for age. Girls had been retained more frequently than the boys had. In spatial memory, boys performed significantly better than girls did. Males also performed significantly better in academic achievement, motor control, intellectual functioning, internalizing and externalizing behavior and ratings of competency by parents and teachers. For AXIS I, psychiatric diagnoses showed a greater number of comorbid psychiatric disorders in ADHD males. These data may suggest that ADHD females are under-identified in the general population, thereby contributing to the far greater incidence of males in clinical samples (Brown, Madan-Swain & Baldwin 1991).

In another study, analyses indicated the Home Situations Questionnaire variables showed no difference between ADHD boys and girls. However, significant differences were found for three of the School Situations Questionnaire. Parent reports of behavioral problems across Home Situations Questionnaire items revealed a uniform lack of gender differences (Breen & Altepeter 1990).

A 1989 study examined the Cognitive and Behavioral Differences in ADHD Boys and Girls. The subjects of this study, in addition to DSM-III criteria diagnosis, also reported more than 1.5 standard deviations above the mean on the Conners’ Teacher Rating Scale-Revised. The subjects were rated on one of eight categories: off-task, fidgeting, vocalization, talks to mother, play with objects, out of seat, negative behavior and mother comments. The results indicated no significant
difference between ADHD boys and girls across most categories. ADHD boys were observed as more deviant than normal girls. Other standard tests did not find any significant differences. ADHD boys and girls had similar academic and behavior profiles, suggesting limited gender differences (Breen 1989).

In a 1992 study of boys diagnosed with ADHD compared with boys not diagnosed, using the PASS (Planning, Attention, Successive Processing & Simultaneous Processing) three out of four measures (planning, attention and successive processing) showed significant differences between the groups. The fourth measure, simultaneous processing, showed no significant differences between groups (Reardon & Naglieri 1992).

**Genetics**

Parents from 52 two-parent families (26 with a normal child and 26 with an ADD/ADHD child) were surveyed on child behavior, family functioning, time allocation and parental adjustment. The CPQ was used to measure child behavior. For hyperactivity, conduct and learning, parents of ADHD children reported higher scores than parents of normal children. There were also significant group/parent interactions in which mothers of ADHD children reported higher scores than fathers for hyperactivity and learning. Also noteworthy from this study, mothers of ADHD children rated their own depression higher than their husbands or mothers of normal children. Mothers of ADHD children also indicated they are more depressed than their husbands are, their children are more difficult, and extended families do not play an active role in their lives (Cunningham, Benness & Siegel 1988).
A twins study of inattention and impulsivity-hyperactivity showed different results, using a factor analysis of teacher ratings and maternal interviews. The study examined the contribution of shared and non-shared environments. The results showed a significant genetic contribution to inattention and impulsivity-hyperactivity with lesser contributions to shared/non-shared environments. The conclusion was that genetic factors are important (Sherman, Iacono & McGue 1997).

In a 1998 study, in order to look for genetic influence, parental personality traits and resulting antisocial behavior were studied in children with and without ADHD. The results showed that boys with ADHD more often had mothers with a major depressive episode or anxiety within a one-year timeframe and fathers with a childhood history of ADHD. The study also found that boys with comorbid ADHD and Oppositional Defiant or Conduct Disorder (ODD/CD) had fathers with lower agreeableness, higher neuroticism and a tendency toward anxiety disorder. The study also found a higher rate of overt antisocial behavior in children associated with maternal characteristics including high neuroticism, low conscientiousness and the presence of major depression with no generalized anxiety disorder. Children with ADHD had a higher incidence of the associated maternal neuroticism with aggression. In addition, while low SES had an effect on antisocial behavior in ADHD boys, parent traits and disorders were above the SES effects (Nigg & Hinshaw 1998).

Another study focused on second-degree relatives of subjects with ADHD found that there was an increased risk for ADHD when compared with the control group’s second-degree relatives. The study also found a greater consistency with male
preference and concluded that grandfathers and uncles were at greater risk than grandmothers and aunts (Faraone, Biederman & Milberger 1994).

