

PERPLEXITIES IN DISCRIMINATION OF ATTENTION DEFICIT
HYPERACTIVITY DISORDER (ADHD): SPECIFIC BEHAVIORS THAT MAY
HOLD SOME ANSWERS

A Dissertation

by

JUDITH R. HARRISON

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree
of

DOCTOR OF PHILOSOPHY

May 2009

Major Subject: Educational Psychology

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ABSTRACT

Perplexities in Discrimination of Attention Deficit
Hyperactivity Disorder (ADHD): Specific Behaviors That May
Hold Some Answers. (May 2009)

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Attention deficit hyperactivity disorder (ADHD) is a source of diagnostic and intervention confusion and uncertainty for practitioners and parents. Questions creating some of the confusion were answered in a series of three studies. The sample was parent and teacher behavioral ratings for 389 children and 502 adolescents with ADHD and 3131 children and 3161 adolescents without ADHD in public and private schools and mental health clinics in forty states.

In the first study, data was derived from participant *T-scores* on the Behavior Assessment System for Children (2nd ed.) to evaluate the construct validity using first and second order factor analyses. Sufficient construct validity was established.

In the second study, descriptive discriminant analyses (DDA) and item level ANOVAs were used to investigate whether behaviors that discriminate between the target (i.e., ADHD) and comparison groups were associated with the primary symptoms, comorbid conditions, functional impairment, or some combination of the three. Analyses were completed using subscale *T-scores* and individual item scores from the target and comparison groups. Results were compared to determine if the behaviors that discriminated between the groups were consistent across developmental stages and between parents and teachers as raters. Primary symptoms, comorbid conditions, and functional impairment explained the variance as rated by parents and teachers. Primary symptoms were found to be the strongest discriminators of children and adolescents as rated by parents. Atypicality explained the largest variance (72.25%) between children and learning problems explained the largest variance (64.32%) between adolescents when rated by teachers.

The third study was a literature review of intervention studies to increase the academic performance of youth with ADHD in light of the statistical significance controversy. Fifty-one single subject and group design

studies of academic, behavioral, multimodal and parent training were found. Both sides of the statistical significance controversy were summarized. The method of result reporting for 23 group design studies was investigated. Seventy-seven percent of the studies reported results as "significant" with 26% reporting effect sizes. Researchers are encouraged to report effect sizes and explicitly compare results to previous studies in order to establish replicability for ease of educator interpretation.

DEDICATION

This dissertation is dedicated to the memory of my father,
Clinton B. Bond, class of 1954.

ACKNOWLEDGMENTS

Within this dissertation, I briefly discuss the research-to-practice gap. Within the acknowledgment, I express sincere gratitude to individuals within *both* fields, research and practice, along with my family. It took a village.

I want to thank my dissertation committee for all of their support and guidance. Dr. Vannest pushed me beyond what I thought I was capable of and repeatedly assured me that I could do it. Dr. Thompson taught me the knowledge that I need and made sure that I knew it at a visceral level and communicated it with conviction. Dr. Reynolds provided data and answered all of my questions when I was at a total loss. Drs. Fournier and Webb-Johnson provided support and encouragement throughout the process. Without this unique committee, I could have never completed this entire process.

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CHAPTER I

INTRODUCTION

The identification of Attention Deficit Hyperactivity Disorder (ADHD) is the source of professional discussion and lingering uncertainty and confusion in the literature (Hallahan, Lloyd, Kauffman, Weiss, & Martinez, 2005; Kauffman, 2005). Practitioners, researchers, and parents all seek a clear conceptualization of behaviors demonstrated by children and adolescents in this heterogeneous population. The confusion and lack of a definitive conceptualization of ADHD is evidenced by vast quantities of research on the topic and the numerous revisions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) from one edition to the next.

ADHD is a neurobiological disorder (Nadeau, 1995; Quinn, 1995) that affects three to seven percent of school age children (American Psychiatric Association, 2000; Barkley, 1997; Cantwell, 1996) with primary symptoms of inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2000; Reif, 2005). Despite large quantities of research with this population,

This dissertation follows the style of *Review of Educational Research*.

the behavior of children and adolescents with ADHD leaves practitioners in a conceptual, diagnostic, and intervention conundrum.

Possible explanations for this confusion are secondary behaviors (American Academy of Pediatrics, 2000; Barkley, 2006; Dulcan, 1997; Gershon, 2002; Goldstein, 1999) and symptoms of comorbid conditions (August, Realmuto, MacDonald, Nugent & Crosby, 1996; Bird, Gould, & Staghezza-Jaramillo, 1994; Szatmari, Offord, & Boyle, 1989). Other explanations are functional impairment, potential differences between parent and teacher perceptions of behavior or the difference in behavior demonstrated by children and adolescents with ADHD in different environments (Achenbach, McConaughy, & Howell, 1987; Mitsis, McKay, Halperin, Newcorn, & Schulz, 2000), and the undifferentiated diagnostic criteria between developmental stages (Barkley, 2006; Fischer, Barkley, Fletcher, & Smallish, 1993; Langberg, Epstein, Altaye, Molina, Arnold, & Vietiello, 2008). Some of these factors may contribute to contradictory research results (e.g., the effects of behavioral therapy with and without psychostimulant medications, Conners et al., 2001; MTA Cooperative Group,

1999). All of these issues are current, relevant, and important.

First, many children and adolescents with ADHD demonstrate behaviors that do not appear to be directly related to the primary symptoms (Dulcan, 1997; Gershon, 2002; Goldstein, 1999). This population exhibits symptoms of comorbid conditions (American Academy of Pediatrics, 2000; Barkley, 2006; Dulcan, 1997; Gershon, 2002) and secondary behaviors related to functional impairment (Jarratt, Riccio, & Siekieriski, 2005; Klimkeit, Graham, Lee, Morling, Russon, & Tonge, 2006). Some children and adolescents with ADHD demonstrate symptoms of comorbid conditions such as depression, oppositional defiant disorder, anxiety disorders, and conduct disorder (American Academy of Pediatrics, 2000; Barkley, Fischer, Edelbrock, & Smallish, 1990b).

Secondary behaviors related to functional impairment associated with ADHD include problems with adaptability, interpersonal relationships, and social skills (Klimkeit et al., 2006; Kolko, Loar, & Sturnick, 1990; Landau & Moore, 1991). In addition, children and adolescents with ADHD experience behaviors related to functional impairment such as academic underachievement (Barkley, 1998; DuPaul &

Stoner, 2003) in reading, written language and math (Mayes, Calhoun, & Crowell, 2000), and higher rates of grade retention (Barkley et al., 1990b).

Second, differing perceptions of behavior by parents and teachers and differences in behaviors demonstrated by individuals with ADHD in different environments have been identified in the literature since 1987 (Achenbach et al., 1987). Because the DSM-IV diagnostic criteria requires symptoms be evident in two or more settings (American Psychiatric Association, 1994), practitioners might have trouble with the requirement to use measures from both raters when agreement is difficult to reach.

Third, the DSM-IV diagnostic criteria for ADHD are identical for children and adolescents (American Psychiatric Association, 1994). Some prior research suggests a decline with age in hyperactivity (Hart, Lahey, Loeber, Applegate, & Frick, 1995), while others contend that hyperactivity does not decrease as children become adolescents; instead functional impairment increases (Langberg et al., 2008).

Finally, adding to above perplexities in diagnosing ADHD is the difficulty of treatment and intervention selection in schools. This difficulty may be linked to

problems with intervention selection, adoption, or sustainability as a gap between research and special education practice is well documented (Carnine, 1997; Greenwood & Abbott, 2001). Research informs practice and without reading and understanding research, educators often rely on information that is not empirically validated. A lack of understanding of research (Landrum, Cook, Tankersley, & Fitzgerald, 2002) increases this gap. Evidence of effective interventions related to the characteristics of children and adolescents with ADHD is available in peer reviewed published literature.

However, the professional research community commonly uses methods of reporting science in this area that are too complex and difficult for practitioners (and some researchers) to read without extensive training in research methodology and statistical analyses. If knowledge and reporting of results were standard practice for the academic population, based on technical adequacy and ease of reading and interpretation, the research-to-practice gap might decrease. Researchers and practitioners would be encouraged to seek answers within the literature and use the data that exist to inform decision making in schools and future design of studies. For instance, reporting

effect sizes might increase practitioner understanding of the evidence for empirically based studies.

To further the science and address the issues that continue to pose problems for our field, a series of three studies is included here. The first study, *A preliminary study: Construct validity of the scores derived from the BASC-2 Parent Rating Scales (PRS) and Teacher Rating Scales (TRS)*, is a first and second-order factor analytic study. The purpose of this study is to establish a thorough understanding of the construct validity of scores produced by sixteen subscales of the Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2004) with the sample of students from the study in Chapter III.

The second study, *Behaviors that discriminate ADHD: primary symptoms, symptoms of comorbid conditions, or functional impairment?*, investigates the behaviors that discriminate children and adolescents with ADHD from those without. This study examines the BASC-2 primary subscales and individual items in relation to primary symptoms, symptoms of comorbid conditions, and functional impairment, and identifies the behaviors that differentiate among the three. Next, the consistency between parents and teachers

as raters of across key developmental stages is evaluated. Last, the researcher compares teacher and parent ratings on the BASC-2.

The third study, *Reading and understanding the evidence of effective interventions for students with ADHD: The relevance and meaning of the statistical significance controversy*, reviews evidence for interventions to increase academic performance for students with ADHD in light of the statistical significance controversy. Findings include results from a comprehensive literature review and a count of the method of result reporting (i.e., statistical significance, practical significance, clinical significance, and replication) found in the studies.

Together these three studies provide some of the information needed to address the complexities that exist in diagnosis and intervention selection and implementation with children and adolescents with ADHD. Implications and recommendations for practitioners and researchers make up the final section of each of the following studies. The overall goal of this dissertation is to provide new information for practitioners and the field in hopes of increasing understanding of current issues related to ADHD

and prompting or encouraging more investigation in each of these areas.

CHAPTER II

A PRELIMINARY STUDY: CONSTRUCT VALIDITY OF SCORES DERIVED
FROM THE BASC-2 TRS AND PRS

A thorough understanding of the construct validity of the scores on assessment instruments is a necessary condition in any empirical study (Furr & Bacharach, 2008). Construct validity is "the degree to which a test measures what it claims, or purports, to be measuring" (Brown, 1996, p. 231). To make valid arguments for study conclusions, researchers must be able to defend scores from assessment tools as measures of the intended constructs. Tests of construct validity provide partial evidence for this defense.

Tests of construct validity in part determine if items on a test are a representative sample of the construct the test originally was designed to measure. Further, factor analysis can evaluate the appropriateness of inferences made from the operationalized definition of the constructs within a study compared to the theoretically measured constructs (Gorsuch, 1983; Nunally, 1978; Reynolds, 1982; Thompson, 2004a).

Factor analysis was designed to address such questions as "Does the tool produce scores that seem to measure the

intended dimensions?" and "Are items intended to measure a given dimension actually measuring and only measuring that dimension?" (Thompson, 2004a, p. 4). In 1946, Joy Guilford discussed factor analysis in relation to construct validity,

This is the kind of validity that is really meant when the question is asked, 'Does this test measure what it is supposed to measure?' A more pertinent question should be 'what does this test measure?' The answer then should be in terms of factors (p. 428).

Nunnally (1978) suggested that "factor analysis is intimately involved with questions of validity...Factor analysis is at the heart of the measurement of psychological constructs" (pp. 112-113).

However, the informed researcher understands that factors from factor analysis are a working reference frame as construct validity is an estimate formed by integrating information from numerous sources (Cronbach & Meehl, 1955).

Factor analysis provides one source of information regarding the construct validity and underlying dimensions of behavior measured by psychological assessment tools. To answer the questions posed by construct validity investigation, factor analysis reduces the number of

variables or items by detecting the underlying dimensions or structure within those items. Factor analysis consolidates correlated items into factors (Thompson, 2004a). The extent to which factors created by grouping items is consistent with the operational definition of the construct provides part of the information needed to establish construct validity. These factors are "first-order factors" (Thompson, 2004a). Further, to establish simple structure within a large sample of items in correlated factors, additional factor analysis can extract factors that are more succinct or represent broader areas of generalizability (Gorsuch, 1983) from the first-order factors.

Factors extracted from first-order factors are second-order factors and "should be extracted whenever factors are correlated" (Thompson, 2004a, p. 72). First and second-order factors provide complementary perspectives to the underlying dimensions of the items (Thompson, 2004a). Thompson (2004a) contends that "too few researchers reporting correlated first-order factors conduct these needed higher-order analyses" (p. 72). As Gorsuch (1983) emphasized:

Rotating obliquely in factor analysis implies that the factors do overlap and that there are, therefore, broader areas of generalizability than just a primary factor. Implicit in all oblique rotations are higher-order factors. It is recommended that these [always] be extracted and examined so that the investigator may gain the fullest understanding of the data. (p. 255).

However, Kerlinger (1984) noted, "while ordinary factor analysis is probably well understood, second-order factor analysis, a vitally important part of the analysis, seems not to be widely known and understood" (p. xivv).

Thus establishing construct validity, or the consistency of internal structure, of a psychological assessment instrument through first and second-order factor analysis prior to conducting an empirical study provides support for the findings and the generalizability of results.

The psychological assessment used as a measure for the study in Chapter III of this dissertation is the Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2004). The BASC-2 is a multimethod multidimensional behavioral rating system with five components, two rating scales (i.e., parent and teacher), a self-report scale, a developmental history, and a system

for direct observation of student behavior. Barkley (2006) describes the BASC-2 as "a broad-band rating scale that provides coverage of the major dimensions of child psychopathology known to exist, such as depression, anxiety, withdrawal, aggression, delinquent conduct, and inattentive and hyperactive-impulsive behavior" (p. 354).

Scores on the sixteen primary subscales of the teacher (TRS) and parent rating (PRS) scales, of the BASC-2 are measures of behaviors that differentiate children and adolescents with ADHD from those without in the study in Chapter III of this dissertation. Therefore, while construct validity of the BASC-2 has been established in the manual (Reynolds & Kamphaus, 2004) and in a few other studies (e.g., DiStefano & Kamphaus, 2007; Palomares, 1992), this study addresses information not currently in the literature. Specifically, the present study uses exploratory factor analysis with a unique sample of children and adolescents (i.e., a combined group with ADHD and those without) and includes second-order analyses. These will be used as specific subscales described in the study in Chapter III. Thus, construct validity and a thorough understanding of the underlying dimensions created by the scores for a combined group of children and

adolescents with ADHD and those without produced by the primary scales on the Teacher Rating Scale for Children (TRS-C), Teacher Rating Scale for Adolescents (TRS-A), Parent Rating Scale for Children (PRS-C), and Parent Rating Scale for Adolescents (PRS-A) of the BASC-2 (Reynolds & Kamphaus, 2004) is desirable.

Other researchers (e.g., DiStefano & Kamphaus, 2007; Palomares, 1992) have completed factor analyses of the BASC-2 scales for purposes other than as a preliminary study of the construct validity of scores for this unique population. Confirmatory factor analysis (CFA), with correlated first-order factors without higher order factors extracted or without reporting pattern and structure matrices have been conducted for a direct comparison to this study). Prior to publication, confirmatory factor analysis (CFA) was the "primary tool for item analysis and scale construction" (Reynolds & Kamphaus, 2004, p. 96). Exploratory Factor Analysis (EFA) and CFA were used to establish and validate the composite scales that are "broader behavioral dimensions than those measured by individual scales" (Reynolds & Kamphaus, 2004, p. 141). In these analyses, factors remained correlated and higher order factor analyses were not reported. In addition,

"factor loadings" were reported only for factor in which the item was assigned.

Previous studies used confirmatory and exploratory factor analyses; however, pattern and structure matrices were not reported for any of the studies. Weis and Smenner (2007) evaluated the construct validity of the BASC Self Report of Personality using confirmatory factor analysis. First-order factors were oblique and higher order factor analysis was not completed.

Two studies used exploratory factor analysis with data from the first edition of the BASC (Reynolds & Kamphaus, 1992). Palomares (1992) completed four EFAs "to examine the latent structure of behaviors for male and female offspring when rated by mothers and when rated by fathers" (p. 35). Palomares (1992) established similar factor structure across all four analyses with differences contributed to rater bias, but did not provide pattern and structure matrices or investigate higher order factors. DiStefano and Kamphaus (2007) evaluated the factor structure of the BASC-2 Teacher Rating Scale-Preschool (TRS-P) form with EFA to develop a short behavioral screener with orthogonal factors for externalizing and internalizing behaviors. However, only data from the TRS-P

was evaluated and pattern and structure matrices were not reported.

Consistent factor analytic results across samples provide evidence that the measured constructs are the same (Reynolds & Kaiser, 1990). As Gorsuch (1983) wisely suggested, "Factor the data by several different analytic procedures and hold sacred only those factors that appear across all the procedures used" (p. 330). However, factor analysis has not been used to evaluate construct validity of scores from the sixteen primary scales with a combined group of children and adolescents with and without ADHD. Chapter III will address this next step.

The purpose of this study is twofold. The primary purpose is to determine underlying dimensions and thus partial evidence for the construct validity of the scores of a sample of children with ADHD and those without produced by the BASC-2 (the instrument to be used in an empirical study). The measures to be evaluated are the primary scales of the TRS-C, TRS-A, PRS-C, and PRS-A of the BASC-2 (Reynolds & Kamphaus, 2004). A secondary purpose of the present study is to provide both illustration and evidence of the applicability of second-order factors to a construct validity study conducted as a preliminary study.

Although, the BASC-2 was factor analyzed prior to publication (Reynolds & Kamphaus, 2004), new information is provided here. First is information regarding the replicability of previous findings with a more specific unique subgroup of children and adolescents. Second is the extent to which the sixteen primary subscales measure the intended constructs. Third is different methodology (i.e., higher order factors were extracted) compared with previous factor analytic studies of the BASC-2. Fourth is that all pattern and structure coefficient matrices are provided.

Method

Participants

Data and participants in this study are from the BASC-2 standardization sample (see Reynolds & Kamphaus, 2004). In this sample, children and adolescents were from public and private schools, mental health clinics, hospitals, and preschools/daycares in 40 states between the years 2002 and 2004 (Reynolds & Kamphaus, 2004). General norm samples were from general education classrooms in private and public schools and closely matched to the 2001 U.S. population demographically (Reynolds & Kamphaus, 2004).

For purposes of this study, the target and comparison groups to be used in the study in Chapter III are combined,

with inclusion criteria of (1) parent report of formal diagnosis of ADHD only (i.e., the target group in Chapter III) and (2) no emotional, physical or behavioral problems reported (i.e., the comparison group in Chapter III). For inclusion in this study as having no emotional, physical, or behavioral problems, participants from the original standardization study were excluded if parents reported the child or adolescent had received special education or gifted services, had a developmental delay, mental retardation, emotional behavioral disturbance, orthopedic/motor impairment, visual impairment, hearing impairment, multiple disabilities, deaf/blindness, other health impairment, congenital cytomegaly virus, sensory integration dysfunction, traumatic brain injury or speech and/or language impairment, specific learning disability, or other condition. In addition participants were not included if the parent reported a clinical diagnosis of autism, dementia, anxiety, aspergers syndrome, bipolar disorder, conduct disorder, depression, dysthymia, opposition defiant disorder, post traumatic stress disorder, or a somatization disorder.

Table 2.1

Mean age in months for TRS participants

Group	n	Mean	SD
Children			
ADHD	187	115.15	19.925
Not ADHD	1451	106.48	21.483
Adolescents			
ADHD	234	178.59	26.039
Not ADHD	1531	180.69	24.471

As analyses were completed for parent and teacher ratings of children and adolescents separately, demographic information is provided in two tables and discussed here for parent and teacher ratings independently. The TRS sample included 1638 children, 187 with ADHD and 1451 with no physical or emotional problem, and 1795 adolescents, 234 with ADHD and 1531 with no physical or emotional problems. Table 2.1 provides mean age in months and Table 2.2 provides race and gender demographics for participants on the TRS.

Table 2.2

Race and gender demographics for TRS participants

Group/Variable	Not ADHD		ADHD		Total	
	n	% age	n	% age	n	% age
Children	1451	88.5	187	11.4	1638	100
Total						
Gender						
Male	655	45.1	135	72.2	790	48.2
Female	796	54.9	52	27.8	848	51.8
Race						
African	205	14.1	34	18.2	239	14.6
American						
Hispanic	293	20.2	15	8.0	308	18.8
White	862	59.4	132	70.6	994	60.7
Other	21	1.4	1	0.5	22	1.3
Asian	43	3.0	0	0	43	2.6
American						
American	27	1.9	5	2.7	32	2.0
Indian						
Adolescents						
Gender						
Male	659	43	173	73.9	832	47.1
Female	872	57	61	26.1	933	52.9
Race						
African	198	12.9	30	12.8	228	12.9
American						
Hispanic	265	17.3	16	6.8	281	15.9
White	996	65.1	181	77.4	1177	66.7
Other	6	4	3	1.3	9	0.5
Asian	46	3.0	2	0.9	48	2.7
American						
American	20	1.3	2	0.9	22	1.2
Indian						

The PRS sample for this study included 1882 children, 202 with ADHD and 1680 with no physical or emotional problem and 1898 adolescents, 268 with ADHD and 630 with no physical or emotional problems. Table 2.3 provides mean age in months for participants on the PRS and Table 2.4 describes race and gender demographics for the PRS.

Table 2.3

Mean age in months for PRS participants

Group	Mean	SD
Children		
ADHD	113.57	19.885
Not ADHD	103.28	21.566
Adolescents		
ADHD	176.79	25.672
Not ADHD	178.48	26.805

Table 2.4

Race and gender demographics for PRS participants

Group/Variable	Not ADHD		ADHD		Total	
	N	% age	n	% age	n	% age
Children						
Total	1680		202		1882	100
Gender						
Male	792	47.1	146	72.3	938	49.8
Female	888	52.9	56	27.7	944	50.2
Race						
African American	206	12.3	27	13.4	233	12.4
Hispanic	257	15.3	16	7.9	273	14.5
White	1094	65.1	151	74.8	1245	66.2
Other	33	2.0	2	1.0	35	1.9
Asian American	69	4.1	2	1.0	71	3.8
American Indian	21	1.2	4	2.0	25	1.3
Adolescents						
Total	1630		268		1898	100
Gender						
Male	683	41.9	202	75.4	885	46.6
Female	947	58.1	66	24.6	1013	53.4
Race						
African American	156	9.6	32	11.9	188	9.9
Hispanic	200	12.3	14	5.2	214	11.3
White	1196	73.4	217	81.0	1413	74.4
Other	13	0.8	2	0.7	15	0.8
Asian American	47	2.9	2	0.7	49	2.6
American Indian	18	1.1	1	0.4	19	1.0

Procedure

Parents and teachers completed rating forms consisting of items from the BASC-2 standardization sample for children and adolescents in 40 states during the BASC-2 standardization process. Educators with a graduate degree in psychology or supervised by a psychologist served as site coordinators. Site coordinators recruited teachers to participate in the study who distributed rating scales to parents and teachers. Parents and teachers returned the forms to site coordinators who coded the forms to assure confidentiality.

Instrument

For this study, items from the 16 primary subscales from the BASC-2 Parent Rating Scale for Children (PRS-C), Parent Rating Scale for Adolescents (PRS-A), Teacher Rating Scale for Children (TRS-C), and the Teacher Rating Scale for Adolescents (TRS-A) were selected as these are the measures to be used in the next study. The BASC-2 TRS-C, TRS-A, PRS-C and PRS-A assess symptoms of emotional and behavioral problems demonstrated by children (6-11 years old) and adolescents (12-21 years old). The four rating scales require a parent or teacher to rate a child or adolescent's behavior according to frequency as never,

sometimes, often, and almost always over the previous six months on 139 items on the TRS-C, 139 items on the TRS-A, 160 items on the PRS-C, and 150 items on the PRS-A.

The researcher collected item raw scores and *T*-scores on the 16 primary subscales and critical items on the published BASC-2. Critical items are "special" items. Practitioners can interpret these items cautiously as stand-alone items. The sixteen primary subscales are aggression, attention problems, adaptability, anxiety, atypicality, conduct problems, depression, functional communication, hyperactivity, learning problems, leadership skills, somatization, social skills, study skills, withdrawal, and activities of daily living. Critical items are thoughts, verbalizations, and actions that represent a need for the further clinician investigation. Some are related to harm to self or others, and others represent the need for referral to an outside professional (Reynolds & Kamphaus, 2004). Some critical items are components of subscales, such as depression and others have clinical importance at the item level. Raw scores are the total points for each item and scale scores are linear *T*-scores with a mean of 50 and a standard deviation of 10. The learning problems and study skills subscales are exclusive

to teacher ratings and the activities of daily living scale is exclusive to parent ratings.

Analyses

Four first- and second-order principal component factor analyses (exploratory factor analyses; EFA) were completed. Principal components factor analysis, instead of principal axes factor analysis, was selected due to the large number of variables in the present study, and to avoid "capitalizing on the unique sampling error variance" (Thompson, 2004a, p. 52). Cliff (1987) contends that "the choice of common factors or components methods often makes virtually no difference to the conclusions of a study" (p. 349). The number of measured variables in a study affects the comparability of factor structures from the two methods, because as more measured variables are analyzed, the ratio of the diagonal entries in the correlation matrix to the off diagonal entries gets exponentially smaller as more measured variables are considered (Thompson, 2004a). Additionally, the iterative estimation of communalities in principal axes factor analysis may capitalize unduly on sampling error in the effort to consider measurement error, and this tradeoff may be unacceptable in some cases. As Thompson (2006) noted "the more statistical estimates we

make in any analysis for a given data set, the greater is the likelihood that we are capitalizing on the unique sampling variance in a given sample of scores" (p. 52).

In addition, the literature does not provide sufficient information to justify using confirmatory factor analysis (CFA); therefore, the researcher selected EFA for this study. The underlying structure or dimensions of behaviors as measured by the BASC-2 were determined using four principal component factor analyses with Promax rotation with the Statistical Package for the Social Sciences (SPSS) computer program version 16. Promax (Hendrickson & White, 1964) was selected because simple structure could not be obtained using orthogonal rotation (Thompson, 2004a). Scores from a combined group of students (i.e., those identified with ADHD and those with no physical, emotional, or behavior problems) from the BASC-2 TRS-C, TRS-A, PRS-C, and PRS-A were used in these analyses. Correlated first-order factors exist so both factor and structure coefficients are critical to interpretation of the first-order factors; however, second-order factors were orthogonal and thus pattern and structure coefficients are identical and considered pattern/structure coefficients (Gorsuch, 1983; Thompson,

2004a). "Pattern coefficients are the weights applied to the measured variables to obtain scores on the factor analysis latent variables (called factor scores)" (Thompson, 2004a, p. 16). Structure coefficients are "bivariate correlation coefficients between the measured variable and their composite variable" (Thompson, 2004a, p. 18). Given correlated first-order factors (Thompson, 2004a, p. 72), the researcher extracted second-order factors from the interfactor correlations among the first-order factors for each of the four scales (i.e., TRS-C, TRS-A, PRS-C, and PRS-A).

The researcher examined items within each first-order factor to select a name for that factor. All items within the factors that constitute a second-order factor contributed information to the name of the second-order factor. Factor names best represent the behaviors described by each item within the factor. Naming factors the same as the subscales within the BASC-2 was avoided as "factors should be given names that do not invoke the labels of observed variables because the latent constructs are not variable themselves" (Thompson & Daniel, 1996, p. 202).

Results

The primary purpose of this study was to evaluate the construct validity of the scores from sixteen primary subscales of the TRS and PRS of the BASC-2 as a preliminary study. A secondary purpose was to demonstrate the use of first-order factor analysis to evaluate construct validity and second-order factor analysis to uncover the overall dimensions of behavior represented by the items within the scales. Reported results are in separate sections for each of the four scales.

Information within the discussion of each first-order factor includes: (1) definition of the factor, (2) sample items from the BASC-2 subscales, and (3) pattern and structure coefficients for the sample items. A factor definition is included the first time the factor appears to avoid redundancy, as some factors are included in more than one scale. Within the discussion of second-order factors, the following is included: (1) a definition of the second-order factor, (2) first-order factors within the second-order factor, and (3) pattern/structure coefficients supporting inclusion of the first-order factor in the second-order factor.

Table 2.5

*Pattern/structure coefficients for second-order factors
for the TRS-C*

First-Order Factor	Factor				
	I	II	III	IV	V
Peer Communication	-.742	.161	.209	.280	-.099
Deceitful	.739	-.145	.109	-.094	-.076
Academic Problems	.627	.288	-.454	-.006	.095
Adjustment					
Stability	-.609	-.517	.043	-.072	.007
Peer Aggression	.601	.330	-.002	.021	.327
Aural Learning	-.555	-.073	.543	-.094	-.140
Disengaged	.432	.366	-.225	-.416	-.064
Self Distrust	-.028	.784	-.025	-.296	-.137
Illness Trepidation	-.069	.691	-.217	.034	.226
Social Isolation	.448	.627	.098	-.142	.089
Self defamation	.359	.479	.352	.194	.102
Personal Knowledge	-.044	-.022	.802	.145	-.040
Physicality	-.096	-.110	.107	.824	-.037
Sensory Distortion	.083	.097	-.167	.138	.737
High Risk	.046	.027	.127	-.470	.711

Structure and pattern coefficients provide evidence for item inclusion in the first factors. Structure/Pattern coefficient provide evidence of first-order factor inclusion in the second-order factors. Four tables visually represent structure/pattern coefficients for the first-order factors included in the second-order factors for the TRS-C (Table 2.5), the TRS-A (Table 2.6), the PRS-A (Table 2.7), and the PRS-C (Table 2.8). Factor pattern and structure coefficients for the first-order factor analyses are the appendices. As Gorsuch (1983) emphasized, "proper interpretation of a set of factors can only occur if at least S and P are both examined" (p. 208).

- Appendix A provides pattern and structure coefficients for the TRS-C
- Appendix B provides pattern and structure coefficients for the TRS-A
- Appendix C provides pattern and structure coefficients for the PRS-C
- Appendix D provides pattern and structure coefficients for the PRS-A

Table 2.6

Pattern/structure coefficients for second-order factors for the TRS-A

First -Order Factor	Factor			
	I	II	III	IV
Peer Aggression	.457	-.671	.008	-.020
Peer Communication	-.194	.743	.018	-.006
Social Isolation	.662	-.244	-.148	-.083
Self Distrust	.792	-.130	-.019	-.038
Academic Problems	.313	-.668	.298	.061
Illness Trepidation	.697	-.095	.122	.191
Self Defamation	.687	-.104	.056	-.013
Sensory Distortion	-.161	-.085	.822	.136
High Risk	.365	.118	.015	.600
Disengaged	.656	-.268	-.217	.084
Academic				
Conscientiousness	-.105	.707	.031	-.269
Adjustment Stability	-.557	.416	-.239	-.031
Deceitful	.223	-.143	-.051	.760
Aural Learning	-.022	.717	.074	.141
Physicality	-.258	.069	.607	-.247

Table 2.7

Pattern/structure coefficients for second-order factors for the PRS-A

First -Order Factor	Factor			
	I	II	III	IV
Peer Communication	-.362	-.651	.004	.116
Peer Aggression	.397	.733	-.015	-.049
Self Distrust	.188	-.077	.850	-.069
Illness Trepidation	.117	.343	.655	-.086
Disengaged	.471	.212	.603	.008
Social Isolation	-.190	.741	.230	-.114
Dependent	.695	.401	.285	.079
Self Defamation	.245	.395	.513	.376
Societally Seditious	.704	.258	.115	-.074
Adjustment Stability	-.240	-.673	-.271	-.172
Temperamental	.234	.309	.109	-.584
Deceitful	.674	.147	.442	-.002
Physicality	.071	.122	.450	.710
High Risk	-.778	.015	-.116	-.199
Socially Engaged	.199	.001	-.197	.634

Table 2.8

Pattern/structure coefficients for second-order factors for the PRS-C

First-Order Factor	Factor				
	I	II	III	IV	V
Peer Communication	-.746	-.157	.000	.064	.230
Impetuous	.688	.429	.166	.085	.001
Peer Aggression	.464	.367	-.176	.465	.079
Disengaged	.400	.496	.299	.216	-.419
Self Distrust	-.161	-.028	.819	.209	.075
Social Isolation	.555	-.052	.267	.289	.346
Peer Rejection	.369	.261	.534	.064	-.299
Illness Trepidation	.354	-.053	.254	.604	.134
Physicality	.110	.165	.692	-.294	.118
Self Defamation	.333	.263	.120	.196	.698
High Risk	.113	.048	-.012	.086	-.834
Sensory Distortion	-.045	.047	-.095	.846	-.074
Deceitful	-.068	.856	.012	-.150	.114
Dependency	-.625	.140	.065	-.103	-.113
Adjustment Stability	.169	.589	.240	.377	-.038

Teacher Rating Scale for Children (TRS-C)

First-Order Factors

Fifteen first-order factors were found for the TRS-C: (1) Peer Aggression, (2) Peer Communication, (3) Academic Problems, (4) Self Distrust, (5) Social Isolation, (6) Illness Trepidation, (7) Disengaged, (8) Aural Learning, (9) Adjustment Stability, (10) Personal Knowledge, (11) Deceitful, (12) Self Defamation, (13) Sensory Distortion, (14) High Risk, and (15) Physicality. A discussion of each follows with the factor pattern and structure coefficients, presented respectively in parentheses, providing evidence of inclusion in the factor.

(1) *Peer Aggression*. Peer Aggression is a set of behaviors that are harmful to other children. "Harmful" includes physically hurtful behaviors or those that interfere with the successful learning of others. Peer Aggression consists of items from the hyperactivity, aggression, and conduct problems subscales. Items include "bothers other children when they are working" (pattern coefficient = .830, structure coefficient = .827), "annoys others on purpose" (.815, .826), "calls other children names (.813, .745), and "hits other children" (.728, .656).

(2) *Peer Communication*. Peer Communication is the ability to relate verbally and nonverbally in a reciprocal, positive manner with other children. Items are from the social skills, leadership skills, study skills, withdrawal, functional communication, and adaptability subscales and include "congratulates others when good things happen to them" (.981, .829), "compliments others" (.953, .809), and "tries to bring out the best in other people" (.926, .841).

(3) *Academic Problems*. Academic Problems are learning deficits. Items from the learning problems, functional communication, study skills, and adaptability subscales are included such as "has reading problems" (.987, .819), "has problems with mathematics" (.904, .770), and "has trouble keeping up in class" (.822, .866).

(4) *Self Distrust*. Self Distrust is composed of characteristics of thoughts, feelings, and verbalizations of self-doubt. Items were from the anxiety and depression subscales including "worries" (.753, .745), "says, 'I'm afraid that I will make a mistake'" (.722, .656), and "says, 'I get nervous during tests or tests make me nervous'" (.677, .586).

(5) *Social Isolation*. Social Isolation is a set of behaviors, feelings, and verbalizations that are

representative of spending vast amounts of time alone. Items originated in the withdrawal and depression subscales for example, "plays alone" (.814, .678), "has trouble making new friends" (.812, .811) and "seems lonely" (.772, .765).

(6) *Illness Trepidation*. Illness Trepidation is a class of behaviors characterized by anxiety transformed into physical symptoms. Items on this factor are from the somatization subscale and include "complains about health" (.790, .7677), complains of pain (.758, .748, .604), and "visits the school nurse" (.741, .700).

(7) *Disengaged*. Disengaged is represented by demonstrated behaviors and behaviors that create perceptions in others that the child is not mentally focused on, or engaged with, true surroundings. Items from the atypicality and withdrawal scales are included in this factor, such as "seems out of touch with reality" (.658, .712), "acts strangely" (.613, .733), and "does strange things" (.608, .719).

(8) *Aural Learning*. Aural Learning is composed of skills or behaviors needed to learn by listening. Items from the attention problems subscale are on this factor; for example, "listens attentively" (.520, .752), "pays

attention" (.516, .755), and "listens carefully" (.510, .741).

(9) *Adjustment Stability*. Adjustment Stability is socially acceptable responses to changes in routine or environment. Items from the adaptability and depression subscales were associated with this factor including "recovers quickly after a setback" (.639, .724), "seems to take setbacks in stride" (.593, .612), and "is easily soothed when angered" (.591, .600).

(10) *Personal Knowledge*. Personal knowledge consists of critical items and is the child's ability to provide information needed for individual safety. Items from the PRS-C include "provides own telephone number when asked" (.757, .768), and "provides own home address when asked" (.770, .768).

(11) *Deceitful*. Deceitful is a set of behaviors that are associated with being dishonest in action and words. Items from the conduct problems subscale are in this factor and include "cheats in school" (.617, .624), "steals at school" (.607, .561), and "lies" (.520, .616).

(12) *Self Defamation*. Self Defamation is a set of behaviors representative of a tendency to malign oneself verbally. Items from the depression subscale were

identified for this factor, such as "says, 'I hate myself'" (.753, .770), "says, 'I want to die or I wish I were dead'" (.768, .738), and "says, 'nobody likes me'" (.292, .547).

(13) *Sensory Distortion*. Sensory Distortion is sensory and auditory hallucinations or delusions from the atypicality subscale. Items are "sees things that are not there" (.814, .769) and "hears sounds that are not there" (.806, .777).

(14) *High Risk*. High risk is behaviors that are characteristic of risk for dangerous behavior to self or others in the future. Critical items on this factor include, "has toileting accidents" (.570, .522), "eats things that are not food" (.554, .527), and "throws up after eating" (.280, .322).

(15) *Physicality*. Physicality is behaviors associated with physical disabilities or illnesses. Critical items compose this factor; for example, "has seizures" (-.568, -.449), "eats too much" (.506, .366), and "has eye problems" (.424, .297).

Second-Order Factors

Second-order factors for the TRS-C are Social, Personal, Academic, Behavioral, and Psychological. The Social second-order factor is a set of social competencies

or behaviors that either hinder or assist children and adolescents in successfully functioning in social situations. First-order factors in the Social factor are Peer Communication (pattern/structure coefficient = $-.742$), Peer Aggression ($.601$) and Adjustment Stability ($-.609$). The Personal factor is a group of behaviors, thoughts, and feelings of self worth with first-order factors of Self Distrust ($.784$), Illness Trepidation ($.691$), Social Isolation ($.627$), and Self Defamation ($.687$). Academic dimension is a set of behaviors associated with learning and consists of three first-order factors, Aural Learning ($-.555$), Personal Knowledge ($.802$), and Academic Problems ($.627$). The Behavioral second-order factor is a set of behaviors that deviate from the norm to a large degree and appear "odd." First-order factors in the Behavioral second-order factor are Physicality ($.824$) and Disengaged ($.432$). The Psychological second-order factor is a set of behaviors that represent psychological well being. First-order factors are High Risk ($.711$), Sensory Distortion ($.737$), and Peer Aggression ($.327$).

Teacher Rating Scale for Adolescents (TRS-A)

First-Order Factors

Fifteen first-order factors were found for the TRS-A:

(1) Peer Aggression, (2) Peer Communication, (3) Social Isolation, (4) Self Distrust, (5) Academic Problems, (6) Illness Trepidation, (7) Self Defamation, (8) Disengaged, (9) High Risk, (10) Sensory Distortion, (11) Academic Conscientiousness, (12) Adjustment Stability, (13) Deceitful, (14) Aural Learning, and (15) Physicality. A discussion of each follows. Definitions are not included if provided in the previous section to avoid redundancy.

(1) *Peer Aggression*. Peer Aggression includes items from the hyperactivity, conduct problems, aggression, attention problems, and depression scales such as "teases other adolescents" (pattern coefficient = .965, structure coefficient = .787), "annoys others on purpose" (.933, .826), and "bullies others" (.921, .695).

(2) *Peer Communication*. Peer Communication includes items from the leadership, functional communication, attention problems, adaptability, and social skills scales such as "encourages others to do their best" (.886, .805), "tries to bring out the best in other people" (.847,

.804,)), and "is good at getting people to work together" (.840, .814).

(3) *Social Isolation*. Items in Social Isolation originated in the withdrawal subscale, for example; "has trouble making new friends" (.869, .796), "plays alone" (.839, .710), and "avoids other adolescents" (.836, .755).

(4) *Self Distrust*. Within Self Distrust, items originated in the anxiety subscale and include "worries" (.983, .842), "worries about what other children think" (.816, .595), and "worries about things that cannot be changed" (.652, .751).

(5) *Academic Problems*. Items in the Academic Problems factor are from the learning problems and functional communication subscales such as "has reading problems" (.842, .757), "has spelling problems" (.808, .762), and "has trouble keeping up in class" (.647, .774).

(6) *Illness Trepidation*. Illness Trepidation includes items from the somatization subscale such as "complains of pain" (.828, .800), "complains about health" (.785, .798) and "has stomach problems" (.754, .730).

(7) *Self Defamation*. Self Defamation includes items from the depression subscale such as "says, 'I want to die or I wish I were dead'" (.791, .732), "says, 'I hate

myself'" (.776, .797), and says, "Nobody likes me" (.682, .795).

(8) *Disengaged*. Disengaged includes items from the atypicality subscale such as, "babbles to self" (.503, .513), "says things that make no sense" (.475, .531), "has strange ideas" (.465, .498), and "seems out of touch with reality" (.440, .456).

(9) *High Risk*. High Risk includes items from the conduct problems subscale such as "throws up after eating" (.790, .798) and "smokes or chews tobacco at school" (.703, .646).

(10) *Sensory Distortion*. Sensory Distortion includes items from the atypicality subscale such as "hears things that are not there" (.993, .625) and "sees things that are not there" (.813, .623).

(11) *Academic Conscientiousness*. Academic Conscientiousness is an observable effort to excel academically. Items included are from the study skills and learning problems subscale such as, "gets failing grades" (-.474, -.681), "completes homework" (.439, .690), and "tries to do well in school" (.439, .716).

(12) *Adjustment Stability*. Adjustment Stability includes items from the adaptability subscale such as

"adjusts well to new teachers or caregivers" (.508, .590), and "adjusts well to changes in routines" (.493, .633).

(13) *Deceitful*. Deceitful includes items from the conduct problems subscale such as "steals at school" (.565, .517), "sneaks around" (.389, .355), and "lies" (.376, .343).

(14) *Aural Learning*. Aural Learning includes items from the attention problems subscale such as "listens to directions" (.109, .448), "listens carefully" (.224, .548), and "pays attention" (.201, .515).

(15) *Physicality*. Physicality includes critical items such as "has seizures" (.582, .453) and "has eye problems" (.497, .405).

Second-Order Factors

Second-order factors on the TRS-A are (1) Personal, (2) Academic, (3) Behavioral, and (4) Antisocial. A description of each follows with pattern/structure coefficients. First-order factors in the Personal second-order factor are Self Distrust (pattern/structure = .792), Illness Trepidation (.697), Social Isolation (.448), Disengaged (.656), and Adjustment Stability (-.557).

First-order factors in the Academic second-order factor are Academic Problems (-.668), Aural Learning (.717),

Academic Conscientious (.743), and Peer Aggression (-.671). First-order factors in the Behavioral second-order factor are Physicality (.607) and Sensory Distortion (.822). The Antisocial second-order factor is a set of behaviors that put the student at risk for involvement with the legal system or in danger of physical harm. First-order factors in the second-order factor, Antisocial, are Deceitful (.760) and High Risk (.600)

Parent Rating Scale for Children (PRS-C)

First-Order Factors

Fifteen first-order factors were found for the PRS-C: (1) Peer Communication, (2) Impetuous, (3) Peer Aggression, (4) Disengaged, (5) Self Distrust, (6) Social Isolation, (7) Peer Rejection, (8) Illness Trepidation, (9) Physicality, (10) Self Defamation, (11) High Risk, (12) Sensory Distortion, (13) Deceitful, (14) Dependent, and (15) Adjustment Stability. A discussion of each follows with a definition provided for factors not defined in previous sections along with pattern and structure coefficients.