Another study with a broader scope examined the biological relatives of boys with ADHD and CD and their history of behavior problems. The study concluded that biological relatives of children with ADHD were significantly more likely to have a history of ADHD but not antisocial behavior or substance use. The study also concluded that family history is associated with attention deficit, with or without hyperactivity. While the study concludes there is a familial link, it is clear that the data does not address whether the link is genetic or due to a psychosocial process. The findings warrant further study in this regard (Frick, Lahey, Christ, Loeber & Green 1991).

In a review and evaluation of literature centered on gender differences in ADHD, 18 studies were examined with an evaluation of primary symptomatology, intellectual and academic functioning, comorbid behavior, social behavior and family. The results indicated no gender differences in the above categories. There was a gender difference with intellectual impairment. Girls had a greater degree of impairment than boys did. However, girls had lower levels of hyperactivity and externalizing behaviors, peer aggression and a trend toward lower SES than boys did (Gaub & Carlson 1997).

It is important to note the researchers caution that the gender differences may not have emerged due to the lack of data available for the variables being researched.
Diagnosis

In an examination of potential misdiagnosis of ADHD, five boys with an ADHD diagnosis were examined. The boys were on medication (methylphenidate) and having increased adverse behavioral side effects. The result of the author’s evaluation was a re-diagnosis of Pervasive Developmental Disorder. The author addresses the concern of the over-diagnosis of ADHD as well as the over-prescription of stimulants for treatment. The author’s conclusion suggested that a psychiatric diagnosis was a specialty that required time and careful assessment mainly because there are other disorders that share characteristics with ADHD (Perry 1998).

Consistent with Perry’s perspective, Waldman and Lilienfeld (1991) examined inclusion and exclusion criteria for diagnosing ADHD and ODD. The diagnostic efficiency of these symptoms was evaluated using four conditional probability indices (positive predictive power, negative predictive power, sensitivity and specificity). The results indicated that ADHD symptoms were as useful as ODD symptoms as exclusion criteria for ODD. Also, ODD symptoms were as effective as ADHD symptoms as inclusion criteria for ADHD. Conditional probability can be effective in diagnosis and differentiation of childhood disorders.

Parent/Teacher Ratings

Two factors (Inattention and Hyperactivity-Impulsivity) resulted from using a parent rating scale, factor analysis and assessment of differences of ADHD, including ratings across gender, age and ethnic groups. The results indicate a higher incidence

In another study, teachers rated ADHD in non-referred Hispanic and non-Hispanic white children using the Teacher Report Form, the ADHD Scales-IV and the Conners’ Abbreviated Teacher Rating Scale. The results showed significant differences between boys and girls. Girls had fewer behavioral and hyperactive/inattentive symptoms. Also Hispanics scored lower than non-Hispanic whites. Caution is given to the fact that all raters were non-Hispanic white (Dominquez de Ramirez & Shapiro 1998).

Findings from teachers’ ratings of 66 adolescent boys using multiple rating scales suggests that it is feasible to consider using multiple teacher assessment strategy regardless of the instrument used. In this particular study, the Teacher Report Form, Iowa/Abbreviated Conners’ and the Disruptive Behavior Disorders Rating Scale were used with two to five teachers rating each adolescent (Molina, Pelham, Blumenthal & Galiszewski 1998).

The ADHD Rating Scale-IV was evaluated for its ability to differentiate inattention and hyperactivity-impulsivity using children with ADHD and a control group. The results concluded that the ADHD Rating Scale-IV was effective in discriminating children with ADHD as well as inattentive type. Both parent and teacher ratings were predictive, while teacher ratings made a stronger contribution to subgroup assessment (Power, Doherty, Panichelli-Mindel, Karustis, Eiraldi, Anastopoulos & DuPaul 1998).
Consistent with other findings, a 1991 study of parent and teacher ratings using the ADHD rating scale was found to be highly reliable with adequate criterion-related validity, internally consistent, stable over time and highly related to criterion measures of classroom performance. The results showed evidence of significant differences between boys and girls related to the frequency of ADHD symptomatology (DuPaul 1991).

**Medication Therapy**

In a three-week, double-blind study on the impact of methylphenidate on specific categories of social behavior in 25 boys with ADHD, a decrease in noncompliance and physical/verbal aggression was found (Hinshaw, Henker, Whalen & Erhardt 1989).

Similarly, a 1990 study of 17 boys with ADHD playing in a baseball game evaluated attention. In addition, other skills and judgment were assessed. The results indicated methylphenidate had a beneficial effect on attending (Pelham, McBurnett, Harper & Milich 1990).

Also consistent, in a study of the effects of methylphenidate, 34 children with ADHD and a diagnosed tic disorder were examined in a double-blind comparison with placebo. After completing a Conners’ Abbreviated Teacher Rating Scale, Abbreviated Parent Rating Scale, Mother’s Objective Method for subgrouping, Peer Conflict Scale, Global TIC Rating Scale and Stimulant Side Effect Checklist, researchers found that methylphenidate showed dramatic improvement in hyperactive, disruptive and aggressive behavior. In addition, there was no worsening
of tic disorders. Teacher ratings indicated an improvement in motor and vocal tics (Gadow, Sverd, Sprafkin & Nolan 1996).

**Follow-up Studies**

A 1995 12-year follow-up study re-evaluated 33 male ADHD subjects and compared their scores against childhood scores from the Iowa Conners’ Teacher Rating Scale. Measurements of inattentive/overactive (IO) and aggressive plus inattentive/overactive (AO) were compared. Core deficits persisted in more than half of the ADHD group. IO subjects did not differ significantly from the controls in psychiatric functioning except for persistent ADHD. Significant academic problems in high school were displayed in ADHD subjects compared with controls (Claude & Firestone 1995).

Similarly, a 1993 follow-up study of 91 men diagnosed with childhood ADHD and 95 controls measured educational achievement, occupational rank, psychiatric status and persistence of ADHD symptoms. ADHD subjects, while gainfully employed, had completed less schooling, had lower occupational rankings and were seven times more likely to have an antisocial personality disorder or a drug abuse problem (Mannuzza, Klein, Bessler & Malloy 1993).
Chapter III: Design of the Study

Sample

The subjects included in group one for this study were males in grades Pre-K through eight. Data were collected on subjects in Camden County, southern New Jersey, who attended Parochial Elementary School. One school was in an urban setting with a population comprised predominantly of African-Americans. The population was generally low socio-economic status. The other school was in a suburban Camden County location with a population of predominantly white middle-class socio-economic status. A total of 165 boys were used to collect the data for the study. The subjects were not clinically diagnosed for ADD/ADHD.

For group two, data were collected and analyzed on a clinically diagnosed population of 61 boys. The subjects were in grades Pre-K through eight and were residents at a clinic in southern New Jersey for children with developmental issues.

Measures

The instrument used for this study was the Conners’ Teacher Rating Scale-Revised: Short Version (CTRS-R: S). The CTRS-R: S is widely used for the assessment of ADD/ADHD and related behavioral disorders in children and adolescents. The scales have been developed over 30 years and represent significant research and improvements over that period.
There are three types of scales: one for parents, one for teachers and one self-report scale. There are long and short versions for each scale. Although, it is preferable to use the long forms and to administer all three ratings when possible, the instrument is flexible and any one scale may be administered individually in either the long or the short form. The short form is helpful when time for administration is limited. The short forms contain the essential items that are also on the long form. In general, the results for both the long and short forms will be comparable.

The CTRS-R: S categorizes results in four areas of behavior: Oppositional, Cognitive Problems/Inattention, Hyperactivity and ADHD Index. The scoring is delineated for age groups (3-5, 6-8, 9-11, 12-14, 15-17).

Some of the key features of the CTRS-R: S are:

* large normative database - (a total of 832 males were normed specifically for the CTRS-R: S in the age group of this study)
* multidimensional scale that assesses Behavior, Conduct, Cognitive and Attention Deficit/Hyperactivity
* subscales are linked to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).
* reliability ranges from .75 to .90 for internal consistency with six to eight week test-retest coefficients ranging from .60 to .90.