(1) *Peer Communication*. Peer Communication includes items from the leadership skills, social skills, functional communication, and adaptability subscales such as "gives

good suggestions for solving problems" (pattern coefficient = .771, structure coefficient = .707), "shows interest in other's ideas" (.715, .650), and "offers to help other children" (.680, .612).

(2) *Impetuous*. Impetuous is a set of behaviors that represent symptoms of hyperactivity, inattention, and aggression. Items included are from the aggression, attention problems, and hyperactivity scales including "argues when denied own way" (.735, .682), "interrupts others when they are speaking" (.734, .659), and "argues with parents" (.721, .688).

(3) *Peer Aggression*. Peer Aggression includes items from the hyperactivity, aggression, conduct problems, attention problems, and adaptability subscales such as "hits other children" (.693, .653), "is cruel to others" (.687, .723), and "bullies others" (.679, .657).

(4) *Disengaged*. Disengaged includes items from the atypicality scale such as "acts strangely" (.671, .619), "says things that make no sense" (.522, .626), and "does strange things" (.616, .616).

(5) *Self Distrust*. Self Distrust includes items from the anxiety and depression subscales such as "worries about what teachers or caregivers think" (.731, .647), "worries

about making mistakes" (.701, .683), and "worries about schoolwork" (.700, .612).

(6) *Social Isolation*. Social Isolation includes items from the withdrawal subscale such as "is shy with other children" (.780, .626), "is shy with adults" (.722, .522), "will change direction to avoid having to greet someone" (.572, .518), and "refuses to join group activities" (.508, .586).

(7) *Peer Rejection*. Peer Rejection is a set of behaviors that represent actions or the perception of being shunned by peers. Items from the depression and withdrawal scales are included such as "complains about not having friends" (.815, .777), "says, 'I don't have any friends'" (.802, .767), "says, 'nobody likes me'" (.728, .734) and "is chosen last by other children for games" (.433, .544).

(8) *Illness Trepidation*. Illness Trepidation includes items from the somatization subscale such as, "complains about health" (.719, .677), "complains of being sick when nothing is wrong" (.726, .638), and "complains of pain" (.580, .601).

(9) *Physicality*. Physicality includes critical items and items from the somatization and anxiety subscale, such

as "has fevers" (.713, .601), "vomits" (.667, .566), and "gets sick" (.647, .559).

(10) *Self Defamation*. Self Defamation includes items from the depression subscale such as, "says, 'I want to die' or 'I wish I were dead'" (.826, .643), "says, 'I hate myself'" (.768, .641), and "says, 'I want to kill myself'" (.848, .602).

(11) *High Risk*. High Risk includes items such as "sleeps with parents" (.716, .353) and "has seizures" (.671, .281).

(12) *Sensory Distortion*. Sensory Distortion includes items from the atypicality subscale such as "hears things that are not there" (.697, .609) and "sees things that are not there" (.733, .625).

(13) *Deceitful*. Deceitful includes items from the conduct problems subscale and includes "lies" (.672, .700), "lies to get out of trouble" (.653, .682), and "sneaks around" (.483, .549).

(14) *Dependent*. Dependent is the condition of being overly reliant on others for self-care and attention. Critical items and items from the activities of daily living scale are included such as "has trouble fastening

buttons on clothing" (.506, .330) and "sleeps with parents" (.466, .319).

(15) *Adjustment Stability*. Adjustment Stability includes items from the adaptability subscale such as "adjusts well to changes in routine" (-.610, -.609), "adjusts well to changes in family plans" (-.593, -.600), and "recovers quickly after a setback" (-.513, -.563).

Second-Order Factors

Second-order factors on the PRS-C are (1) Social (2) Antisocial, (3) Personal, (4) Behavioral, and (5) Psychological. A discussion follows with definitions provided for second-order factors not previously defined and pattern/structure coefficients for each first-order factor within the second-order factor.

First-order factors in the Social second-order factor are Self Distrust (pattern/structure coefficient = .819) and Physicality (.692). First-order factors in the second-order factor, Antisocial, are Deceitful (.856), Disengaged (.496), and Adjustment Stability (.589). First-order factors in the Personal second-order factor are Self Distrust (.819) and Physicality (.692). First-order factors in the Behavioral second-order factor are Physicality (.824) and Sensory Distortion (.846). First-

order factors in the second-order factor, Psychological, are High Risk (-.834) and Self Defamation (.698).

Parent Rating Scale for Adolescents (PRS-A)

First-Order Factors

Fifteen first-order factors were found for the PRS-A: (1) Peer Communication, (2) Peer Aggression, (3) Self Distrust, (4) Illness Trepidation, (5) Disengaged, (6) Social Isolation, (7) Dependent, (8) Self Defamation, (9) Societally Seditious, (10) Adjustment Stability, (11) Temperamental (12) Deceitful, (13) Physicality, (14) High Risk, and (15) Socially Engaged. A discussion follows of each.

(1) *Peer Communication*. Peer Communication includes items from the leadership skills, functional communication, attention problems, adaptability, and social skills subscales such as "gives good suggestions for solving problems" (pattern coefficient = .753, structure coefficient = .707), "is effective when presenting information to a group" (.703, .683), and "is clear when telling about personal experiences" (.676, .657).

(2) *Peer Aggression*. Peer Aggression includes items from the hyperactivity, aggression, and conduct problems subscales such as, "calls other adolescents names" (.838,

.697), "teases others" (.826, .688), and "bullies others" (.810, .657).

(3) *Self Distrust*. Self Distrust includes items such as "says, 'I get nervous during tests' or 'test make me nervous'" (.722, .588), "worries about what teachers or caregivers think" (.700, .522), and "worries about making mistakes" (.821, .664).

(4) *Illness Trepidation*. Illness Trepidation includes items from the somatization subscale such as, "complains of pain" (.804, .744), "complains about health" (.785, .730), and "gets sick" (.707, .588).

(5) *Disengaged*. Disengaged includes items from the atypicality subscale such as "has strange ideas" (.722, .606), "acts strangely" (.718, .674), and "stares blankly" (.653, .611).

(6) *Social Isolation*. Social Isolation includes items from the withdrawal and depression subscales such as "has trouble making new friends" (.753, .743), "makes friends easily" (-.640, -.704), and "is shy with other children" (.579, .564).

(7) *Dependent*. Dependent includes items from the activities of daily living, hyperactivity, attention problems, and functional communication scales such as

"needs to be reminded to brush teeth" (1.01, .631), "needs help from others to get up on time" (.851, .484), and "interrupts others when they are speaking" (.642, .692).

(8) *Self Defamation*. Self Defamation includes items from the depression subscale such as "says, 'I want to die or I wish I were dead'" (.998, .785), "says, 'I hate myself'" (.839, .782), and "says, 'nobody likes me'" (.513, .705).

(9) *Societally Seditious*. Societally Seditious is a set of behaviors demonstrating dishonesty and rebelliousness against societal norms. Items from the conduct problems scale are included such as "uses illegal drugs" (.841, .599), "smokes or chews tobacco at school" (.817, .595), and "drinks alcoholic beverages at school" (.800, .586).

(10) *Adjustment Stability*. Adjustment Stability includes items from the adaptability subscale such as "adjusts well to changes in plans" (.768, .749), "adjusts well to changes in family plans" (.766, .731), and "adjusts well to changes in routine" (.677, .702).

(11) *Temperamental*. Temperamental is a set of behaviors that represent rapid fluctuations between affective states. Critical items are included such as "is easily annoyed by

others" (.402, .496), "changes moods quickly" (.349, .472), and "is easily upset" (.332, .495).

(12) *Deceitful*. Deceitful includes critical items from the conduct problems subscale such as "eats things that are not food" (.595, .345), "sneaks around" (.438, .573), "lies" (.428, .617), and "lies to get out of trouble" (.381, .597).

(13) *Physicality*. Physicality includes critical items such as "eats too much" (.641, .496) and "has a hearing problem" (.463, .352).

(14) *High Risk*. High Risk includes critical items and items from the conduct problem subscale such as "sleeps with parents" (.716, .353), "has seizures" (.671, .481), and "throws up after eating" (.406, .182).

(15) *Socially Engaged*. *Socially Engaged is a set of behaviors that represent participation in group activities.* Socially Engaged includes items from the social skills subscale such as "attends after school activities" (.634, .566) and "joins clubs or social groups" (.598, .577).

Second-Order Factors

Second-order factors are Antisocial, Social, Personal, and Emotional. A description of the first-order factors found on each second-order factor follows.

First-order factors in Antisocial are Deceitful (pattern/structure coefficient = .674), Societally Seditious (.704), High Risk (.704), and Dependent (.695). First-order factors in the Social second-order factor are Peer Communication (.651), Peer Aggression (.733), and Adjustment Stability (-.584). The second-order factor, Personal, includes the first-order factors of Self Distrust (.850), Illness Trepidation (.655), and Disengaged (.603). The second-order factor, Emotional, is a set of behaviors that represent the impact of mood fluctuations of social engagement with peers and includes the first-order factors of Socially Engaged (.634) and Temperamental (-.584).

Discussion

Results of this study provide preliminary information needed prior to conducting a study of the behaviors that differentiate children and adolescents with ADHD using the sixteen primary subscales of the BASC-2 TRS and PRS. Results also demonstrate the use of factor analysis for construct validity and answer the question, "Can valid inferences be drawn from scores on the BASC-2 with this group of children and adolescents?" In addition, this study provides an illustration of the use of second-order factor analysis.

First, the following discussion includes factors that are the same as those previously established by Reynolds and Kamphaus (2004) across all four scales of the BASC-2. Second, the discussion includes first-order factors within the TRS and PRS that are different from those previously established. Third is a discussion of second-order factors. Fourth is a comparison of the methodology used here to previously used methodology. Last, the discussion includes a comparison of factors found in this study to those found in previous studies.

Comparison of First- and Second-Order Factors to BASC-2

Subscales

Information regarding construct validity across all four scales is present with several factors equivalent to the BASC-2 subscales or items within the subscales remaining as a cohesive unit defining the construct. As a whole, subscales within the BASC-2 measure emotional and behavioral disorders of childhood and adolescence. This is evident in the factors found in this study. In addition, the subscales measure constructs defined by theory and diagnostic criteria. Figure 2.1 provides a summary of equivalent factors across each of the four scales to avoid redundancy within the discussion of each scale.

Figure 2.1

First-order factors and equivalent BASC-2 subscales across all pertinent scales

- Self Distrust = Anxiety
- Social Isolation = Withdrawal
- Illness Trepidation = Somatization
- Disengaged = Atypicality
- Adjustment Stability = Adaptability
- Deceitful = Conduct Problems and Critical Items
- Self Defamation = Depression
- Aural Learning = Attention Problems
- Dependent = Activities of Daily Living

Teacher Rating Scales (TRS)

Results provide evidence of the construct validity of the scores produced by the fifteen primary subscales of the BASC-2 TRS with this population. The four first-order factor analyses provide evidence that a majority of the subscales measured the intended constructs. On the TRS-C, seven factors, Self Distrust, Social Isolation, Illness Trepidation, Disengaged, Adjustment Stability, Deceitful

and Self Defamation are equivalent to BASC-2 subscales as illustrated in Figure 2.1. On the TRS-A, eight factors are equivalent to the BASC-2 subscales, Self Distrust, Social Isolation, Illness Trepidation, Disengaged, Adjustment Stability, Deceitful, Self Defamation, and Aural Learning. In addition, only critical items are in the Physicality factor.

However, some of the first-order factors combined constructs known through theory and information provided by Reynolds and Kamphaus (2004) to be highly correlated. Three factors were different from the BASC-2 subscales on the TRS-C and TRS-A, Peer Aggression, Peer Communication, and Academic Problems. These three are composed of items from more than one subscale of the BASC-2 and that represent similar or correlated constructs.

Interestingly, two of the factors composed of more than one subscale from the BASC-2 are equivalent to composite scales described by Reynolds and Kamphaus (2004). The BASC-2 has five composite scales, externalizing problems, internalizing problems, school problems, behavioral symptoms index, and the adaptive skills composite. These composites measure broader dimensions of behavior than the individual scales by combining subscales

into one composite subscale and thus produce one score based on the items within the individual scales (Reynolds & Kamphaus, 2004). Reynolds and Kamphaus (2004) used two types of factor analysis, confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) or principal component factor analysis, to create the composite scales in the BASC-2. As in this study, highly correlated constructs grouped naturally together to create composite scores.

The BASC-2 items that represent externalizing behaviors in hyperactivity, aggression, and conduct problems grouped together as Peer Aggression. This factor is the same as the Externalizing Composite Scale on the BASC-2. This is a dimension of behavior defined by Achenbach and Edelbrock (1978) as uncontrolled and by Reynolds and Kamphaus (2004) as "characterized by disruptive-behavior problems such as aggression, hyperactivity, and delinquency." Reynolds and Kamphaus (2004) describe the externalizing behavior composite as "broader behavioral dimensions than those measured by the individual scales" (p. 141) with scale scores that correlate rather highly. However, this was a first-order factor and not a second-order factor as would be expected.

As with Peer Aggression, the Peer Communication first-order factor is also equivalent to a composite scale identified on the BASC-2, the Adaptive Skills Composite. Again, first-order factors were composed of correlated scales that appear to be measuring a broader construct.

Analyses revealed two additional differences. First on the TRS-C, the Academic Problems factor is composed of learning problems, functional communication, study skills, and adaptability items. These subscales appear to be measuring a single construct composed of multiple correlated subscales, but are not a composite scale on the BASC-2. However, Academic Problems is equivalent to the learning problems subscale on the TRS-A. Second on the TRS-C, Physicality is composed of critical items and items from the somatization and anxiety subscales and is not equivalent to any BASC-2 primary or composite subscales.

To reemphasize, the items defining some of the constructs measured by the BASC-2 remained as a cohesive group even when combined with other constructs to form larger factors. The social skills, leadership skills, learning problems, hyperactivity, anxiety, attention problems, and aggression items remained together on the PRS-C. All items from the aggression and hyperactivity

subscales are in the Peer Aggression factor on both the TRS-C and TRS-A. Items from the social skills subscale are all in the Peer Communication factor on the TRS-C and TRS-A. The aggression, anxiety, hyperactivity, leadership skills, somatization, social skills, study skills, withdrawal, and critical items remained together on the TRS-A.

Parent Rating Scales (PRS)

Results of the factor analyses provide evidence for the construct validity of the scores produced by the BASC-2 PRS with a majority of the factors equivalent to the BASC-2 subscales. On the PRS-C, eight factors are the same as the BASC-2 subscales, Self Distrust, Social Isolation, Illness Trepidation, Disengaged, Adjustment Stability, Deceitful, Self Defamation, and Dependent. In addition, High Risk and Personal Knowledge are composed only of critical items. On the PRS-A, seven factors in Figure 2.1 were equivalent to the BASC-2 subscales, Self Distrust, Social Isolation, Illness Trepidation, Disengaged, Adjustment Stability, Deceitful, and Self Defamation. High Risk was composed only of critical items.

However, two first-order factors were different for the PRS-C and PRS-A than the BASC-2 subscales, Peer Aggression

and Peer Communication. Again, Peer Aggression is composed of the externalizing scales of hyperactivity, aggression, and conduct problems and the Peer Communication scale is composed of the adaptability scales.

Three additional differences are present. On the PRS-C attention problems items split between Peer Aggression, Peer Communication, and Impetuous. The Impetuous factor contains items from the aggression, attention problems, and hyperactivity subscales. On the PRS-A, conduct problems items are found on three factors, Peer Aggression, Deceitful, and Societally Seditious. The Dependent factor consists of items from the activities of daily living scale, hyperactivity, attention problems, and functional communication subscales.

On the PRS-C, items from four of the subscales remained together as a cohesive group. Items from adaptability were on the Peer Aggression factor; leadership skills, functional communication, and social skills remained together as a cohesive group in the Peer Communication factor. The activities of daily living skills items remained together in the Dependent factor. Withdrawal items remained together in the Social Isolation factor.

Items from the activities of daily living subscale remained together in the Dependent factor.

On the PRS-A, items from two subscales remained together a cohesive unit within larger factors found here. Aggression items remained in the larger factor of Peer Aggression. Leadership skills items remained together in Peer Communication.

In addition, second-order analyses extracted seven larger dimensions from these first-order factors representing additional correlation between the first-order factors.

Second-Order Factors

Second-order factors represent the overall constructs within the items of the primary subscales on the PRS and TRS of the BASC-2. Answering the questions posed by factor analysis for construct validity, sixteen subscales in the four rating scales measured seven overall dimensions of behavior.

First, the BASC-2 measured the global behavioral dimension, Personal, on all four rating scales. The second-order factor, Personal, represents a broad construct of internalizing behaviors. This construct is composed of thoughts and feelings that are not always visible to

observers and thus the name "Personal". These behaviors can be life threatening and interfere with every day functioning. Measuring this construct, the BASC-2 provides information needed to address mental health issues not often noticed as thoughts and feelings demonstrated are not attention seeking or disruptive behaviors.

Next, the BASC-2 measured the Social dimension on the TRS-C, PRS-C, and PRS-A. Social is a dimension of behavior that represents risk and resiliency. As opposed to Personal, behaviors that define this construct are highly visible and represent a broad combination of behaviors measured by adaptability and externalizing behavior items pooled together.

Third, the BASC-2 measured the Academic dimension through items on the TRS-C and TRS-A. Academic is a construct operationalized by behaviors that hinder or assist students to learn, such as attention problems, learning problems, functional communication, study skills, and adaptability. Additional items from the externalizing behavior subscales and depression subscale on the Academic dimension are found on the TRS-A. These behaviors also interfere with academic performance. As a whole, this

dimension represents behaviors that are necessary for academic functioning.

The fourth and fifth second-order factors are very similar. Scores on the atypicality, somatization, anxiety subscales, and critical items provide a measure of the Behavioral dimension on the TRS-C and TRS-A. Scores on the conduct problems and critical items produce a measure of the Psychological dimension on the TRS-C and PRS-C. While very similar, both factors are measuring different constructs found together on the TRS-C and PRS-C. The primary difference is conduct problems and critical items that represent the possibility of developing conduct problems are in the Psychological dimension; while the Behavioral dimension is a construct composed of internalizing behaviors and those identified through the atypicality subscale.

Sixth, the BASC-2 measured the Antisocial dimension on the TRS-A, PRS-C, and PRS-A. The Antisocial dimension is a set of behaviors that puts the student at risk for involvement with the legal system or in danger of physical harm. On the PRS-A, activities of daily living, attention problems, and functional communication appear in Antisocial dimension. Interestingly the conduct problems items on the

PRS-A sorted fairly even between the first-order factors of Peer Aggression and Societally Seditious and continued to remain separated after the second-order factor analysis in the Social and Antisocial Capacities.

Finally, Emotional dimension was only a second-order factor on the PRS-A and is represented by a small number of social skills and critical items. Items in Emotional dimensions are only relevant to parent ratings of adolescents and logically fit within the Social dimension factor, but structure/pattern coefficients provide a definite delineation of this factor as free standing. Reasons for this could be numerous.

Possibly this dimension represents behaviors beyond the Social dimension that are relevant to developmental differences during adolescence. This is a period of change and discovery with physiological changes being only the tip of the iceberg. Adolescents are attempting to establish themselves as adults while continuing to receive guidance and direction from authority figures. These changes in themselves might create mood fluctuations. In addition, social engagement becomes highly important during this stage. Considering natural psychological and emotional changes, these items do appear to fit within the

theoretical constructs represented by this second-order factor.

Comparison of Methodology to Prior Literature

The methodology used here provides knowledge to the field regarding the use of factor analysis to evaluate construct validity. In addition, this study provides an illustration of "factoring the factors" or second-order factor analysis to determine the most comprehensive dimensions being measured within an assessment instrument.

Several studies with data from the first and second editions of the BASC have used factor analysis. However, this study differs from those in four ways as demonstrated in Table 2.9 and as discussed in the introduction of this chapter. First, the stated purpose of each study was different from each other and from the purpose here. Second, the samples used in each study were different. Third, the type of factor analysis was different. Fourth, the results were of the factor analyses in previous studies were interpreted, or at least reported as being interpreted from, only the "factor loading" not the pattern and structure coefficients.

Table 2.9

Comparison of factor analysis studies

Study Feature	Palomares (1992)		Reynolds & Kamphaus (2004)		Weis & Smenner (2007)		DiStefano & Kamphaus (2007)		Present Study
	1	2	1	2	1	2	1	2	
BASC-1 or BASC-2?									
Subscales from BASC	All from PRS	All subscales from the 4 scales	All subscales from the 4 scales	Composite subscales of the SRP	Composite subscales of the SRP	All from TRS-P	16 primary subscales from 4 scales		
EFA or CFA	EFA	EFA/CFA	EFA/CFA	CFA	CFA	EFA	EFA		
First-order factors orthogonal?	Yes	No	No	No	No	Yes	No		
Both pattern and structure matrices reported?	No	No	No	No	No	No	Yes		
All factor coefficients reported?	No	No	No	No	No	No	Yes		
Correlated factors?	No	Yes	Yes	Yes	Yes	No	Yes		
Second-order analysis?	No	No	No	No	No	No	Yes		
Sample?	4385 parent reports with children 6-19 years old	More than 13000 TRS, PRS, and SRP cases ages 2-18	More than 13000 TRS, PRS, and SRP cases ages 2-18	970 adolescents	970 adolescents	564 4-6 year olds	1638 children and 1795 adolescents with ADHD only or without		
Stated purpose?	"To examine the latent structure of behaviors for male and female offspring when rated by mothers and when rated by fathers" (p. 35)	"in developing the composites" (p. 141)	"in developing the composites" (p. 141)	"To examine the fit of a three-factor model with a new sample of adolescents (p. 113)".	"To examine the fit of a three-factor model with a new sample of adolescents (p. 113)".	"To create a screener.." (p. 94)	To determine underlying dimensions and thus partial evidence of the construct validity of BASC-2 to be used in an empirical study		

Comparison to Previous Findings

Results from EFA were reported in the BASC-2 manual (Reynolds & Kamphaus, 2004), in one published study (DiStefano & Kamphaus, 2007), and one additional dissertation (Palomares, 1992), but for different purposes. Table 2.10 illustrates the similarities between the previous and present studies. Reynolds and Kamphaus (2004) reported that CFA and EFA provided information to establish and validate the composite scales, discussed earlier, of the BASC-2.