Validity was obtained using factor analysis techniques on derivation and cross-validation samples. Convergent and divergent validity was supported by examining the relationship between CTRS-R: S scores and other related measures. Discriminate validity
was supported by statistical analysis on the ability to differentiate ADHD individuals from non-clinical or other clinical groups (Conners, 1997).

Design

This study was predictive in nature. It was designed to test the validity of the CTRS-R: S to predict the existence of ADD/ADHD.

The scores of the clinically diagnosed population were compared with the scores of a non-diagnosed population to determine the validity of the instrument. The sample was analyzed in two ways. The first analysis compared the scores of the entire non-diagnosed sample (group one) with the entire diagnosed sample (group two). The second analysis realigned the two groups into four sub-groups according to grade (grade-group). The intent was to align the grade-group with the age scales by which the CTRS-R: S scores an individual, because not all raters reported birth-date due to privacy issues. Therefore, an estimate was made for the age group in which a particular subject was included, based on his grade level. The grade groups are as follows: Grade-group one (Pre-K & K), grade-group two (grades 1-3 inclusive), grade-group three (grades 4 & 5), grade-group four (grades 6-8 inclusive).

For this study, the CTRS-R: S was given to teachers in the subjects’ schools. The teachers were given written instructions only (Appendix A) for completing the ratings. The title section was deleted from the CTRS-R: S in order to eliminate rater bias in scoring. After the ratings were completed, a follow-up question was asked of the teachers to determine if any of the subjects were clinically diagnosed with ADD/ADHD. Any subjects who were clinically diagnosed were moved from the non-diagnosed to the diagnosed population in order to maintain the integrity of the study.
Hypothesis

Null Hypothesis #1: There will be no difference in the CTRS-R: S ratings (scores) of boys in grades Pre-K through eight who were clinically diagnosed with ADD/ADHD when compared with the CTRS-R: S scores of boys in grades Pre-K through eight who were not clinically diagnosed.

Alternate Hypothesis #1: There will be a significant difference in the CTRS-R: S scores of boys in grades Pre-K through eight who were clinically diagnosed with ADD/ADHD when compared with the CTRS-R: S scores of boys in grades Pre-K through eight who were not clinically diagnosed.

Null Hypothesis #2: There will be no difference in the CTRS-R: S scores of boys in grade-groups who were clinically diagnosed with ADD/ADHD when compared with the CTRS-R: S scores of boys in grade-groups who were not clinically diagnosed.

Alternative Hypothesis #2: There will be a significant difference in the CTRS-R: S scores of boys in grade-groups who were clinically diagnosed with ADD/ADHD when compared with the CTRS-R: S scores of boys in grade-groups who were not clinically diagnosed.

Null Hypothesis #3: There will be no interaction between grade and grade-group.

Alternative Hypothesis #3: There will be interaction between grade and grade-group.
Analysis

A multivariate analysis of variance (manova) was performed on the data using SPSS statistical analysis software. In addition, Tukey HSD, Bonferroni and Sheffé post hoc tests were performed to test the differences between each pair of means, across the four behavioral conditions.

It was assumed that the integrity of the data gathered was such that the results will be valid. The data for the clinically diagnosed subjects were obtained without any knowledge on the part of the researcher as to details of how the data were obtained. The data for the non-diagnosed subjects were scored and analyzed by the researcher; however, no claim can be made as to the integrity, prior knowledge or bias that may have existed on the part of the raters.

Summary

An analysis of data was made between the scores of boys in grades Pre-K through eight, who were clinically diagnosed with ADD/ADHD, and boys in grades Pre-K through eight, who were not clinically diagnosed. The research was conducted to test the validity of the CTRS-R: S.

It is anticipated that the CTRS-R: S will perform according to the validity claims that are published in the technical manual and that the hypotheses will be accepted.
Chapter IV: Analysis of Results

The purpose of this study was to examine the Conner’s Teacher Rating Scale - Revised: Short Version (CTRS-R: S) as a diagnostic instrument for identifying the presence of behavioral problems in the following areas: ADHD, Cognitive/Inattentive, Hyperactivity and Oppositional.

The study compared the scores of boys diagnosed with ADD/ADHD with those of boys not diagnosed with ADD/ADHD. The boys were in grades Pre-K through eight.

The study also compared the results between grade-groups for each behavioral problem to determine if the results were consistent with the findings of the entire population.

The first hypothesis stated that there would be a significant difference in the scores of boys in grades Pre-K through eight who were clinically diagnosed with ADD/ADHD when compared with the scores of boys in the same grades who were not clinically diagnosed.

A manova was performed for the diagnosed and non-diagnosed samples (group). As a result of testing four dependent variables (behavioral conditions), the analysis of variance provides an approximate F statistic using Pillai’s trace, Wilks’ lamda, Hotelling’s trace and Roy’s largest root criterion. The results of all four analytic methods indicated a main effect for the group.

The second hypothesis stated that there would be a significant difference in the scores between grade-groups of boys in grades Pre-K through eight who were clinically
diagnosed with ADD/ADHD when compared with the scores of boys in the same grade-groups who were not clinically diagnosed. For the grade-group analysis, three of the four analytic methods were not significant.

The third hypothesis stated that there would be an interaction between group and grade-group. All four methods indicated a significant grade-group interaction. The results of the multivariate tests are shown in table 4.1.

Table 4.1 Multivariate Tests

<table>
<thead>
<tr>
<th>Effect</th>
<th>Pillai's Trace</th>
<th>Wilks' Lambda</th>
<th>Roy's Largest root</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>20.058</td>
<td>20.058</td>
<td>20.058</td>
</tr>
<tr>
<td>Grade-group</td>
<td>1.660</td>
<td>1.664</td>
<td>3.169</td>
</tr>
<tr>
<td>Group*Grade-group</td>
<td>1.888</td>
<td>1.885</td>
<td>2.929</td>
</tr>
</tbody>
</table>

It was appropriate to narrow the perspective and view the results of each of the four behavioral conditions separately. The results of a manova also include the univariate anova for each dependent variable.

For the group effect, all four behavioral conditions were significant at the .05 level. Therefore the first null hypothesis was rejected and the hypothesis was accepted, confirming a significant difference in the scores between boys diagnosed with ADD/ADHD and non-diagnosed boys in measuring potential behavioral problems in ADHD, Cognitive/Inattentive, Hyperactivity and Oppositional. Table 4.2 includes the
results for the between-subject effects for the group analysis of the four dependent variables.

Table 4.2 Tests of Between-Subject Effects for Group

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>OPP</td>
<td>1.000</td>
<td>61.889</td>
</tr>
<tr>
<td></td>
<td>COG</td>
<td>1.000</td>
<td>16.185</td>
</tr>
<tr>
<td></td>
<td>Hyper</td>
<td>1.000</td>
<td>62.167</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>1.000</td>
<td>63.600</td>
</tr>
</tbody>
</table>

The second hypothesis was concerned with the grade-group analysis. The cognitive condition was significant at the .05 level, F (3,216) = 2.690, p < .05. The hyperactive condition was also significant at the .05 level, F (3,216) = 3.814, p < .05. The oppositional and ADHD scores were not significant. Therefore, the second null hypothesis was not rejected and the hypothesis not accepted as a result of these findings. Although two conditions were significant, the CTRS-R: S is primarily used as a screening tool for ADHD, therefore the importance of this behavioral measure must be considered.

The results for the between subject effects of the grade-group analysis are shown in table 4.3.

Table 4.3 Tests of Between-Subject Effects for Grade-group

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade-group</td>
<td>OPP</td>
<td>3.000</td>
<td>0.812</td>
</tr>
<tr>
<td></td>
<td>COG</td>
<td>3.000</td>
<td>2.590</td>
</tr>
<tr>
<td></td>
<td>Hyper</td>
<td>3.000</td>
<td>3.814</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>3.000</td>
<td>2.385</td>
</tr>
</tbody>
</table>

For the interaction between grade and grade-group, the cognitive condition was significant at the .05 level, F (3,216) = 3.535, p < .05. The oppositional, hyperactive and
ADHD scores were not significant. Therefore, the third null hypothesis was not rejected and the third hypothesis not accepted as a result of these findings. Although the cognitive condition was significant, the CTRS-R: S is primarily used as a screening tool for ADHD; therefore, the importance of this behavioral measure must be considered. The results for the interaction between group and grade-group are shown in Table 4.4.