DiStefano and Kamphaus (2007) evaluated the factor structure of the BASC-2 TRS-P form during the development of an assessment instrument used to screen the behavioral characteristics of pre-school age children. While DiStefano and Kamphaus (2007) used a rating scale not used in this study, the PRS-Preschool, some of the items were the same. DiStefano and Kamphaus (2007) reported "factor loadings."

Table 2.10

Factor comparison to BASC-2 subscales and previous studies

Reynolds & Kamphaus (2004)	Palomares (1992)	DiStefano & Kamphaus (2007)	Present Study
Adaptability	Positive Social Skills	Externalizing (Adaptability)	Adjustment Stability
Aggression	Negative Social Skills	Externalizing (Aggression)	Peer Aggression
Hyperactivity	Negative Social Skills	Externalizing (Hyperactivity)	Peer Aggression
Attention Problems	Distractible Behaviors	Externalizing (Attention Problems)	Aural Learning/ Impetuous
Depression	Solitary/Lonely Behaviors	Internalizing (Depression)	Social Isolation/Self Defamation
Anxiety	Worry/Nervous Behaviors	Internalizing (Anxiety)	Self Distrust
Somatization	Somatization Behaviors		Illness Trepidation

Table 2.11 provides a direct comparison of the “factor loadings” described in the DiStefano and Kamphaus (2007) study and the pattern and structure coefficients from analyses here. A majority of the items found by DiStefano and Kamphaus (2007) are similar to the results of the factor analysis of the TRS-C. DiStefano and Kamphaus (2007) identified items for the externalizing factor from the adaptability, aggression, hyperactivity, and attention problems subscales. In this study, these items on the externalizing factor in DiStefano and Kamphaus (2007) are split between the Impetuous, Peer Aggression, and Adjustment Stability factors.

DiStefano and Kamphaus (2007) identified items for the internalizing factor from the depression, anxiety, and withdrawal subscales. In this study, these items are split between the Self Distrust, Social Isolation, Adjustment Stability, Self Defamation, and Disengaged factors.

Table 2.11

Comparison of factors in DiStefano and Kamphaus (2007) with pattern and structure coefficients

Item	DiStefano and Kamphaus (2007) PRS-P		Present Study (PRS-C)			
	Subscale	EL	IL	Factor	Pattern	Structure
Is stubborn	Adaptability	.69		Impetuous	.604	.615
Disrupts the play of other children	Aggression	.66		Peer Aggression	.437	.583
Argues when denied own way	Aggression	.63		Impetuous	.735	.682
Interrupts others when they are speaking	Hyperactivity	.61		Impetuous	.734	.659
Cannot wait to take turn	Hyperactivity	.62		Impetuous	.399	.533
Has a short attention span	Attention problems	.61		Impetuous	.521	.677
Is easily distracted	Attention problems	.63		Impetuous	.599	.683
Is easily upset	Depression	.61	.70	Impetuous	.333	.594
Changes moods quickly	Depression	.67	.59	Adjust Stability	.266	-.406
Cries easily	Depression		.59	Impetuous	.324	.417
Is sad	Depression		.57	Social Isolation	.302	.417
Is nervous	Anxiety		.59	Self Distrust	.426	.484
Worries	Anxiety		.49	Self Distrust	.494	.530
Avoids other children	Withdrawal		.49	Social Isolation	.569	.582
Has trouble making new friends	Withdrawal		.54	Peer Rejection	.516	.616

Notes. EL is loading on externalizing behavior; IL is loading on internalizing behavior

In a dissertation, Palomares (1992) completed four EFAs to determine the structure of items on the first edition of the BASC (Reynolds & Kamphaus, 1992) based on mother's ratings of daughters, mother's ratings of sons, father's ratings of daughters, and father's ratings of sons. Seen in Table 2.12 and Figure 2.2, these factors are very similar to the ones found in the present study.

Figure 2.2 provides a list of factors that are the same in the Palomares (1992) dissertation and factors found in this study. In addition, Table 2.12 provides "factor loadings" on similar items from Palomares (1992) and those found here.

Results from the present study in part replicate (see Figure 2.2 and Table 2.12) the finding of Palomares (1992). Two of the larger factors found here were also found in his study. Palomares (1992) identified a factor that he named Positive Social Skills that is almost identical to the Peer Communication factor in this study. In addition, his Positive Social Skills factor includes items from the Peer Aggression factor found here. In addition, Anxiety and Somatization remained cohesive sets of items in both studies.

Figure 2.2

Factor comparison to Palomares (1992)

- Peer Communication = Positive Social Skills
- Peer Aggression/Impetuous/Dependent = Negative Social Skills
- Self Distrust = Worry/Nervous Behaviors
- Impetuous /Dependent = Distractible Behaviors
- Sensory Distortion /Disengagement = Pathogonomic Behaviors

Table 2.12

Factor comparison with Palomares (1992)

	BASC-2												Palomares (1992)											
	Children						Adolescents						Present Study											
	M*D		M*S		F*S		M*D		M*S		F*S		P		S		P		S					
	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL				
Shows interest in others' ideas	SKL	.73	.67	.67	.67	.72	.60	.65	.65	.65	.62	PC	.71	.69	.60	.65								
Tries to bring out the best in other people	SKL	.73	.71	.70	.70	.70	.72	.68	.75	.72	PC	.68	.73	.58	.68									
Offers help to other children/adolescents	SKL	.67	.65	.61	.67	.67	-	-	-	-	PC	.68	.69	.50	.61									
Argues when denied own way	AGG	.56	.62	.59	.59	.59	.58	.42	.60	.37	Imp/Dep	.73	.68	.40	.58									
Calls other children names	AGG	.56	.61	.40	.54	.54	-	-	-	-	PA	.55	.53	.83	.70									
Interrupts parents when they are talking on the phone	HYP	-	-	-	-	-	.42	.64	.54	.44	Imp/Dep	.68	.60	.61	.61									
Disrupts the play of other children	HYP	.53	.62	.42	.56	.56	-	-	-	-	PA	.44	.58	.61	.63									
Worries	ANX	.63	-	.43	.55	.55	.64	.54	.44	-	SD	-	-	.60	.65									
Worries about things that cannot be changed	ANX	.55	-	.41	-	-	.56	.44	.39	-	SD	.49	.48	.52	.61									
Says, "I'm afraid I will make a mistake"	ANX	.59	-	.54	.57	.57	-	.58	.45	.49	SD	.50	.60	.72	.67									
Gets sick	SOM	.47	.44	.36	.38	.38	-	.44	.39	.42	Ill	.65	.33	.71	.59									
Complains of pain	SOM	.46	.49	.47	.31	.31	-	.46	.40	.52	Trep	.58	.60	.80	.74									

Table 2.12 Continued

	Palomares (1992)										Present Study							
	BASC-2					Children					Adolescents							
	Factor	M*D		M*S		F*D		F*S		M*D	M*S	F*D	F*S	Factor	PRS-C		PRS-A	
		FL	FL	FL	FL	FL	FL	FL	FL						P	S	P	S
Is easily distracted	ATN	.50	.59	-	.50	-	.50	-	.50	.49	.72	-	.66	Imp/Dep	.60	.68	.46	.71
Sees things that are not there	ATP	-	.30	-	-	-	-	-	.46	-	-	.61	Sen Di	.73	.62	.55	.35	
Drinks alcoholic beverages	CND	-	-	-	-	-	-	-	.70	.64	-	.81	SS	-	-	.80	.59	
Chews or smokes tobacco	CND	-	-	-	-	-	-	-	.69	.74	-	.82	SS	-	-	.81	.60	
Use illegal drugs	CND	-	-	-	-	-	-	-	.69	.68	-	.79	SS	-	-	.84	.60	

Note. The following abbreviations are used. AGG = Aggression; ANX = Anxiety; ATN = Attention Problems; ATP = Atypicality; CND = Conduct Problems; Del = Delinquent Behaviors; Dis = Disengaged; F*D = Father by Daughter; FL = Factor Loading; F*S = Father by Son; HYP = Hyperactivity; Ill Trep = Illness Trepidation; Imp/Dep = Impetuous/Dependent; M*D = Mother by Daughter; M*S = Mother by Son; Neg SKL = Negative Social Skills; P = Pattern Coefficient; PA = Peer Aggression; Path = Pathognomic Behaviors; PC = Peer Communication; Pos SKL = Positive Social Skills; S = Structure Coefficient; SD = Self Distrust; Sen Di/Dis = Sensory Distortion/Disengaged; SKL = Social Skills; SOM = Somatization; SS = Societally Seditious; Wor/Ner = Worry/Nervous Behavior.

Summary of Findings

Overall, the BASC - 2 has sufficient construct validity for use in the next study. However, the researcher and readers must be aware of findings presented here that replicate those of Palomares (1992), DiStefano and Kamphaus (2007), and information provided by Reynolds and Kamphaus (2004) in the manual of the BASC-2. Specifically, a thorough understanding of three factors.

As ADHD is defined by symptoms of hyperactivity and impulsivity, two factors that include these symptoms and replicate the results of Palomares (1992), Peer Aggression and Peer Communication, are identified across all four scales (i.e., TRS-C, TRS-A, PRS-C, and PRS-A) and one factor, Impetuous, found on the PRS-C in this study only are relevant to the study in Chapter III of this dissertation. Therefore, Peer Aggression, Peer Communication, and Impetuous represent complexities found in assessing and defining the behaviors that best differentiate children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD) and warrant consideration in the following study and discussion here.

Peer Communication (or the Adaptability Scales Composite) and Peer Aggression (or the Externalizing

Behavior Composite) represent the underlying dimensions of behavior found in items of the BASC-2 subscales across all four scales. In addition, the Impetuous factor represents a group of behaviors (i.e., attention problems, aggression, and hyperactivity) that are controversial and debated in the literature in regards to diagnosing ADHD (see Jensen et al., 2001). However, these large factors or composite scales are relevant for "summarizing performance and for drawing broad conclusions regarding different types of adaptive and maladaptive behavior" (Reynolds & Kamphaus, 2004, p. 65). Information gained from these broad constructs is not sufficient or intended for clinicians diagnosing emotional and behavioral disorders by pinpointing mental health disorders or student strengths (Reynolds & Kamphaus, 2004). Instead, these broad constructs found here and across studies is relevant as one purpose of this study is to gather information regarding the underlying dimensions represented by the BASC-2 for the next study in this dissertation.

The purpose of the next study is to determine behaviors that best differentiate children and adolescents with ADHD from those without. The BASC-2 subscales and individual items will represent behaviors. When

interpreting the results of the study in Chapter III, a thorough understanding that three factors, Peer Aggression, Peer Communication, and Impetuous indicate that some items and subscales are measuring not only individual constructs but larger constructs is needed for accurate conclusions and inferences to be drawn from the results of that study. For instance, if aggression was found to strongly differentiate children and adolescents with ADHD, the researcher must consider the correlation between the aggression and hyperactivity subscales to draw valid conclusions.

Implications

Implications from this study are relevant to the original purpose of this study and for the field. The primary purpose of this preliminary study was to evaluate the construct validity of scores produced by items on the BASC-2 primary subscales for four rating scales with a unique population of students in order to establish the foundation for a future study on the behaviors that best discriminate children and adolescents with ADHD from those without. Results are consistent with previous studies which indicate that the 16 subscales within the BASC-2 TRS-C, TRS-A, PRS-C, and PRS-A have sufficient construct

validity for examining the behaviors that discriminate children and adolescents with ADHD from those without any emotional, physical, or behavioral disorders.

Six specific implications exist for the field. First, scores from the sixteen primary subscales of the BASC-2 have potential validity for use in empirical studies with this population with a thorough understanding by the researcher of both the factor structure and the intended use of the BASC-2 for clinical purposes. Large factors consisting of correlated subscales might affect the results of research studies and professional judgment and knowledge is needed when determining if this factor structure affects conclusions. In addition, the BASC-2 was designed in part as a tool when diagnosing emotional and behavioral disorders of childhood. As discussed earlier, from a theoretical perspective (not the empirical purpose here), the large factors do not have a great deal of clinical utility for determining a diagnosis based on criteria established within the DSM-IV (American Psychiatric Association, 1994). However, considering the items within those large factors, as defined by theory, as individual constructs does assist clinicians.

Second, factor analysis is an appropriate means of establishing construct validity. Researchers are encouraged to use factor analysis to establish the construct validity of any assessment instrument to be used in empirical studies. To draw conclusions regarding constructs defined by test items, requires confidence that scores from the test are measuring the intended constructs.

Third, second-order factor analysis is a means of evaluating the overall dimensions measured by a psychological assessment instrument that provides the most comprehensive understanding of the dimensions of behavior measured by that instrument. When orthogonal, or correlated factors, are found researchers should extract higher order factors to achieve simple structure. Fourth, practitioners, aware of the correlation between some subscales, can interpret the results of the BASC-2 as a component of the diagnostic process. Practitioners can use information gained from other sources, as well as professional judgment, when interpreting test results and thus the exact nature of the exhibited externalizing behavior should be investigated before diagnosis is made. Fifth, further research is needed to support the individual constructs currently accepted in the field as externalizing

behavior disorders, such as hyperactivity, aggression, and conduct disorder. Results of this study and others indicate that behaviors associated with each might be similar when defined by items on rating scales. Sixth, determining the differences between parents and teachers as raters requires further research. This study factor analyzed each to determine the underlying dimensions

Conclusion

Evaluating the construct validity of scores derived from assessment tools is necessary to establish a thorough understanding of the underlying dimensions inherent in the items intended as outcome measures in research studies. Construct validity established in this study demonstrates that the scores derived from the BASC-2 are sufficient for inferences and conclusions of an empirical study with a population of children and adolescents with ADHD and those without. This study and others demonstrate that some of the subscales representing externalizing and adaptive behaviors are actually measuring similar constructs or potentially even the same construct, but this does not diminish the overall construct validity of the BASC-2. Reynolds and Kamphaus (2004) acknowledge that these subscales are correlated and include composite scales that

measure these subscales as broader behavioral dimensions. Separation of each is necessary for diagnostic utility and thus for evaluating the behaviors that best discriminate children and adolescents with ADHD from those without.

The purpose and design of the BASC-2 was to measure behaviors related to overall emotional and behavioral disorders completed through a combination of all of the scores and all of the instruments within the system. In addition, importance is placed on the "real world" applications of the BASC-2. Behavioral constructs, especially hyperactivity, aggression, and conduct problems, are often correlated or co-exist (Hinshaw, 1987; Jensen, Martin, & Cantwell, 1997; Lahey, Green, & Forehand, 1980). Result replication across studies establishes the beginning of a knowledge base. Results provide the information needed to conduct future studies with children and adolescents with ADHD and interpret decisions in light of information on the correlation between externalizing behaviors and adaptive behaviors.

Factor analysis is a viable tool for determining the construct validity of scores that underlie common psychological constructs. In addition, extracting higher order factors to achieve simple structure within the

dimensions of these constructs provides a clear conceptualizing of the measured dimensions of behavior and provides needed information to both practitioners and researchers.

CHAPTER III

BEHAVIORS THAT DISCRIMINATE ADHD: PRIMARY SYMPTOMS,
SYMPTOMS OF COMORBID CONDITIONS, OR FUNCTIONAL IMPAIRMENT?

Attention Deficit Hyperactivity Disorder is a neurobiological disorder (Barkley, 1995; Nadeau, 1995; Quinn, 1995) often comorbid with at least six additional disorders (American Academy of Pediatrics, 2000; Barkley, 2006; Dulcan, 1997; Gershon, 2002; Goldstein, 1999) identified in the DSM-IV-TR (American Psychiatric Association, 2000) with impaired social and academic daily functioning affecting 7.8% of the school age population (Centers for Disease Control, 2005) and is one of the most prevalent (American Psychiatric Association, 2000; Cantwell, 1996; Evans, Timmins, Sibley, White, Serpell, & Schultz, 2006) and widely studied childhood behavioral disorders (Goldman, Genel, Bezman, & Stanetz, 1998; Hinshaw, 1994; Vitiello & Sherrill, 2007).

The criteria or behaviors associated with the diagnosis of ADHD include six symptoms of hyperactivity-impulsivity and/or six symptoms of inattention. However, other behaviors are present that impact the functioning of individuals with ADHD (American Academy of Pediatrics, 2000; Barkley, 2006; Dulcan, 1997; Gershon, 2002;

Goldstein, 1999). Table 3.1 is a complete list of these behaviors for reference. For example, there are behaviors demonstrated by individuals with ADHD which are associated with (1)primary symptoms,(2)symptoms of comorbid conditions, and (3)functional impairments (Barkley, 2006). The number of behaviors associated with ADHD creates a conceptual, diagnostic, and intervention selection dilemma (Kauffman, 2005; Wingenfeld, 2002).

Behavioral Categories

Table 3.1

Behavioral categories

Primary Symptoms	Comorbid Conditions	Functional Impairment
Inattention	Anxiety Disorder	Atypicality
Hyperactivity- Impulsivity	Depression	Aggression
	Oppositional Defiant Disorder	Social skills deficits
	Conduct Disorder	Interpersonal relationship skills deficits (including parent-child and peer relationships)
	Learning disabilities	Deficits in daily living skills
	Somatization	Functional communication deficits
		Variability in task performance
		Emotional self control
		Withdrawal

Primary Symptoms

Primary symptoms are behaviors listed as diagnostic criteria in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV; American Psychiatric Association, 1994). The diagnostic criteria for ADHD are: (1) six or more symptoms of inattention or hyperactivity-impulsivity present for six or more months, (2) some symptoms before age seven, (3) functional impairment in two or more settings, and (4) symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder, and are not better accounted for by another mental disorder.

Comorbid Conditions

Comorbidity is the presence of one or more disorders in addition to the primary disorder. Thus comorbid conditions here are disorders that exist in conjunction with ADHD. Individuals with ADHD often meet the DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for multiple disorders, including internalizing (e.g., anxiety, depression), and other externalizing (oppositional defiant disorder, conduct disorder) behavior disorders (American Academy of Pediatrics, 2000), and

learning disorders (Dietz & Montague, 2006; Hallahan et al., 2005). In addition, recent research has suggested that children and adolescents with developmental delays and autism spectrum disorders might also have ADHD (Goldstein & Schwebach, 2004).

Comorbid internalizing behavior disorders are anxiety and depression. Twenty five to thirty percent have anxiety disorders (American Academy of Pediatrics, 2000; Tannock, 2000). Nine to thirty two percent also have been diagnosed with depression (Biederman, Newcorn, & Sprich, 1991).

Comorbid externalizing behaviors are oppositional defiant disorder and conduct disorder. Forty five to eighty four percent have oppositional defiant disorder (American Academy of Pediatrics, 2000; Faraone & Biederman, 1997; Wilens et al., 2002). Forty four to fifty percent of adolescents with ADHD have comorbid conduct disorder (Barkley & Biederman, 1997; Barkley et al., 1990b; Wilens et al., 2002).

Twenty five percent of students in programs for learning disabilities have ADHD (Barkley, 1998; DuPaul & Stoner, 2003) in combination with reading, written language, and mathematics disorders (Barkley, 1998; Mayes et al., 2000; Parmar, Cawley, & Frazita, 1996).

While only recently investigated, autism spectrum disorders and developmental delays were found to often be comorbid with ADHD (Barkley, 2006; Goldstein & Schwebach, 2004). Autism spectrum disorders and developmental delay are not listed in Table 3.1 as only emerging support is provided in the literature for this comorbidity. In addition, the relationship between autism spectrum disorders and ADHD appears to be "one way" with autism being the primary diagnosis. Goldstein and Schwebach (2004) found fifty nine percent of children with PDD NOS or autism to be comorbid with ADHD.

In response to issues with comorbidity, two studies (Jensen et al., 2001; Livingston et al., 1990) investigated the potential need for revision of the current structure of the DSM-IV (American Psychiatric Association, 1994) ADHD criteria specifically in response to the possibility of differing clinical profiles between "pure ADHD," ADHD with comorbid externalizing behaviors and internalizing behaviors. Livingston et al. (1990) found that boys with ADHD comorbid with internalizing (i.e., anxiety) and externalizing disorders (i.e., oppositional defiant disorder, conduct disorder) differed along multiple

dimensions from those with ADHD, comorbid with ADHD, and internalizing disorders.

Jensen et al. (2001) reported results from the National Institute of Mental Health Collaborative Multisite Multimodal Treatment Study of Children with Attention-Deficit Hyperactivity Disorder (MTA) in this area and concluded that children with comorbid internalizing and externalizing disorder responded differently to treatment, warranting further consideration of distinct classifications of ADHD + ODD/CD, ADHD + ANX, ADHD+ANX+ODD/CD, or ADHD only. The implication is that both are diagnostically distinct disorders and not ADHD with comorbid conditions.

Functional Impairment

Behaviors demonstrated by individuals with ADHD are often related to functional impairment created by the primary symptoms or symptoms of comorbid conditions. Functional impairment is the daily impact of symptoms on social and academic functioning (Sparrow et al., 1984).

ADHD impacts the social functioning of children and adolescents through difficulties with daily living skills (Clark, Prior, & Kinsella, 2002; Jarratt et al., 2005), social skills (Klimkeit et al., 2006; Kolko et al., 1990),

and interpersonal relationships (Kolko et al., 1990; Van der Oord, Van der Meulen, Oosterlaan, Buitelaar, & Emmelkamp, 2005). Symptoms of ADHD impact functional communication (Clark et al., 2002; Jarret et al., 2005; Klimkeit et al., 2006, Reynolds & Kamphaus, 2004), social skills (Klimkeit et al., 2006; Kolko et al., 1990), interpersonal relationship skills (Kolko et al., 1990; Landau & Moore, 1991; Pelham & Bender, 1982; Van der Oord et al., 2005) with peers and parents (Bagwell, Molina, Pelham, & Hoza, 2001; Barkley, DuPaul, & McMurry, 1990a; DuPaul et al., 2001; Johnston & Mash, 2001; Johnston, Pelham, & Murphy, 1985; Smith, Brown, Bunke, Blount, & Christophersen, 2002).

Peer relationship difficulties seem to stem from peer rejection as a result of aggressive, disruptive, intrusive, and noisy behavior (DuPaul et al., 2001; Milich, Landau, Kilby, & Whitten, 1982). In addition, a lack of emotional self control, primarily in exciting or frustrating situations (Melnick & Hinshaw, 2000; Walcott & Landau, 2004) interferes with social relationships.

Symptoms interfere with daily academic functioning. Children and adolescents with ADHD demonstrate inconsistent use of organization and study skills, work productivity,

and academic engagement rates (DuPaul & Power, 2000; DuPaul & Stoner, 1994). The ineffective organization skills of students with ADHD can be grouped into three categories, time management, neatness, and working memory. Time management difficulties are demonstrated through ineffective activity planning, tardiness, visible struggles estimating time framework, and an overestimate of the length of time intervals (Carbone, 2001; Grskovic, Zentall, & Stormont-Spurgin, 1995; Turnbull, Turnbull, Shank, & Leal, 1999). Difficulties with neatness are demonstrated through problems with tidiness of school materials and assignments and frequently misplacing tasks and objects (Carbone, 2001; Cherkes-Julkowski, Sharp, & Stolzenberg, 1997).

The DSM-IV (American Psychiatric Association, 1994) criteria also indicate that, "functional impairment in two or more settings" (i.e., home and school) is required. However, high rates of disagreement exist between parent and teacher rating of child behavior, the logical raters for identifying functional impairment in home and school settings. This disagreement indicates parents and teachers perceive behavior differently and thus the behaviors

identified by parents and teachers as problematic might also be different.

Parents and Teachers as Raters

Primary conditions, symptoms of comorbidity and functional impairment are all sources of possible discrepancy between accurate identification of ADHD based on behaviors and each is dependent on ratings from reliable sources. In the majority of cases these sources are parents and teachers ratings and results of prior studies indicate that agreement between teachers and parents has been low on behavior rating scales (Achenbach et al., 1987; Mitsis et al., 2000) suggesting that parent and teacher perception of behaviors are different. Thus a complete conceptualization necessitates an evaluation of parent and teacher perception of behavioral categories as discriminators of ADHD.

Children and Adolescents

In addition to inconsistency with raters like parents and teachers, development could also be a source of variance in discriminating behaviors. ADHD is considered a chronic disorder with a trajectory from childhood to adolescence to adulthood (Langberg et al., 2008). Some research however, suggests a decline or change in primary

symptomology as children become adolescents and adults (Barkley, 2006; Fischer et al., 1993; Hart et al., 1995). These studies are inconsistent across behaviors; inattention appears to remain constant across age whereas hyperactivity declines (Barkley et al., 1990b; Hart et al., 1995).

Others (Langberg et al., 2008) contend that behaviors related to the primary symptomology remain constant and that the behavioral change between childhood and adolescents is a reflection of behaviors associated with functional impairment (Langberg et al., 2008). As children move into adolescence, parents and teachers emphasis is placed on behaviors most impacting academic performance such as those associated with study skills, self confidence, organizational skills, and time management (Alspaugh & Harting, 1995; DuPaul & Stoner, 2003; Langberg et al., 2008; Midgley & Urban, 1992).

The diagnosis of ADHD has evolved over the last four decades to reflect improvements in technology of assessments and new data about behavior. The existence of a variety of behaviors is well documented in the literature as are the difference between teacher and parents as raters and the inconsistency in studies about the developmental

trajectory of these behaviors. Although we know that symptoms of comorbid conditions and functional impairments exist, and Jensen et al. (2001) contend that the DSM-IV (American Psychiatric Association, 1994) diagnosis should be modified to include two more categories combining primary symptoms and symptoms of comorbid conditions, there is no available research in print to indicate what, if any, specific behaviors discriminate ADHD except the primary symptoms. Nor do we know if there are distinguishing characteristics between parents and teachers report of behavior or given different developmental stages (e.g. children and adolescents).

The purpose of the present study is to determine which behaviors related to three behavioral categories (primary symptoms, symptoms of comorbid conditions, and indicators of functional impairment) best discriminate (1) children with ADHD from those without according to parents, (2) children with ADHD from those without according to teachers, (3) adolescents with ADHD from those without according to parents, and (4) adolescents with ADHD from those without according to parents, as determined by evidence from a broad band rating scale. Therefore, the following research questions will be answered.

1. Are behaviors that discriminate children with ADHD from those without related to (1) the primary symptoms of ADHD, or (2) the symptoms of comorbid conditions, or (3) functional impairment based on teacher ratings, or (4) a combination of the three?
2. Are the behaviors that discriminate adolescents with ADHD from those without ADHD related to (1) the primary symptoms of ADHD, or (2) the symptoms of comorbid conditions, or (3) functional impairment based on teacher ratings, or (4) a combination of the three?
3. Are the behaviors that discriminate children with ADHD related to (1) the primary symptoms of ADHD, or (2) symptoms of comorbid conditions, or (3) functional impairment based on parent ratings, or (4) a combination of the three?
4. Are the behaviors that best discriminate adolescents with ADHD from those without related to (1) the primary symptoms of ADHD, or (2) the symptoms of comorbid conditions, or (3) functional impairment based on parent ratings, or (4) a combination of the three?

Method

Participants

Participants in this study were selected from a larger study, the standardization of the BASC-2 (see Reynolds & Kamphaus, 2004). During the standardization process, children and adolescents were recruited from public and private schools, mental health clinics and hospitals and preschools/daycares from across the United States (Reynolds & Kamphaus, 2004). For general norms, children and adolescents were selected from general education classrooms in private and public schools. The sample strongly matched the 2001 U.S. population demographically (Reynolds & Kamphaus, 2004). Separate samples were collected for parent and teacher ratings of children and adolescents resulting in a final sample of 5946 Parent Rating Scale (PRS) forms and 5206 Teacher Rating Scale (TRS) forms.

Table 3.2

Mean age in months for TRS participants

Group	n	Mean	SD
Children			
ADHD	187	115.15	19.925
Not ADHD	1451	106.48	21.483
Adolescents			
ADHD	234	178.59	26.039
Not ADHD	1531	180.69	24.471

For purposes of this study, participants were selected for two groups based on parent report of a formal diagnosis: (1) the target group with a diagnosis of only ADHD, and (2) a comparison group with no emotional, physical, or behavioral problem. For inclusion in the comparison group, children and adolescents had to meet the following criteria: parent report that (1) the child or adolescent did not meet eligibility for special education or gifted services, (2) did not have a mental health diagnosis, and (3) did not take psychiatric medication. Table 3.2 provides mean age in months for TRS participants.

Table 3.3

Race and gender demographics for TRS participants

Group/Variable	Not ADHD		ADHD		Total	
	n	% age	n	% age	n	% age
Children						
Gender						
Male	655	45.1	135	72.2	790	48.2
Female	796	54.9	52	27.8	848	51.8
Race						
African American	205	14.1	34	18.2	239	14.6
Hispanic	293	20.2	15	8.0	308	18.8
White	862	59.4	132	70.6	994	60.7
Other	21	1.4	1	0.5	22	1.3
Asian American	43	3.0	0	0	43	2.6
American Indian	27	1.9	5	2.7	32	2.0
Adolescents						
Gender						
Male	659	43	173	73.9	832	47.1
Female	872	57	61	26.1	933	52.9
Race						
African American	198	12.9	30	12.8	228	12.9
Hispanic	265	17.3	16	6.8	281	15.9
White	996	65.1	181	77.4	1177	66.7
Other	6	4	3	1.3	9	0.5
Asian American	46	3.0	2	0.9	48	2.7
American Indian	20	1.3	2	0.9	22	1.2

The sample for teacher rating of child and adolescent behavior included 1638 children, 187 in the target group and 1451 in the comparison group, and 1795 adolescents, 234 in the target group and 1531 in the comparison group. Table 3.3 provides demographics for participants on the TRS.

Table 3.4

Mean age in months for PRS participants

Group	n	Mean	SD
Children			
ADHD	202	113.57	19.885
Not ADHD	1680	103.28	21.566
Adolescents			
ADHD	268	176.79	25.672
Not ADHD	1630	178.48	26.805

The sample for parent ratings included 1882 children, 202 in the target group and 1680 in the comparison group, and 1898 adolescents, 268 in the target group and 1630 in

the comparison group. Table 3.4 provides mean age in months and Table 3.5 provides demographics for children and adolescents as rated by parents.

Table 3.5

Race and gender demographics for PRS participants

Group/Variable	Not ADHD		ADHD		Total	
	n	% age	n	% age	n	% age
Children						
Total	1680		202		1882	100
Gender						
Male	792	47.1	146	72.3	938	49.8
Female	888	52.9	56	27.7	944	50.2
Race						
African American	206	12.3	27	13.4	233	12.4
Hispanic	257	15.3	16	7.9	273	14.5
White	1094	65.1	151	74.8	1245	66.2
Other	33	2.0	2	1.0	35	1.9
Asian American	69	4.1	2	1.0	71	3.8
American Indian	21	1.2	4	2.0	25	1.3
Adolescents						
Total	1630		268		1898	100
Gender						
Male	683	41.9	202	75.4	885	46.6
Female	947	58.1	66	24.6	1013	53.4
Race						
African American	156	9.6	32	11.9	188	9.9
Hispanic	200	12.3	14	5.2	214	11.3
White	1196	73.4	217	81.0	1413	74.4
Other	13	0.8	2	0.7	15	0.8
Asian American	47	2.9	2	0.7	49	2.6
American Indian	18	1.1	1	0.4	19	1.0

Procedure

Children and adolescents were rated on standardization items from the BASC-2 in 40 states. Site coordinators, educators with a graduate degree in psychology or supervised by a psychologist, were responsible for coding forms for confidentiality, recruiting teachers and parents, and collecting and delivering completed forms. Along with completion of the BASC-2 rating scale, parents completed a "permission to participate" form with demographic and emotional/behavioral data, including parent's education level, race/ethnicity, and any physical, emotional, or behavioral problems.

Instrument

Items from the sixteen BASC-2 primary scales from four rating sources (1) parent rating of child behavior (PRS-C), (2) parent rating of adolescent behavior (PRS-A), (3) teacher rating of child behavior (TRS-C), and (4) teacher rating of adolescent behavior (TRS-A) were used to determine behaviors most closely associated with ADHD, determine if behaviors that discriminate the target and comparison groups were consistent between parent and teacher ratings, and determine if behaviors that discriminate the target and comparison groups were

consistent between parents and teachers as raters. In addition, the BASC-2 critical items across the scales were included. Critical items are items that warrant attention to the individual item score to "flag" behaviors that require further investigation by a clinician and often represent thoughts, feelings, and behaviors that are considered infrequent, suggest danger to self or others or require referral to another professional.

The BASC-2 Teacher Rating Scales (TRS-C and TRS-A) and Parent Rating Scales (PRS-C and PRS-A) assess symptoms of emotional and behavioral problems demonstrated by children (6-11 years old) and adolescents (12-21 years old). Parents and teachers rate the behavior of children and adolescents over the previous six months on a four point scale, never (0), often (1), sometimes (3), and almost always (4). Teachers rate child and adolescent behavior on 139 items. Parents rate child behavior on 160 items and adolescent behavior on 150 items.

Item raw and subscale *T*-scores from the sixteen primary scales (see Table 3.6) were utilized. Raw scores are the total points for all items on each subscale. Subscale scores are reported as *T*-scores with a mean of 50 and a standard deviation of 10.

Table 3.6

*Sixteen clinical and adaptive subscales of the
BASC-2 TRS and PRS*

Clinical	Adaptive
Aggression	Activities of Daily Living
Attention Problems	Adaptability
Anxiety	Atypicality
Conduct Problems	Functional Communication
Depression	Leadership Skills
Hyperactivity	Social Skills
Learning Problems	Study Skills
Somatization	
Withdrawal	

The learning problems and study skills scale are exclusive to teacher ratings and the activities of daily living scale is exclusive to parent ratings. Table 3.7 provides the number of items for each primary scale on each of the four rating scales.

Table 3.7

Count of items in primary subscales

	TRS-C	TRS-A	PRS-C	PRS-A
Attention Problems	7	7	6	6
Hyperactivity	11	11	10	8
Activities of Daily Living			8	8
Functional Communication	10	8	12	12
Conduct Problems	9	12	9	14
Adaptability	8	8	8	8
Aggression	10	10	11	10
Leadership	6	6	8	10
Depression	11	11	14	13
Atypicality	10	9	13	10
Withdrawal	8	8	12	8
Social Skills	8	8	8	8
Anxiety	7	7	14	11
Somatization	9	8	12	11
Critical Items	10	13	15	13
Study Skills	7	9		
Learning Problems	8	8		
Total	139	139	160	150

Analyses

The four research questions were answered by a visual comparison of target and comparison group means, four descriptive discriminant analyses (DDA) and item level ANOVA's for each item on the four scales. DDA was used to evaluate which of the behavioral categories and BASC-2 scales explained the variance between the target and comparison groups. Item level ANOVAs provided additional information to the DDAs by evaluating item level mean differences and allowed further exploration into the items within the categories and subscales that best differentiated children and adolescents in the target and comparison groups.

Mean T-Scores

First, mean *T*-scores for the target and comparison group were interpreted according to levels of significance defined by Reynolds and Kamphaus (2004) with a supplemental table and graph for each scale. *T*-scores are standardized scores used to express the individuals score in reference to a group's performance with a mean of fifty and a standard deviation of ten (Gall, Gall, & Borg, 2007). BASC-2 *T*-scores are linear derivations. Scores one standard deviation above the mean, a *T*-score of 60 or

above, represents the at-risk range and scores two standard deviations above the mean (*T*-score of 70 or above) are considered clinically significant on the clinical subscales. Scores one standard deviation below the mean, a *T*-score of 40 or below, represents the at-risk level and scores two standard deviations below the mean (a *T*-score of 30 or below) are in the clinically significant range for the adaptive scales.

Descriptive Discriminant Analyses

Descriptive Discriminant Analysis (DDA; Huberty, 1994) was completed to determine if primary symptoms, symptoms of comorbid conditions, and/or functional impairment contributed to the difference in children and adolescents from those without any disability. DDA is an analysis that describes group differences based on the attributes of the entities (Huberty & Hussein, 2003). Thus the objective here was to describe group differences between the target and comparison groups on primary diagnostic criteria, symptoms of comorbid conditions, and functional impairment.

Structure coefficients and standardized canonical discriminant function coefficients were interpreted and are provided in a table for each BASC-2 subscale. Canonical discriminant function coefficients consider the relative

importance of the subscale, as they are a confounded function of the subscales, and are context specific for a particular set of variables (Thompson, 2006). For example, if hyperactivity was removed from the analysis, the remainder of the canonical discriminant function coefficient would change. On the other hand, structure coefficients are "bivariate correlation coefficients between the measured variable and their composite variable" (Thompson, 2004a, p. 18). Structure coefficients do not take into consideration the impact of the other variables (Thompson, 2006). Both are interpreted here because if one of the subscales had a function of zero, it might actually discriminate between the two variables if it had a large structure coefficient, because it might be denied any discriminatory credit for commonly explained variance. On the other hand, a subscale might have a "suppressor effect" if it had a structure coefficient of zero but a large canonical discriminant function. A suppressor effect "improves prediction indirectly by making other predictors better, which cannot happen if the predictor variables are all perfectly uncorrelated" (Thompson, 2006, p. 237). In addition, the percentage of variance explained by the

subscales is calculated as the squared structure coefficient multiplied by 100.

Item Level ANOVAs

ANOVAs for each item were interpreted by the effect size, eta squared (η^2). Eta squared (η^2) was calculated by dividing the total sum of squares for each item by the between sum of squares using a computer spreadsheet program, Excel. Eta squared results are discussed in terms of magnitude of effect, less than one percent (< 1%), one to five percent (1%-5%), six to ten percent (6%-10%), eleven to thirteen percent (11%-13%), and greater than fourteen percent (> 14%).

Note that these categories or benchmarks are not "labeled with adjectives" (Glass, McGaw, & Smith, 1981) as in some literature (Thompson, 2006) for several reasons (for further discussion see Chapter IV of this dissertation). Stated briefly, labeling effect sizes will decrease generalizability of the notion of effect size across disciplines or result importance (Cohen, 1977), and effect sizes must be interpreted "in the context of a given analysis" (McCartney & Rosenthal, 2000). The overall concept is that "effect sizes should be interpreted via direct, explicit comparison of the effects in related

literature" (Thompson, 2006, p. 199). As no prior effect sizes could be found relative to this study, the effect sizes of individual items of the four scales were interpreted within the context and as support for the results of the DDA and group means with hopes that in the future researchers will replicate this study and thus begin the process of established effects.

Only examples of items with effect sizes 14% or greater are presented due to the large number interpreted. However, the numbers of items with effect sizes less than 14% percent are discussed with a description of the scales in which a majority of the items originated. For easy comparison of the number of items with ES and the total number of items within each scale, Table 3.7 presents the number of items within each subscale for each rating scale. Additional tables depict the standardized canonical function coefficient (i.e., pattern coefficient) and the structure coefficient for each primary scale.

Results

The four research questions asked if the behaviors that accounted for the variance between the target and comparison groups as rated by teachers and parents were related to the primary symptoms, symptoms of comorbid

conditions, or functional impairment of ADHD. For ease of readability, results are reported under separate headings of teacher and parent rating and subheadings of discrimination of child behavior and discrimination of adolescent behavior.

Teacher Rating Scale

Discrimination of Child Behavior

Results here answer the first research question, "Are behaviors that discriminate children with ADHD from those without ADHD as rated by teachers (1) the primary symptoms of ADHD, or (2) symptoms of comorbid conditions, or (3) functional impairment?" Results are reported from the (1) DDA, (2) comparison of target and comparison group means to levels of clinical significance established by Reynolds and Kamphaus (2004), and (3) results of the item level ANOVAs.

Table 3.8

Descriptive statistics for 14 scales for TRS data for children

Variable	Not ADHD		ADHD		Total	
	m	SD	m	SD	m	SD
Hyperactivity	48.30	8.76	61.19	11.75	49.75	10.00
Aggression	48.60	8.53	60.58	14.29	49.94	10.08
Conduct problems	48.61	8.82	59.47	12.94	49.83	9.97
Anxiety	49.32	9.51	55.13	12.67	49.97	10.07
Depression	48.59	8.44	60.75	14.09	49.95	10.00
Somatization	49.27	9.2	54.76	11.46	49.89	9.63
Atypicality	48.12	7.15	61.94	15.25	49.67	9.75
Withdrawal	48.48	8.76	59.36	11.4	49.70	9.71
Attention	48.35	9.14	61.29	8.21	49.80	9.91
problems						
Adaptability	51.53	9.13	40.44	8.87	50.29	9.75
Social Skills	51.45	9.62	42.52	8.78	50.45	9.94
Leadership	51.40	9.53	41.69	7.31	50.31	9.80
Functional	51.87	8.89	41.71	9.38	50.73	9.50
Communication						
Learning	48.41	8.62	58.82	9.83	49.57	9.35
Problems						
Study Skills	51.60	9.15	40.72	50.38	9.67	

Descriptive discriminant analysis. Table 3.8 reflects means and standard deviations for mean *T*-scores for the target and comparison groups and total. Results from the DDA indicate that behaviors associated with all behavioral categories accounted for a large percent of the variance between the groups (25% to 73%) except symptoms of two comorbid conditions, somatization (.311, .017) that accounted for 9.6 % and anxiety (.314, -.005) that accounted for 9.56%. One measure of functional impairment, atypicality (.849, .400), accounted for the largest amount of variance, 72.25% between the groups followed by the primary symptoms of 60% for attention (.768, .257) and, and 57% for hyperactivity (.755, .277). Table 3.9 presents function and structure coefficients for the teacher rating of child behavior.