Table 4.4 Tests of Interaction Between Group and Grade-group

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group*Gradegroup</td>
<td>OPP</td>
<td>3.000</td>
<td>1.056</td>
</tr>
<tr>
<td></td>
<td>COG</td>
<td>3.000</td>
<td>3.535</td>
</tr>
<tr>
<td></td>
<td>Hyper</td>
<td>3.000</td>
<td>2.255</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>3.000</td>
<td>1.060</td>
</tr>
</tbody>
</table>

In order to analyze the data further, post hoc testing was performed. The Tukey, Bonferroni and Sheffé tests produced identical results for multiple comparisons. The multiple comparison was used to show specifically which mean differs from another. In this study, the multiple comparison was performed for each of the four behavioral conditions. The results of the Tukey will be referenced to avoid redundancy.

The multiple comparison for oppositional resulted in significant difference between the means of grade-groups one and three (p = .004). For cognitive, there was a significant difference between the means of grade-group one and all of the other grade-groups (one/two, p = .034, one/three, p = .000, one/four, p = .014). For hyperactivity, grade-group three differed significantly from all other groups (three/one, p = .000, three/two, p = .009, three/four, p = .016). For ADHD, there was a significant difference between the means of grade-group three from all other groups (three/one, p = .000, three/two,
p = .019, three/four p = .005). Table 4.5 shows the significant pairwise multiple comparisons for the four behavioral conditions.

Table 4.5 Tukey Post Hoc Comparisons

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>(i) Gradegroup</th>
<th>(j) Gradegroup</th>
<th>Mean Diff (i-j)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPP</td>
<td>1</td>
<td>3</td>
<td>9.0509</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>6.0598</td>
<td>0.034</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>6.7591</td>
<td>0.014</td>
</tr>
<tr>
<td>COG</td>
<td>1</td>
<td>2</td>
<td>11.3472</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYPER</td>
<td>3</td>
<td>1</td>
<td>10.3158</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>6.7313</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>6.4290</td>
<td>0.016</td>
</tr>
<tr>
<td>ADHD</td>
<td>3</td>
<td>1</td>
<td>9.9014</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>6.1751</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>7.0392</td>
<td>0.005</td>
</tr>
</tbody>
</table>

A graphical display of the means for all conditions in the grade-group tests represents a linear trend relative to age of the subjects. There is a decrease in scores from grade-group one (Pre-K & K) through grade-group three (grades 4 & 5). For grade-group four, the trend reverses and the means increase for all conditions. Graph 4.1 represents the means across the four grade-groups for all conditions.
Summary
A manova was performed on the scores of boys Pre-K through grade eight diagnosed with ADD/ADHD and boys not diagnosed with ADD/ADHD. The results of the analyses for the entire sample indicated a significant difference in the comparison of means of the diagnosed with the non-diagnosed group. The first hypothesis was accepted.

The two groups were also analyzed according to grade-groups. The grade-groups aligned with the age scales used for scoring the CTRS-R: S. A manova was performed across four behavioral variables of diagnosed and non-diagnosed subjects. The ADHD and oppositional scores were not significant. The results failed to reject the second null hypothesis; therefore, the second hypothesis was not accepted.

The interaction between the group and grade-group was also analyzed.
The ADHD, hyperactive and oppositional scores were not significant. The results failed to reject the third null hypothesis; therefore, the third hypothesis was also not accepted.

The implications of these results will be discussed in Chapter V.
CHAPTER V: SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to test the validity of the Conners’ Teacher Rating Scale-Revised: Short Form (CTRS-R: S). The CTRS-R: S is an instrument used to identify children with ADD/ADHD and related behavioral conditions.