Table 3.9

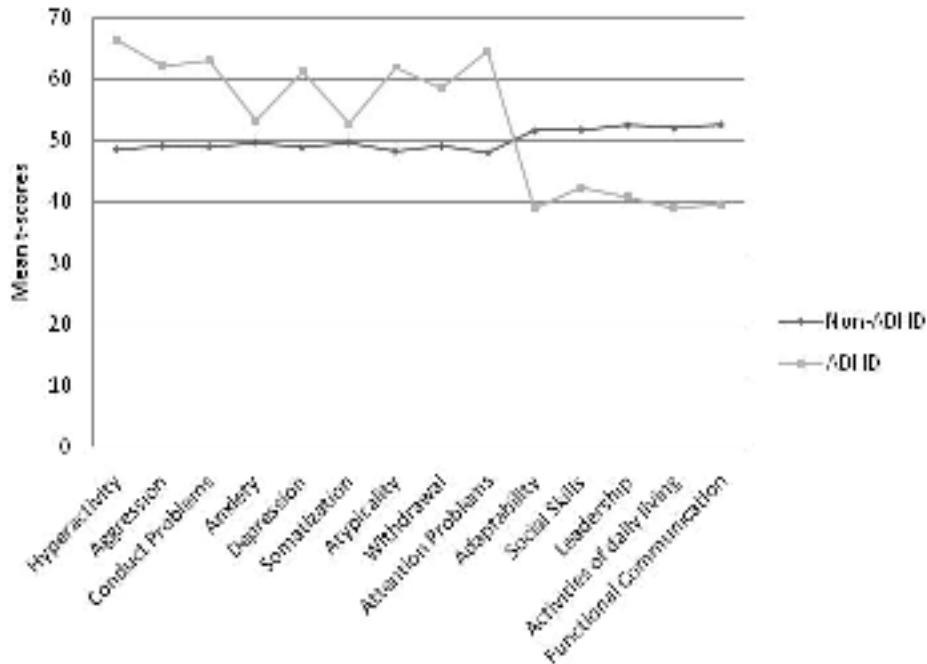
*DDA results for ADHD versus not ADHD for
TRS data for children*

Variable	Coefficients	
	Function	Structure
Atypicality	.400	.849
Attention Problems	.227	.768
Hyperactivity	.277	.755
Depression	.131	.705
Aggression	.294	.687
Adaptability	-.003	-.653
Study Skills	-.098	-.645
Withdrawal	.150	.642
Learning problems	-.098	.637
Conduct Problems	-.293	.621
Functional Communication	-.064	-.609
Leadership	.120	-.559
Social Skills	.076	-.502
Anxiety	.006	.314
Somatization	.015	.310

Group T-score means. Group means for children with ADHD and those without are displayed graphically in Figure 3.1. Item level results validated the results of the DDA. Means for the comparison group were within the average range for the all scales and group means on the clinical scales for the target group in the at-risk range were primary symptoms, hyperactivity and attention problems, symptoms of one comorbid condition, depression, and two measures of functional impairment, aggression, and atypicality. On the adaptive scales, measures of functional impairment, means of the individuals with ADHD were within the low average range.

Figure 3.1

TRS-C group means for the target and comparison groups



Test of item level mean differences (ANOVA). Item level ANOVAs provided support for the DDA results with one exception, aggression. Three items from the attention problems, two items from the hyperactivity, two items from the atypicality subscale, and two items from the aggression subscales had effect sizes fourteen percent or greater between the target and comparison groups. Items from the attention problems subscale are “has a short attention span” ($\eta^2 = 20\%$), “is easily distracted from class work” (η^2

= 15%), and "is easily distracted" ($\eta^2 = 15\%$). Items from the hyperactivity subscale are "has poor self control" ($\eta^2 = 17\%$) and "acts out of control" ($\eta^2 = 20\%$). Items from the atypicality subscale are "does strange things" ($\eta^2 = 15\%$) and "acts strangely" ($\eta^2 = 15\%$). Items from the aggression subscale are "loses temper easily" ($\eta^2 = 16\%$) and "defies teachers or caregivers (people in authority)" ($\eta^2 = 15\%$).

ANOVA results indicated effects between eleven and thirteen percent between the target and comparison groups on twenty items from ten subscales (excluding functional communication, leadership skills, social skills, anxiety, and somatization). Four hyperactivity items, three attention problems items, two depression items, two aggression items, two adaptability, and two study skills items constitute a majority of the items within this range.

In agreement with DDA results, effect sizes between 6% and 10% were found on fifty three items from all but two subscales, anxiety and somatization. The largest number of the items were from the depression, conduct problems (6 items), hyperactivity (5 items), learning problems (5 items), and functional communication (5 items) subscales.

Items with mean differences between 1% and 5% were found between target and comparison groups on fifty two

items from all but two subscales, attention problems and hyperactivity. A majority of the items were critical items (7 items) and items from the somatization subscale (7 items), anxiety subscale (6 items), social skills subscale (5 items), and the functional communication subscales (5 items). Items with mean differences less than one percent were found between the target and comparison groups on two critical items, two somatization items, and one anxiety item. Table 3.10 provides a list of items from the TRS-C with effect sizes of eleven percent or greater and Appendix E provides a list of all items and effect sizes representing the magnitude of difference between the target and comparison groups on the TRS-C.

Table 3.10

Items that differentiate between the target and comparison groups on the TRS-C

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.68	0.79	1.94	0.89	0.20
Has poor self-control.	HYP	0.41	0.68	1.41	0.93	0.17
Loses temper too easily.	AGG	0.24	0.55	1.10	0.99	0.16
Is easily distracted.	ATN	1.03	0.84	2.18	0.83	0.16
Defies teachers.	AGG	0.19	0.45	0.87	0.81	0.15
Acts out of control.	HYP	0.21	0.51	0.95	0.83	0.15
Is easily distracted from class work.	ATN	0.91	0.85	2.04	0.92	0.15
Does strange things.	ATP	0.15	0.41	0.76	0.78	0.15
Acts strangely.	ATP	0.16	0.41	1.29	0.90	0.15
Is overly active.	HYP	0.31	0.62	1.14	1.01	0.13
Babbles to self.	ATP	0.08	0.31	0.54	0.75	0.12
Acts without thinking.	HYP	0.59	0.70	1.44	0.86	0.12
Argues when denied own way.	AGG	0.43	0.70	1.28	0.98	0.12
Picks at things like own hair, nails, or clothing.	ATP	0.14	0.42	0.73	1.00	0.12
Pays attention.	ATN	2.08	0.80	1.18	0.69	0.11
Disobeys.	CND	0.39	0.59	1.07	0.78	0.11
Item	Scale	M	SD	M	SD	η^2
Gets upset when plans are changed.	ADT	0.43	0.59	1.13	0.86	0.11
Is easily upset.	DEP	0.41	0.66	1.17	0.92	0.11
Listens attentively.	ATN	1.96	0.83	1.06	0.68	0.11
Has good study habits.	STD	1.86	0.96	0.83	0.81	0.11
Has trouble staying seated.	HYP	0.52	0.76	1.38	0.98	0.11
Interrupts others when they are speaking.	HYP	0.55	0.69	1.32	0.85	0.11
Has trouble keeping up in class.	LRN	0.61	0.80	1.50	0.97	0.11

Discrimination of Adolescent Behavior

Results reported here answer the second research question, "Are behaviors that discriminate adolescents with ADHD from those without ADHD as rated by teachers (1) the primary symptoms of ADHD, or (2) symptoms of comorbid conditions, or (3) functional impairment, or (4) a combination of the three?" Results are reported first for the DDA, second comparison of group means to levels of clinical significance established by Reynolds and Kamphaus (2004; Table 3.11) and third for ANOVA.

Descriptive discriminant analysis. Results from the DDA indicate that behaviors associated with all behavioral categories accounted for a large percent of the variance between the groups with the exception of one comorbid condition, anxiety (structure coefficient = .397, function coefficient = -.133) explaining 15.76% and one measure of functional impairment, social skills (-.450, .100) explaining 20.25% of variance. One measure of functional impairment, learning problems (.802, .464) accounted for largest amount of variance 64.32% between the groups followed by the primary symptoms of hyperactivity (.795, .579) accounting for 61% and attention problems (.750,

Table 3.11

Descriptive statistics for 14 scales for TRS-A

Group/Variable	Not ADHD		ADHD		Total	
	m	SD	m	SD	m	SD
Hyperactivity	48.51	8.98	60.73	14.19	50.10	10.65
Aggression	48.71	8.39	59.45	14.79	50.15	10.14
Conduct Problems	48.85	9.07	59.24	14.03	50.21	10.47
Anxiety	48.98	9.42	55.27	12.87	49.81	10.16
Depression	48.47	8.58	58.67	14.12	49.80	10.09
Somatization	48.70	8.42	56.54	13.89	49.73	9.69
Atypicality	48.28	8.19	57.10	12.61	49.44	9.37
Withdrawal	48.67	9.25	57.85	12.46	49.87	10.21
Attention Problems	48.53	9.20	59.55	9.36	49.97	9.94
Adaptability	51.39	9.52	41.51	10.32	50.10	10.19
Social Skills	50.80	9.93	43.76	8.94	49.88	10.08
Leadership Skills	51.23	9.87	43.07	8.69	50.17	10.10
Functional Communication	51.59	9.43	42.00	9.83	50.34	10.01
Learning Problems	48.13	8.49	59.47	11.09	49.62	9.67
Study Skills	51.51	9.71	41.37	8.61	50.18	10.16

.013) for 56.25%, and another measure of functional impairment, aggression (.711, .097) explaining 50.55% of the variance between groups. Table 3.12 depicts structure and factor coefficients for the teacher rating of adolescent behavior.

Table 3.12

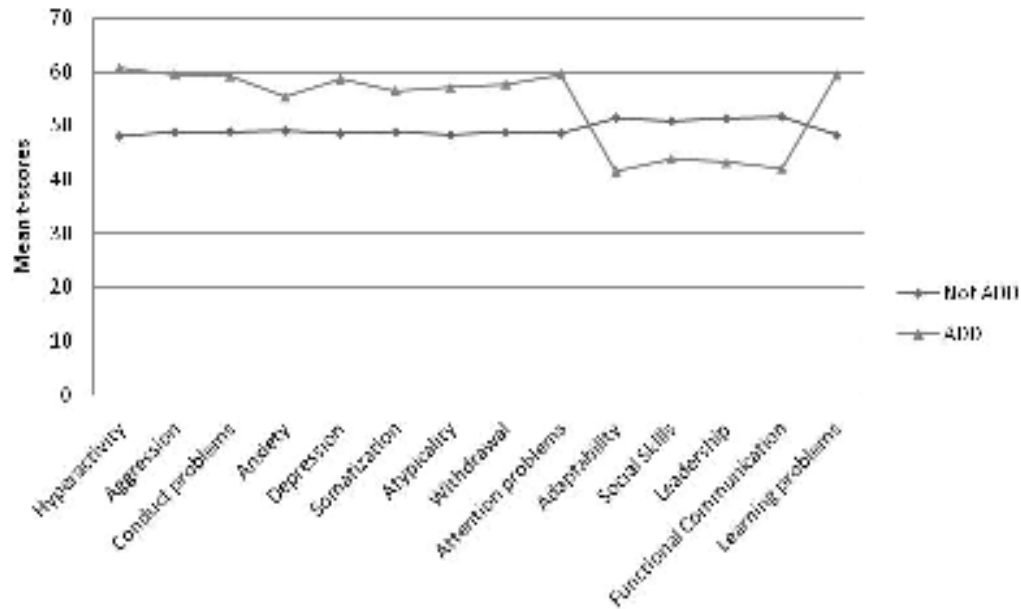
*DDA results for ADHD versus not ADHD for TRS-A data
for adolescents*

Variable	Coefficients	
	Function	Structure
Learning Problems	.439	.800
Hyperactivity	.615	.779
Attention problems	-.049	.748
Aggression	.102	.709
Depression	.094	.673
Study Skills	-.153	-.663
Conduct problems	-.220	.659
Adaptability	.001	-.642
Functional Communication	.117	-.633
Atypicality	-.095	.620
Withdrawal	.335	.591
Somatization	.196	.526
Leadership	-.079	-.525
Social Skills	.100	-.449
Anxiety	-.110	.396

Group T-score means. Group means are graphically displayed in Figure 3.2. Means for the comparison were within the average range for the all scales. For the ADHD group, one primary symptom (hyperactivity) was in the clinically significant range with one primary symptom (attention problems), symptoms of two comorbid conditions (conduct problems and learning problems), and one measure of functional impairment (aggression) being within the at-risk range. Symptoms of three comorbid conditions (anxiety, depression, and somatization), and two measures of functional impairment (atypicality and withdrawal) were all in the at-risk range. All adaptive scales (measures of functional impairment) were in the at-risk range.

Figure 3.2

TRS-A group means for the target and comparison groups



Test of item level mean differences (ANOVA). Items with effect sizes greater than 14% were found between the group of students with ADHD and those without on two items from the attention problems subscale, one item from the learning problems, and one item from the hyperactivity subscale. Items from the attention problems subscale are "is easily distracted" ($\eta^2 = 15\%$) and "has a short attention span" ($\eta^2 = 16\%$). The item from the learning problems subscale is "has reading problems" ($\eta^2 = 16\%$). The item from the hyperactivity subscale is "has poor self control"

($\eta^2 = 16\%$). Table 3.13 is a list of items with effect sizes of eleven percent or greater. Appendix F is a list of all items on the TRS-A with effect sizes for each.

Items with effect sizes between 11 and 13 percent were found between the target group and the comparison group on fifteen items from seven subscales. Five items from the hyperactivity subscale, three items from the aggression subscale, two items each from the learning and conduct problems subscales, and one item each from the study skills, functional communication, and depression subscales were found to have effect sizes between eleven and thirteen percent.

Table 3.13

Items that differentiate between the target and comparison groups on TRS-A

Item	SS	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.5	0.69	1.44	0.9	0.16
Has poor self-control.	HYP	0.26	0.56	1.06	0.97	0.16
Has reading problems.	LRN	0.27	0.57	1.09	1.01	0.16
Is easily distracted.	ATN	0.57	0.76	1.53	0.92	0.15
Threatens to hurt others.	AGG	0.07	0.28	0.47	0.67	0.13
Acts without thinking.	HYP	0.46	0.64	1.22	0.88	0.13
Disobeys.	CND	0.28	0.53	0.9	0.83	0.12
Has spelling problems.	LRN	0.51	0.70	1.28	0.97	0.11
Disrupts the schoolwork of other children.	HYP	0.35	0.61	1.03	0.90	0.11
Acts out of control.	HYP	0.13	0.41	0.63	0.80	0.11
Defies teachers.	AGG	0.2	0.47	0.75	0.80	0.11
Disrupts other adolescents' activities.	HYP	0.35	0.60	1.02	0.91	0.11
Lies.	CND	0.24	0.50	0.81	0.81	0.11
Has difficulty explaining rules of games to others.	FUN	0.35	0.56	0.98	0.88	0.11
Is easily upset.	DEP	0.35	0.59	1.01	0.90	0.11
Annoys others on purpose.	AGG	0.31	0.59	0.97	0.92	0.11
Interrupts others when they are speaking.	HYP	0.33	0.58	0.97	0.88	0.11
Is well organized.	STD	1.81	0.94	0.88	0.79	0.11
Has problems with mathematics.	LRN	0.56	0.70	1.31	0.91	0.11

Items with effect sizes between six and ten percent were found on fifty-seven items from all subscales except anxiety. Over half of the items were from the study skills (8 items), conduct problems (6 items), aggression (6 items), adaptability (6 items), hyperactivity (5 items), and functional communication subscales (5 items).

Effect sizes between one and five percent were found between the ADHD and the group without ADHD on fifty seven items from all but three BASC-2 subscales, attention problems, hyperactivity, and study skills. A majority of those items were from the social skills (7 items), depression (7 items), anxiety (7 items), withdrawal (6 items), somatization (6 items), and leadership skills (5 items) scales. Effect sizes less than one percent were found between the target and comparison groups on two critical items, two atypicality items, one anxiety item and one conduct problems item.

Parent Rating Scale

Discrimination of Child Behavior

Results were determined by DDA, comparison of group *T*-scores and levels of significance determined by Reynolds and Kamphaus (2004), and item level ANOVA's and answer the third research question, "Are behaviors that discriminate

children with ADHD from those without ADHD as rated by parents (1) primary symptoms of ADHD, or (2) symptoms of comorbid conditions, or (3) functional impairment, or (4) a combination of the three?"

Descriptive discriminant analysis. Table 3.14 reflects means and standard deviations for mean *T*-scores for the target and comparison groups and total.

The structure and pattern coefficients indicate that all behavioral categories accounted for a large percent of the variance between the target and comparison groups with ranging from 31.13% to 73.10% each. The primary symptoms, hyperactivity (.855, .488), attention problems (.833, .419), one measure of functional impairment of, atypicality (.696, .190), and one comorbid condition, conduct problems (.644, .051) explained the largest amount of variance, 73.10%, 69.39%, 48.44%, and 41.47% respectively. Symptoms of two comorbid conditions, somatization (.141, -.187), anxiety (.160, -.151), and two functional impairment, withdrawal (.433, .225), and social skills (-.436, .191) accounted for the smallest amounts of variance 1.99%, 2.56%, 18.75%, and 19% respectively. Table 3.15 presents structure and standardized discriminant function coefficients for the parent rating of child behavior.

Table 3.14

Descriptive statistics for 14 scales for PRS-C

Group/ Variable	<u>Not ADHD</u>		<u>ADHD</u>		<u>Total</u>	
	m	SD	m	SD	m	SD
Hyperactivity	48.42	8.64	66.46	13.40	50.38	10.84
Aggression	49.09	8.70	62.09	13.40	50.51	10.17
Conduct Problems	48.88	8.74	62.98	15.00	50.42	10.57
Anxiety	49.59	9.50	53.18	12.40	49.98	9.91
Depression	48.71	8.54	61.29	14.34	50.08	10.14
Somatization	49.59	9.68	52.80	12.16	49.94	10.03
Atypicality	48.11	7.88	62.01	14.08	49.63	9.78
Withdrawal	48.95	9.13	58.44	13.09	49.98	10.08
Attention problems	47.90	8.95	64.69	8.07	49.73	10.29
Adaptability	51.42	9.23	38.92	9.84	50.05	10.08
Social Skills	51.61	9.48	42.17	9.71	50.59	9.95
Leadership	52.31	9.16	40.77	8.44	51.06	9.77
Activities of Daily Living	51.86	8.99	38.86	10.64	50.44	10.04
Functional Communication	52.42	8.71	39.53	10.61	51.01	9.79

Table 3.15

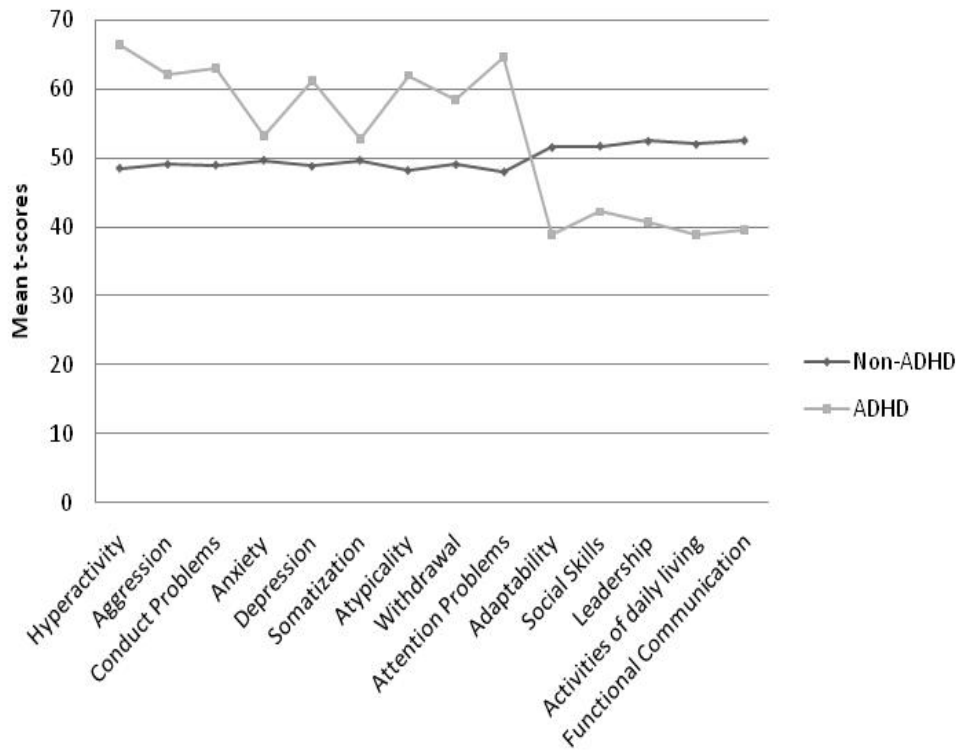
*DDA results for ADHD versus not ADHD on PRS-C
data for children*

Variable	<u>Coefficients</u>	
	Function	Structure
Hyperactivity	.488	.855
Attention problems	.419	.833
Atypicality	.190	.696
Conduct Problems	.051	.644
Functional Communication	-.016	-.634
Activities of Daily Living	.061	-.622
Aggression	-.045	.612
Depression	.140	.591
Adaptability	-.028	-.591
Leadership	-.109	-.558
Social Skills	.191	-.436
Withdrawal	.225	.433
Anxiety	-.151	.160
Somatization	-.187	.141

Group T-score means. Group means are graphically displayed in Figure 3.3. Means for the group of students without ADHD were within the average range for the all scales. Group means on the clinical scales for the ADHD group in the at-risk range were two primary symptoms, hyperactivity, attention problems, symptoms of two comorbid conditions, conduct problems and depression, and two indicators of functional impairment, atypicality and aggression. On the adaptive scales, the means of the ADHD group were in the at-risk range on indicators of functional impairment (functional communication, activities of daily living, and adaptability).

Figure 3.3

PRS-C group means for the target and comparison groups



Test of item level mean differences (ANOVA). Table 3.16 provides a list of items with effect sizes of eleven percent or greater on the PRS-C. Effect sizes greater than fourteen percent were found between the target and comparison groups on five items from the hyperactivity subscale, three items from the attention problems, and one item from the activities of daily living subscales. Items from the hyperactivity subscale are "acts of out control"

($\eta^2 = 18\%$), "has poor self control" ($\eta^2 = 18\%$), "is unable to slow down" ($\eta^2 = 15\%$), "acts without thinking" ($\eta^2 = 15\%$), and "is overly active" ($\eta^2 = 15\%$). Items from the attention problems subscale are "has a short attention span" ($\eta^2 = 27\%$), "is easily distracted" ($\eta^2 = 21\%$), and "pays attention" ($\eta^2 = 14\%$). The item from the activities of daily living subscale is "has trouble following regular routines" ($\eta^2 = 16\%$).

Effect sizes between eleven percent and thirteen percent were found between target and comparison groups on eleven items from seven BASC-2 subscales, three items from the attention problems subscale, two items from the conduct problems subscale, two items from the withdrawal subscale, and one item from the aggression, depression, and hyperactivity subscales

Sixty two items on eleven subscales (excluding somatization, anxiety, and attention problems) and one critical item were found with effect sizes between six and ten percent. A majority of those items originated in the depression (10 items), atypicality (9 items), functional communication (8 items), aggression (7 items), and activities of daily living (3 items) subscales.

Table 3.16

Items that differentiate between the target and comparison groups on the PRS-C

Item	SS	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.64	0.70	2.05	0.86	0.27
Is easily distracted.	ATN	1.05	0.74	2.28	0.75	0.21
Acts out of control.	HYP	0.33	0.53	1.19	0.84	0.18
Has poor self-control.	HYP	0.5	0.63	1.49	0.93	0.18
Has trouble following regular routines.	ADL	0.25	0.48	1.00	0.86	0.16
Is unable to slow down.	HYP	0.53	0.66	1.48	0.92	0.15
Acts without thinking.	HYP	0.89	0.59	1.72	0.81	0.15
Is overly active.	HYP	0.66	0.77	1.73	0.99	0.15
Pays attention.	ATN	2.20	0.75	1.23	0.61	0.14
Is easily upset.	DEP	0.77	0.64	1.60	0.89	0.13
Loses temper too easily.	AGG	0.60	0.69	1.49	0.98	0.13
Pays attention when being spoken to.	ATN	2.29	0.72	1.41	0.72	0.12
Seems out of touch with reality.	ATP	0.09	0.33	0.55	0.70	0.12
Disrupts other children's activities.	HYP	0.40	0.54	1.08	0.79	0.12
Breaks the rules.	CND	0.72	0.54	1.39	0.74	0.12
Listens to directions.	ATN	2.26	0.75	1.40	0.63	0.12
Has trouble making new friends	WDL	0.28	0.50	0.92	0.90	0.11
Disobeys.	CND	0.89	0.51	1.49	0.71	0.11
Makes friends easily.	WDL	2.41	0.74	1.55	0.95	0.11
Listens carefully.	ATN	1.90	0.77	1.04	0.63	0.11

Effect sizes between one and five percent were found between the ADHD and the group without ADHD on fifty seven items from all but two subscales, attention and conduct problems. Along with ten critical items, seven items from anxiety, five items from the withdrawal, somatization, and social skills subscales comprise a majority of these items. Effect sizes less than one percent were found between the target and comparison groups on four critical items, seven anxiety, seven somatization, and three withdrawal items.

Discrimination of Adolescent Behavior

The following results are derived from comparison of group means to the levels of clinical significance as established by Reynolds and Kamphaus (2004), DDA, and item level ANOVA's and answer the fourth research question, "Are behaviors that discriminate adolescents with ADHD from those without ADHD as rated by parents (1) primary symptoms of ADHD, or (2) related to the symptoms of comorbid conditions, or (3) functional impairment, or (4) a combination of the three?"

Table 3.17

Descriptive statistics for 14 scales for PRS-A

Group/Variable	<u>Not ADHD</u>		<u>ADHD</u>		<u>Total</u>	
	m	SD	m	SD	m	SD
Hyperactivity	48.37	8.44	63.95	13.61	50.61	10.84
Aggression	48.97	9.03	59.21	13.83	50.45	10.49
Conduct problems	48.51	8.67	59.82	14.53	50.14	10.51
Anxiety	49.60	9.69	53.80	11.39	50.21	10.06
Depression	48.92	9.21	58.90	14.06	50.36	10.64
Somatization	49.42	9.40	51.79	10.84	49.76	9.65
Atypicality	48.60	8.75	57.23	13.38	49.84	10.02
Withdrawal	48.61	9.11	56.35	12.41	49.73	10.02
Attention problems	47.32	8.90	63.20	8.75	49.61	10.49
Adaptability	51.70	9.28	40.75	11.00	50.12	10.29
Social Skills	51.22	9.78	44.20	10.41	50.21	10.17
Leadership	52.01	9.36	42.56	9.42	50.64	9.94
Activities of daily living	51.95	9.00	38.87	10.78	50.06	10.35
Functional Communication	52.42	8.83	40.95	9.85	50.76	9.84

Descriptive discriminant analysis. Group means and standard deviations are presented in Table 3.17. Results of the DDA indicate the primary symptoms, attention problems (.853, .677) and hyperactivity (.795, .579), functional communication(-.610, .067) and adaptability (-.548, -.021), measures of functional impairment conduct problems, a comorbid condition (.555, .004) and adaptability (-.548, -.021) account for a large percent of variance between the target and comparison groups, 72.76% 63.20%, 45.29%, 30.80% and 37.21% respectively. Along with depression, anxiety, and somatization, comorbid conditions, the scales that represent functional impairment (i.e., atypicality, withdrawal, and social skills) accounted for only a very small amount of variance between the two groups. Table 3.18 presents structure and factor coefficients for the parent rating of adolescent behavior.

Table 3.18

*DDA results for ADHD versus not ADHD for
PRS-A*

Variable	<u>Coefficients</u>	
	Function	Structure
Attention Problems	.677	.853
Hyperactivity	.579	.795
Activities of Daily Living	-.192	-.673
Functional Communication	.067	-.610
Conduct Problems	.004	.555
Adaptability	-.021	-.548
Aggression	-.104	.496
Leadership	-.031	-.481
Depression	.048	.474
Atypicality	-.109	.431
Withdrawal	.265	.383
Social Skills	.393	-.340
Anxiety	-.106	.201
Somatization	-.224	.118

Group T-score means. Group means are presented in Table 3.17 and are graphically displayed in Figure 3.4. Means for the group of adolescents without ADHD were within the average range for the all scales. For adolescents with ADHD, the two primary symptoms, hyperactivity and attention problems, one comorbid condition, depression, and two indicators of functional impairment, aggression, and atypicality were in the at-risk range. Adaptive scales were in the low average range.

Test of item level mean differences. Items with effect sizes of eleven percent or greater on the TRS-A are listed in Table 3.19. Appendix H lists all items with effect sizes between groups. Effect sizes greater than fourteen percent were found between the target and comparison groups on three items from the hyperactivity subscale, three items from the attention problems, and one item from the activities of daily living subscales. Items from the hyperactivity subscale are "acts without thinking" ($\eta^2 = 19\%$), "has poor self control" ($\eta^2 = 21\%$), and "acts out of control" ($\eta^2 = 16\%$). Items from the attention problems scale are "has a short attention span" ($\eta^2 = 36\%$), "is easily distracted" ($\eta^2 = 25\%$), and "pays attention" ($\eta^2 = 19\%$). The item from the activities of daily living

subscale is "needs to be reminded to brush teeth" ($\eta^2 = 14\%$).

Figure 3.4

PRS-A group means for the target and comparison groups

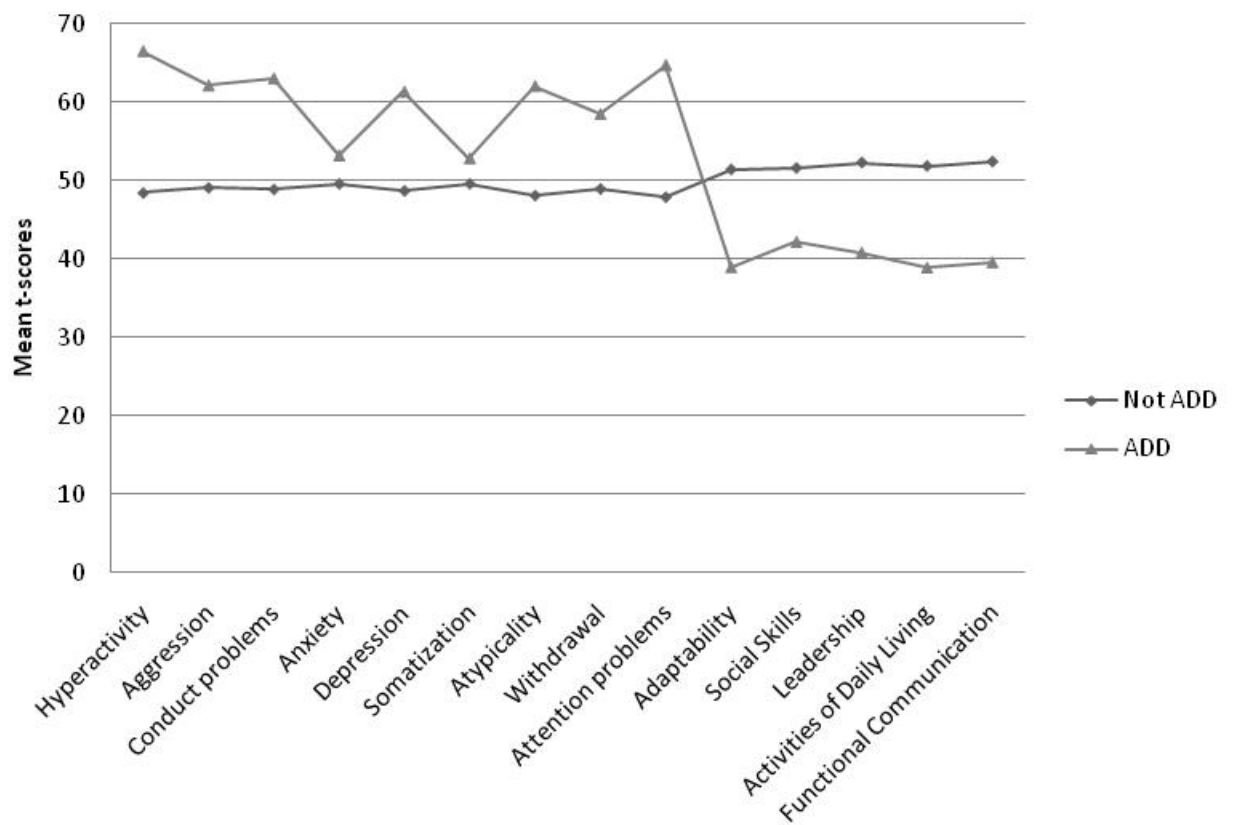


Table 3.19

Items that differentiate between the target and comparison groups on the PRS-A

Item	SS	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.5	0.69	1.44	0.9	0.16
Has poor self-control.	HYP	0.26	0.56	1.06	0.97	0.16
Has reading problems.	LRN	0.27	0.57	1.09	1.01	0.16
Is easily distracted.	ATN	0.57	0.76	1.53	0.92	0.15
Threatens to hurt others.	AGG	0.07	0.28	0.47	0.67	0.13
Acts without thinking.	HYP	0.46	0.64	1.22	0.88	0.13
Disobeys.	CND	0.28	0.53	0.9	0.83	0.12
Has spelling problems.	LRN	0.51	0.70	1.28	0.97	0.11
Disrupts the schoolwork of other children.	HYP	0.35	0.61	1.03	0.90	0.11
Acts out of control.	HYP	0.13	0.41	0.63	0.80	0.11
Defies teachers.	AGG	0.2	0.47	0.75	0.80	0.11
Disrupts other adolescents' activities.	HYP	0.35	0.60	1.02	0.91	0.11
Lies.	CND	0.24	0.50	0.81	0.81	0.11
Has difficulty explaining rules of games to others.	FUN	0.35	0.56	0.98	0.88	0.11
Is easily upset.	DEP	0.35	0.59	1.01	0.90	0.11
Annoys others on purpose.	AGG	0.31	0.59	0.97	0.92	0.11
Interrupts others when they are speaking.	HYP	0.33	0.58	0.97	0.88	0.11
Is well organized.	STD	1.81	0.94	0.88	0.79	0.11
Has problems with mathematics.	LRN	0.56	0.70	1.31	0.91	0.11

Effect sizes between eleven and thirteen percent were found on eight items from four subscales. Three items from the functional communication subscale, two items from the attention problems, two items from the hyperactivity, and one item from the aggression subscale.

Forty seven items on eleven subscales (excluding social skills, anxiety, and somatization) were found with effect sizes between six and ten percent. A majority of those items were from the conduct problems (10 items), adaptability (7 items), functional communication (6 items), activities of daily living (5 items), and leadership (5 items) subscales.

Effect sizes between one and five percent were found between the ADHD and the group without ADHD on sixty eight items from all subscales and critical items. Along with seven critical items, ten items from the anxiety, eight items from social skills, nine items from depression, seven items from aggression, five items from leadership skills, and five items from atypicality subscales comprise a majority of these items. Effect sizes below one percent between the target and comparison groups on six critical items, seven somatization items, two anxiety, two

atypicality, two conduct problems, and one withdrawal item exist.

Discussion

The purpose of this study is to answer three empirical questions through descriptive discriminant analyses (DDA), comparison of group means to levels of significance established by Reynolds and Kamphaus (2004), and item level ANOVAs. The goal was to evaluate whether behaviors discriminate children and adolescents with ADHD from those without in three behavioral categories (primary symptoms, symptoms of comorbid conditions, and/or indicators of functional impairment) across key developmental stages and as rated by parents and teachers. Results indicate that all three categories differentiate between the groups. However, differences were found among the three categories as rated by parents and teachers and across key developmental stages.

Parents and Teachers as Raters

Primary Symptoms

As would be expected, primary symptoms explained a large amount of variance across scales. However, both were only the strongest discriminators on parent ratings of children and adolescents. The strength of discrimination

for parent ratings of children is reflected in Table 3.12 with a structure coefficient of .855, function coefficient of .488 for hyperactivity, a structure coefficient of .833, and a function coefficient of .419 for attention problems. The strength of discrimination the primary symptoms as rated by parents for adolescents is reflected in Table 3.14 with structure coefficients of .853 and .795 and function coefficients of .677 and .579 for attention problems and hyperactivity respectively. The difference appears to be in the functional impairments created by hyperactivity and attention problems in the home and school setting.

Learning problems, as can be seen in Table 3.8, and atypicality, as reflected in Table 3.10, were the strongest discriminators for teacher ratings of adolescents and children with structure coefficients of .849 and .800 and function coefficients of .400 and .439 respectively. Thus, the functional impairment created by the primary symptoms discriminated stronger in schools than in homes. Parents did not rate children on learning problems so it is difficult to say whether this finding would be different if parents were given the opportunity to rate learning problems. Both, on the other hand, rated atypicality. One

explanation for this difference could be the opportunity for comparison to same age peers. Teachers have a school filled with peers for comparison and thus the differences might be more evident. This suggestion is supported by a line of research that questions the DSM-IV requirement for symptoms to be evident across two or more settings (American Psychiatric Association, 1994).

Symptoms of Comorbid Conditions

Depression was a discriminator for teacher ratings of adolescents as reported in Table 3.10 with a structure coefficient of .673 and function coefficient of .094, but not for parent ratings with a structure coefficient of .474 and function coefficient of .048 reflected in Table 3.13. A connection between the increase in learning problems for adolescents and the impact of functional impairment in this environment might increase depression in adolescents that is only visible in the learning environment. Recent research by Evans and colleagues in middle schools supports this relationship. Findings from those studies indicate that as children enter middle school the behavioral expectations are contrary to the primary symptoms.

Functional Impairment

Withdrawal was a discriminator for adolescents as rated by teachers only as can be seen in Table 3.10 with a structure coefficient of .591 and function coefficient of .335 compared to parent ratings of adolescents with a structure coefficient of .383 and function coefficient of .265. A connection might be made for withdrawal in the secondary school environment with symptoms of depression. Withdrawal in the academic environment might be related to depression as depression was a stronger discriminator for children and adolescents as rated by teachers than parents as is reflected in Tables 3.10, 3.8, 3.12, and 3.14 with structure coefficients of .642, .591, .433, and .383 and function coefficients of .150, .335, .225 and .265 respectively.

Two overall impressions are noteworthy. First, Tables 3.8, 3.10, 3.12, and 3.14 illustrated that teacher ratings indicate more discriminators of ADHD than parent ratings. This might be a reflection of prior research indicating that teacher ratings are a more precise match between rating scales and observation of child behavior (Luitjohan, 2005). Alternatively, it might simply imply that ADHD is more visible in the academic environment.

Second, teachers rated internalizing behaviors (depression and withdrawal) as stronger discriminators between groups than parents and parents rated externalizing behaviors (aggression and conduct problems) as stronger discriminators than teachers.

Key Developmental Stages

Primary Symptoms

The primary symptoms were amongst the top three discriminators across developmental stages as can be seen in Tables 3.12 and 3.14. As mentioned earlier, teachers rate atypicality with a structure coefficient of .849 and function coefficient of .400 as the strongest discriminator for children and learning problems for adolescents with a structure coefficient of .800 and function coefficient of .439, above hyperactivity and attention problems with structure coefficients of .755, .769, .768 and .748 and function coefficients of .277, .227, -.049, and .615 as reflected in Tables 3.8 and 3.10 respectively. A discussion of each follows as symptoms of comorbid conditions and functional impairment.

Symptoms of Comorbid Conditions

Learning problems. Learning problems explained more variance with a structure coefficient of .800 and function

coefficient of .439 than any other subscale for adolescents (64%) followed by hyperactivity (structure coefficient = .615, pattern coefficient = .779) and attention problems (.748, -.049). Contradictorily, learning problems explained only 40.58% of the variance between groups on teacher ratings of child behavior with a structure coefficient of .637 and function coefficient of -.098. This finding supports prior research that indicates that hyperactivity discriminates strongly between adolescents with ADHD and their same age peers without ADHD (Langberg et al., 2008). Results here support prior research that indicates that academic problems become more intense and evident as children move into adolescence and enroll in middle schools (Evans et al., 2005a).

To hypothesize whether learning problems creating this variance were a result of comorbid learning disabilities or a functional impairment due to the symptoms of ADHD, item level ANOVAs were consulted. Items representing learning disabilities such as "has reading problems" ($\eta^2 = 16\%$), "has problems with mathematics" ($\eta^2 = 11\%$), and "has spelling problems" ($\eta^2 = 11\%$) had larger effects than items representing functional impairment such as "does not complete tests" ($\eta^2 = 5\%$) and "complains that lessons go to

fast" ($\eta^2 = 3\%$). This finding provides preliminary support to prior research indicating that eight to thirty nine percent of adolescents with ADHD have comorbid learning disabilities in the areas of reading and math (Semrud-Clikeman et al., 1992). Additional support is provided for prior research suggesting that adolescents with ADHD experience more academic failure and difficulties than those without ADHD on items such as "gets failing grades in school" ($\eta^2 = 7\%$) and "has trouble keeping up in class" ($\eta^2 = 11\%$).

Anxiety. Anxiety was not found to be a discriminator between for children or adolescents as rated by teachers or parents as can be seen in Tables 3.8, 3.10, 3.12, and 3.14 with structure coefficients of .314, .160, .396, and .201 and function coefficients of .006, .160, -.110, and -.106 respectively. A large quantity of prior research suggests that children and adolescents experience behaviors associated with anxiety and/or comorbid anxiety disorders (American Academy of Pediatrics, 2000; Tannock, 2000). Behaviors associated with anxiety were consistent across teachers and parents as raters of children and adolescents to have minimal to no mean differences.

Depression. Depression was a discriminator between teacher and parent ratings of children with structure coefficients of .705 and .592, and teacher ratings of adolescents with a structure coefficient of .673 and function coefficients of .131, .140, and .094 respectively but not parent ratings of adolescents with a structure coefficients of .474 and function coefficient of .048.

Functional Impairment

Activities of daily living. Noteworthy, while activities of daily living discriminated strongly for between groups as rated by parents for children and adolescents as reflected in Tables 3.12 and 3.14 with structure coefficients of $-.622$ and $-.673$ and function coefficients of .061 and $-.192$ respectively, it ranked third only to the primary symptoms for parent ratings of adolescents. Behaviors associated with activities of daily living are related to acting in a safe manner, performing simple daily tasks, and organizing ideas (Kamphaus, 2003). The Activities of Daily Living subscale was a new addition to the BASC in the second edition. This subscale provides further diagnostic information for adaptive behavior deficits often found in children and adolescents with lower levels of cognitive functioning (Reynolds & Kamphaus,

2004). In addition, findings here provide support for the items from the activities of daily living subscale as behaviors that are closely associated with ADHD from a parent's rating.

Atypicality. Atypicality explained most of the variance for teacher ratings of children followed by attention problems and hyperactivity as can be seen in Table 3.8 with structure coefficients of .849, .768, and .755 and function coefficients of .400, .227, and .277 respectively. This finding supports prior research as Schwean, Burt, and Saklofske (1999) found that atypicality can be associated with disruptive-behavior disorders and Reynolds and Kamphaus (2004) stated, "it is sometimes appropriate to interpret an elevated atypicality score as simply another indicator of hyperactive and impulsive behaviors" (p. 62).

However, atypicality as the strongest discriminator of ADHD in this population was not expected. Generally, atypicality is associated with developmental delays. In fact, Reynolds and Kamphaus (2004) provide validation evidence suggesting that these scales represent immaturity or developmental delays found in children with lower cognitive function or autism spectrum disorders. Findings

provide preliminary support for recent studies investigating the comorbidity of developmental delays and autism spectrum disorders as comorbid conditions with ADHD (Goldstein & Schwebach, 2004).

Social skills. Social skills were not found to be discriminators of either children or adolescents rated by teachers or parents with structure coefficients of $-.502$, $-.449$, $-.436$, and $-.340$ and function coefficients of $.076$, $.100$, $.191$, and $.393$ as reflected in Tables 3.8, 3.10, 3.12, and 3.14 respectively. While prior research indicates that some children and adolescents with ADHD have deficits in social skills (Klimkeit et al., 2006; Kolko et al., 1990); social skills is not found to be a discriminator of ADHD for children and adolescents across parents and teachers as raters. A distinction should be made here between social skills deficits and social skills performance. Research suggests that children and adolescents with ADHD have knowledge of social skills, but a deficit in performance by applying skills learned to social and academic environments (DuPaul & Stoner, 1994).