The instrument was administered to two groups of boys in grades Pre-K through eight. Group one was not previously diagnosed with ADD/ADHD, and group two was previously diagnosed with ADD/ADHD.

The results of a multivariate analysis of variance (manova) indicated a significant difference between group one and group two. The first hypothesis was accepted.

In order to conduct a more detailed comparison, the two groups were divided into four subgroups (grade-groups). The grade-groups were aligned as closely as possible with the age scales by which the CTRS-R: S scores individuals. There was no significance for ADHD, hyperactivity and oppositional; there was significance for cognitive. The results of a manova and multiple comparisons failed to reject the second null hypothesis.

In addition there was no interaction between the group and grade-group populations for ADHD, hyperactive and oppositional. The results failed to reject the third null hypothesis.

Conclusion

The results of the data for the first hypothesis suggest that the CTRS-R: S was an effective instrument for distinguishing ADD/ADHD and related behavioral problems in children when the sample spans a wide range of ages. However, when comparing
samples within a specific age range, the instrument does not show significance in distinguishing between a diagnosed and non-diagnosed population.

The instrument consistently differentiated cognitive scores from the other behavioral conditions.

**Discussion**

ADD/ADHD has gained the attention of professionals, parents and the community. We are forced to acknowledge, accept and cope with ADD/ADHD because it has become the leading mental disorder diagnosed in children.

In the not so distant past, children who presented ADD/ADHD symptoms were simply labeled “hyper.” Unfortunately, that label may have been the extent of the attention given to a problem that we now know is a serious mental disorder in children. These hyper children were unable to control their behavior, they found it difficult to focus and they were most likely discipline problems. They may have been social outcasts and did poorly in school. Ironically these children may have been the smartest and most socially mature.

Now that we acknowledge and accept ADD/ADHD, we must strive to understand it, because in understanding ADD/ADHD we can overcome the obstacles it creates for those who suffer from it. If the effort is successful, the hyper child of this era will be overachieving rather than overlooked.

The results of this study indicate the following:

1) The CTRS-R: S was effective in identifying children with ADD/ADHD and related behavioral conditions across large samples with no age discrimination.
2) The CTRS-R: S distinguished ADD/ADHD, hyperactivity and oppositional problems from cognitive problems.

3) The CTRS-R: S was unable to distinguish between the three behavioral conditions. The implication is that every child who has ADD/ADHD symptoms also has hyperactivity and oppositional behavior problems comorbid.

4) Mean scores for all conditions drop consistently through grade five and increase for grades six, seven and eight.

5) The instrument should not be used as a diagnostic tool, rather as a screening tool used in conjunction with other tools.

**Implications for Future Research**

Success in assessment, diagnosis and treatment of ADD/ADHD will only be possible if research continues. Additional resources must be allocated to this effort. The CTRS-R: S can make a valuable contribution, but more detailed research must be conducted to clear the discrepancy in the findings of this study relative to the accuracy of the instrument in screening for ADHD. One area of research that may be valuable would be to re-test children who are diagnosed and being treated for ADD/ADHD. There may be interesting results when comparing types of treatment with test/re-test scores. Longitudinal studies may be valuable. The Conners’ rating scales have been in existence long enough to test children of former subjects to look for genetic influence. An effort should be made to increase the credibility of the instrument by distinguishing between ADD/ADHD, oppositional and hyperactivity problems.
REFERENCES


Hancock, L. Mother’s Little Helper. *Newsweek, March 18, 1996, 51-56.*


APPENDIX A

10/12/99

Teachers:

Thank you very much for helping me to complete my Masters Thesis.

Attached are copies of a rating sheet that measures common problems that children have in school. This study is for **BOYS ONLY**. It is **completely confidential** and will not be used for any purpose other than the analysis of the data.

Please read the brief instructions and complete the ratings for each boy in your class. The birth date, age and grade are extremely important for this study so please do not omit any information.

You are doing an observational rating based on your interaction with the child on a daily basis. The child does not participate in the rating and should not be present when you do the rating.

Please enclose the completed rating sheets in the envelope provided, seal it and return it to the school secretary no later than Friday, November 19, 1999.