Withdrawal. Withdrawal only explained the variance between teacher ratings of children with ADHD from those without with a structure coefficient of $.642$ and function

coefficient of .150 as can be seen in Table 3.8.

Withdrawal did not discriminate between adolescents with ADHD and those without either rated by parents or teachers. This finding is consistent with the primary symptoms of ADHD-Primarily Inattentive. Children with only symptoms of inattention might appear withdrawn in the classroom when simply not paying attention.

Implications

Implications for Practitioners

First, findings from the present study will assist practitioners in selecting interventions to address all behavioral difficulties within the behavioral categories described here. While a detailed discussion of intervention is beyond the scope of this manuscript, behavioral and academic interventions and accommodations are needed to address behaviors associated with attention problems, hyperactivity, and learning problems across all developmental stages. Early prevention and intervention strategies are recommended as learning problems appear to become more intense in middle and high school. Evidence based interventions are well established in the literature to address attention problems, hyperactivity, and learning problems. Specific discussions of school difficulties and

interventions can be found in Abramowitz and O'Leary (1991), DuPaul and Eckert (1997), DuPaul and Stoner (1994), Goldstein (1994), Jitendra, DuPaul, Someki, and Tresco (2008), and Pfiffner (1996).

Behaviors across settings emphasizes both parent and teacher perceptions within the context of intervention. Parent understanding of behaviors associated with primary symptoms, symptoms of comorbid conditions, and measures of functional impairment can be increased by books written specifically for them (e.g., Barkley, 1995; Robin, 1990; Robin & Patterson, 1994).

Next, as atypicality was found to be a strong discriminator of children with ADHD, practitioners and teachers should pay close attention to behaviors associated with atypicality. In addition, multiple assessment procedures are recommended in the future to differentiate ADHD from other disorders more commonly associated with atypicality.

Finally, caution should be given to implementing social skills interventions in isolation for children and adolescents with ADHD. As a noteworthy difference was not found between children and adolescents with ADHD and those

without, providing unnecessary social skills interventions might not be an efficient use of instructional time.

Implications for Researchers in the Field

This study established evidence of need for additional research in several areas. First, factor analytical studies are needed to establish dimensions within the group of items found to discriminate the target and comparison groups. Understanding the structure within those items might provide additional information needed for assessment. Second, empirical evidence is needed to determine the degree to which behaviors associated with activities of daily living, atypicality, and anxiety impact children and adolescents with ADHD. Third, additional research is needed to understand the impact or implications of gender and ethnicity within these results.

Fourth, while factor analytic studies are available that examine the dimensionality of the DSM-IV (American Psychiatric Association, 1994) criteria for ADHD (e.g., Anderson, Williams, McGee, & Silva, 1987) the field has only looked at attention and hyperactivity. This study moves beyond the validity of primary symptoms. Results here indicate that behaviors associated with symptoms of comorbid conditions and measures of functional impairment

discriminate children and adolescents with ADHD, as well as, and in some cases better than (e.g., atypicality and learning problems) the primary symptoms. Replication of these findings is strongly encouraged. As a field, we might need to continue to evaluate the true "primary symptoms."

Conclusion

Four research questions were answered with data from a multidimensional broadband rating of child and adolescent behavior. Empirical evidence is provided that behaviors that best discriminate children and adolescents with ADHD from those without related are related to the primary DSM-IV (American Psychiatric Association, 1994) symptoms of ADHD, the symptoms of comorbid conditions, and functional impairment. Findings indicate that a multidimensional view may be needed for diagnosing ADHD and selecting evidence based interventions based on the diagnosis. Additional behaviors that discriminate children and adolescents with ADHD from those without were related to all behavioral categories. Primary symptoms explained some of the largest amounts of variance, but not all. Conceptualizing and assessing behaviors demonstrated by children and adolescents with ADHD as a whole instead of only equating a

diagnosis of ADHD to hyperactivity, inattention, and impulsivity will establish a foundation for understanding, interpreting and addressing students' academic and behavioral needs across the home and school.

CHAPTER IV

READING AND UNDERSTANDING THE EVIDENCE OF EFFECTIVE
INTERVENTIONS FOR STUDENTS WITH ATTENTION DEFICIT DISORDER:
THE RELEVANCE AND MEANING OF THE STATISTICAL SIGNIFICANCE
CONTROVERSY

Criticism of statistical significance testing appeared in the nineteenth hundreds (e.g., Bakan, 1966; Berkson, 1938; Rozeboom, 1960) and has been at the center of controversy within the social sciences with increasing intensity in the last fifteen years (Thompson, 2007). The disagreement among researchers regarding the use of statistical significance tests ranges from some who believe statistical significance testing should be banned from use by social scientists (e.g., Carver, 1978; Schmidt, 1996; Schmidt & Hunter, 1997; Rozeboom, 1997) to others who assert it is necessary (e.g., Meehl, 1997). Numerous positions have been articulated in the literature, primarily with defenders of the use of null hypothesis statistical significance testing (NHSST) responding to the views of the antagonists. As Levin (1998) noted, "The prosecution prosecutes the accused, and then the defense defends" (p. 43). However, the debate is heavily weighted on the antagonist side. Most either advocate for discontinuing

the use of NHSST, or using it as one step in the process or only under certain conditions (Fidler & Cumming, 2007).

Critics who claim statistical significance tests have no place and should be banned (e.g., Carver, 1978; Schmidt, 1996; Schmidt & Hunter, 1997; Rozeboom, 1997) express this opinion with strong language. For instance, Rozeboom (1997) stated "Null hypothesis significance testing is surely the most bone headed misguided procedure ever institutionalized in the rote training of science students" (p. 335). Schmidt and Hunter (1997) boldly state, "statistical significance testing retards the growth of scientific knowledge" (p. 38). A favorite of this author, Deming (1975) implied that the reason students have problems in understanding hypothesis tests is that they may be trying to think. Others criticize NHSST without vehement demands to ban them, but instead take a "middle-of-the-road position" (Knapp, 1998) in which statistical significance testing has a place in research (e.g., Cortina & Dunlap, 1997; Frick, 1996; Knapp, 1998). Others simply claim that the attempt to rid social science research of NHSST is futile or at least going to take a long-term effort. For instance, Nix and Barnette (1998) wrote, "as in all areas of endeavor, change is often difficult to

accept, especially movement away from a phenomenon that has become an integral part of the work of so many people for so many years" (p.7).

The American Psychological Association (APA) has taken several steps to address issues raised by both sides. First, the APA "encouraged" the reporting of effect sizes in 1994 in the fourth edition of the publication manual. Next, in 1996, the APA formed a task force to investigate the possibility of banning statistical significance testing (Thompson, 2007; Wilkinson & the Task Force on Statistical Inference, 1999). Several recommendations were made in the report from Wilkinson and the Task Force on Statistical Inference (1999); however, the recommendations fell short of banning the use of NHSST. Finally, the fifth edition of the APA Publication Manual (2001) included the following statement: "It is almost always necessary to include some index of effect size or strength of relationship in your results section" (p. 25-26). However, NHSST continues to be the prevailing means of interpreting data in social science research (Vacha-Haase & Thompson, 2004).

In an age when the use of evidence-based practice (EBP) in education is mandated by law (i.e., No Child Left Behind, 2002; Individuals with Disabilities Education

Improvement Act, 2004), it is essential that educators read and interpret research. Currently, a gap between research and practice is acknowledged in the literature (Lewis, Hudson, Richter, & Johnson, 2004; Walker et al., 1998) with one potential reason cited as a distrust of research by educators (Greenwood & Abbott, 2001; Landrum et al., 2002). One factor maintaining this mistrust might be a lack of understanding increasing the stakes implied by the statistical significance controversy. Reviewing the literature to select evidence-based interventions for students with ADHD might illustrate the difficulties faced by professionals when attempting to read and interpret research to select evidence-based interventions.

Attention Deficit Hyperactivity Disorder

Educators selecting evidence-based interventions for students with ADHD are often interested in interventions with known effectiveness for increasing academic performance. The core symptoms of ADHD are chronic inattention, impulsivity, and hyperactivity (American Psychiatric Association, 2000; Reif, 2005). In schools, this often translates to interference with academic achievement (i.e., as measured by grades and criterion related achievement tests) and performance (Atkins &

Pelham, 1991; Raggi & Chronis, 2006). As found in the study in Chapter III, learning problems was the strongest discriminator between adolescents with ADHD and those without.

ADHD affects three to five percent of school age children in the United States (American Psychiatric Association, 1994; Barkley, 1998; Carbone, 2001). In fact, children with ADHD have a host of academic difficulties (Semrud-Clikeman et al., 1992) impacting school success on a continuum of intensity, from unremitting aggravation and underachievement to a debilitating impact on daily functioning (Atkins & Pelham, 1991; Barkley, 1998; Brown, 2000; Zentall, 2005). Behavioral manifestations of ADHD are visible in academic task related activities (Atkins & Pelham, 1991; Frederick & Olmi, 1994; Semrud-Clikeman et al., 1992; Hechtman et al., 2004). This population of students exhibits academic underachievement (Barkley, 1998; DuPaul & Stoner, 2003), failing report card grades (Barkley, 1998; DuPaul & Stoner, 2003) and higher rates of grade retention than typically developing peers (Barkley et al., 1990b). In fact, studies have found that thirty percent of students with ADHD drop out of high school (Barkley et al., 1990b). Barkley (1998) stated that the

deficit in academic performance is the most common reason for referral for treatment of students with ADHD to mental health professionals.

Reporting results only as statistically significant or nonsignificant in studies investigating effective interventions for students with ADHD to increase academic performance might be contributing to contradictory and controversial results found in the literature. According to the American Academy of Pediatrics (2001), behavioral treatments, psychostimulant medication, and a combination of the two are the most widely accepted treatments. Pelham and Gnagy (1999) contend "simply medicating children, without teaching them the skills they need to improve their behavior and performance, is not likely to improve the children's long term prognosis" (p. 226). Contradictorily, Hechtman et al. (2004) found that "in the absence of learning disorders, there appears to be no benefit for once-weekly individual academic intervention in children with ADHD who receive optimally titrated stimulant treatment" (p. 817).

DuPaul and Weyandt (2006) state "The most effective treatment for ADHD involves a multimodal approach including psychostimulant medication and behavioral strategies that

are implemented in multiple settings (p. 353).” However, the original report of the largest documented study with children with ADHD, the National Institute of Mental Health Collaborative Multisite Multimodal Treatment Study of Children with Attention-Deficit/Hyperactivity Disorder (MTA, 1999), found that combining psychostimulant medication with behavioral therapy was not superior to medication alone for reducing the core symptoms of ADHD. The MTA (1999) did find that lower doses of medication were sufficient when psychosocial treatment was included. Combining the scores from the original 19 primary outcome measures of the MTA, Conners et al. (2001) completed further analyses to determine effect sizes and found that a combination of medication management and behavioral interventions was superior to medication management alone with a small effect size of .28 and a large effect size of .70 when compared to the community comparison group. In the original analysis (MTA, 1999) investigating statistical significance with 17 outcome measures, no statistically significant advantage was found for using combined treatment.

In addition to possibly contributing to contradictory research results, the statistical significance controversy

may very well be contributing to the research to practice gap. Two commonly mentioned factors contributing to this gap are a lack of trust and understanding of published research and researchers by educators (Landrum et al., 2002). Reporting results only as statistically significant would seem to confound this issue.

The purpose of this paper is to summarize the various views of statistical significance testing and review methods of reporting research results for evidence-based interventions found to increase academic performance for children with ADHD. First, criticisms of NHSST will be presented, followed by the views of those who assert that NHSST has a place in research, and finally results of a comprehensive literature review regarding methods of reporting results in the research for evidence-based interventions targeted at increasing academic performance for children with ADHD.

The Statistical Significance Controversy

Disagreements in the literature regarding the use of NHSST seem to begin first with criticisms and then are followed by rejoinders. While multiple criticisms of NHSST exist, most fall within the four categories that will be discussed here. Interestingly, many proponents of the

continued use of NHSST mention few strengths but simply respond to criticisms. Further, some actually agree with several points made by the critics. However, a belief that NHSST is necessary and should not be banned is prevalent within this group.

Criticisms of NHSST

First, critics contend that NHSST does not tell us what we really want to know (Carver 1993; Cohen, 1994) and argue that both researchers and research consumers often misunderstand the logic. Second, critics argue that the null hypothesis can always be rejected (Falk & Greenbaum, 1995; Thompson, 1998). Finally, critics insist that NHSST does not imply result import and does not allow for the replication of results needed to build a substantive research base (Thompson, 1996).

NHSST Does Not Tell Us What We Want To Know

One major criticism of NHSST is that it does not tell the researcher what the researcher really wants to know (Cohen, 1994; Carver, 1993; Thompson, 1998). Many lack understanding of what tests of statistical significance actually do (Mittag & Thompson, 2000) and thus misunderstand the logic of NHSST and misinterpret p values (Bakan, 1966; Cohen, 1990, 1994; Falk & Greenbaum, 1995;

Meehl, 1967; Rozeboom, 1960; Rosenthal & Gaito, 1963; 1964; Zuckerman, Hodgins, Zuckerman, & Rosenthal, 1993). In the oft-quoted words of Cohen (1994), "it does not tell us what we want to know, and we so much want to know what we want to know, that out of desperation, we nevertheless believe that it does!" (p. 997).

What we want NHSST (or similarly $p_{\text{calculated}}$) to tell us is the probability that, given our data, the hypothesis is true (Cohen, 1994). While in reality, what it tells us is the probability of our results given the hypothesis is true in the population (Cohen, 1994; Gall et al., 2003). In other words, NHSST is not efficient for estimating the probability that the claim is correct or the probability of something occurring in the world (Bakan, 1966; Cohen, 1994; Oakes, 1986). Thompson (2006) explained that " $p_{\text{calculated}}$ estimates *the probability of the sample statistic(s) (and sample results even more extreme in their divergence from the null hypothesis than our sample results), assuming (a) the sample came from a population exactly described by the null hypothesis, and (b) given the sample size*" (p. 179, italics in original).

The Null Hypothesis Can Almost Always Be Rejected

Most agree that given a large enough sample, the null hypothesis will be rejected (Bakan, 1966; Falk & Greenbaum, 1995; Thompson, 1992, 1998). And given that, $p_{\text{calculated}}$ is impacted by sample size (Thompson, 1999), some contend that the null hypothesis is always false (Schmidt & Hunter, 1997; Cohen, 1994; Schmidt, 1996; Tukey, 1991). If sample size is large, $p_{\text{calculated}}$ is smaller and the probability of finding unlikely results increases (Thompson, 2006). In other words, given a large enough sample size with reliable assessment, the null hypothesis will almost always be rejected and all associations will be statistically significant (Thompson, 1993).

The next criticism is a continuation of this concept. Simply rejecting the null hypothesis does not imply result import. This concept is emphasized in the fourth edition of the APA manual with the comment that "neither of the 2 types of probability values produced by significance tests reflects the importance of magnitude of an effect because both depend on sample size" (APA, 1994, p. 18)

NHSST Does Not Imply Result Importance

Researchers are typically on a quest for important, noteworthy, and interesting results and often consider

rejection of a null hypothesis as an indicator of achieving this goal. One criticism of NHSST is that it does not indicate the importance of the results (Gall et al., 2003; Thompson, 1999). An overlap exists with this criticism and the point made that researchers and consumers of research often misinterpret results. Both often consider the term "significant" in the literature to mean important results with some value having been found. However, Abelson (1997a) argues that often results from "gratuitous significance testing, giving no useful information" (p.12) are reported and misinterpreted as important and containing value. The term "statistical significance" is not synonymous with significant as commonly understood (Thompson, 1996). Meehl (1997) advises against the use of the term "significant" when referring to statistically significant results contending this practice is "cancerous" and "misleading."

The importance of results is impacted by the values of the researcher among many other variables. Thompson (1993) stressed this by writing, "if the computer package did not ask you your values prior to its analysis, it could not have considered your value system in calculating p 's and so p 's cannot be blithely used to infer the value of research

results" (p. 365). Harlow, Muliak, and Steiger (1997), argue against the rote use of NHSST without the use of "mindful judgment" (p. 3). McLean and Ernest (1998) stressed that science is always subjective. For instance, Thompson (1993) commented that researchers often support the importance of results with the "universally and thoughtlessly" accepted reasoning that $p < .05$ (Thompson, 1993, p.610).

Replicability Cannot Be Determined Using NHSST

The final criticism to be discussed here is the inability of result replication with the use of statistical significance testing (Thompson, 1999, 2006). For example, Thompson (1992) stresses that NHSST "has created considerable damage as regards the cumulation of knowledge" (p. 436). Without replication, scientific theories and laws have no basis. According to Kehle, Bray, Chafouleas, and Kawano (2007), "science is built upon replication and extension, allowing for the accumulation and evolvement of knowledge and its application" (p. 419), and Thompson, (2006), tells us "science is the business of discovering laws (relationships) about effects that occur (and reoccur) under stated conditions" (p. 252). Comparing results across the literature, often referred to as meta-analytical

thinking, is one way of determining result replicability (Thompson, 2006).

Because statistical significance tests “do not evaluate the probability that sample results describe the population” (Thompson, 2002, p. 65), the ability to compare results across the literature cannot be done effectively or efficiently when results are only reported as $p < .05$ or as dichotomous decisions to reject or not reject the null hypothesis (Carver, 1978; Kehle et al., 2007; Thompson, 1993, 1996; Nix & Barnette, 1998). Doing so will result in conflicting reports of findings of association between variables (Altman, 2004). Falk (1998) explains this as an extension of the criticism made by Cohen (1994) that NHSST does not tell us what we want to know, because p values do not test the probability that results occur in the population and thus do not address replicability.

Proponents View of NHSST

The proponents' view of NHSST in the literature is primarily reported as a defense to the criticisms and founded on four issues with most taking a middle-of -the-road stance. First, the claim is that NHSST is appropriate for some specific purposes. Second, the contention is that research in the social sciences requires a dichotomous or

categorical decision and that statistical significance testing is needed for this purpose. Third, proponents believe that research should be objective, an almost polar perspective from that of critics. Finally, criticisms regarding the misinterpretation are not a reason to ban the use of statistical significance testing. In addition, the use of NHSST as a supplement to result interpretation is emphasized.

NHSST Has a Proper Time and Place

Proponents argue that NHSST is useful for certain purposes (Cortina & Dunlap, 1997; Chow, 1998; Frick, 1996; McLean & Ernest, 1998; Meehl, 1997; Muliak, Raju, & Harshman, 1997) and is needed for theory corroboration (Chow, 1998; Frick, 1996; Muliak et al., 1997). In this situation, no prior knowledge or theory drives the research expectations and the null hypothesis of no-effect or no-correlation is being evaluated (Muliak et al., 1997). Statistical significance tests are used to "provisionally distinguish results due to chance variation from results that represent systematic effect in data available to us" (Muliak et al., 1997, p. 81). Cortina and Dunlap (1997) explain that through the use of statistical significance testing in theory corroboration research, confidence is

increased that alternative hypotheses, such as sampling error as a viable explanation of the study results, are ruled out. Basically, NHSST is proposed to be a screening device or a gatekeeper (Levin, 1998; Onwuegbuzie & Levin, 2003) to determine if an association or effect exists prior to further research.

NHSST Is Useful for Needed Dichotomous Decisions or Categorical Statements

Both proponents and critics agree that only a dichotomous decision of reject or do not reject is made when using NHSST (Abelson, 1997a; Gall et al., 2003). Abelson (1997b) claims, "it is necessary to have a 'lore' of a two-valued categorical statement" (p. 124).

Frick (1996) defends the need for NHSST with the claim that scientific inquiry in psychology is best performed with a goal of discovering dichotomous relationships. The comparison of ordinal (i.e., "one that does not specify the size of effect" or "a claim that specifies only the order of conditions" Frick, 1996, p. 380) and quantitative theories (i.e., "specifying the values that will be observed in the real world" (p. 381) is used to validate his point. The claim is that laws and theories are supported by ordinal theories. Statistical significance

testing is used to support these laws and theories and for the use or practical application when everything else is held constant (Frick, 1996). Further, Frick (1996) argues that directly quantifying a law (e.g., with a reported effect size) reduces the generalizability of the results.

NHSST Is Needed for Objective Decisions

Some proponents of the use of NHSST contend that science is about making objective decisions and statistical significance testing is needed for this purpose (Muliak et al., 1997). The implication appears to be that with NHSST, the researcher is not using any subjective decision-making. Cortina and Dunlap (1997) and Harris (1997) argue that the use of statistical significance tests provides an objective means to rule out hypotheses and put appropriate limits on researcher's interpretation of data.

Misuse and Misinterpretation Is Not a Reason to Ban

The contention here is that misinterpretation or misuse of NHSST is the fault of the researcher, not of the statistical test (Hagen, 1997). When presented with the question of whether to ban or not ban NHSST, opponents often respond with comments such as McLean and Ernest's (1998) "misconceptions are a function of the researcher and not the test statistic" (p. 19); or, Abelson (1997a)

"misunderstandings are not unique to statistical significance" (p. 13). Muliak et al., (1997) argue that testing hypotheses not effectively evaluated through the use of NHSST is the fault of the researcher and not the test. In addition, proponents exclaim that researchers and research consumers often misinterpret the alternatives to NHSST (Knapp, 1998). Responses include the lack of sufficient power to detect an effect with recommendations to increase sample size (Frick, 1996).

NHSST Can Be Used in a Supplemental Manner

Along the same lines, those who take the middle-of-the-road often argue that NHSST should be used in conjunction with effect sizes, confidence intervals, and meta-analytical thinking. Statistical significance tests are necessary, but not sufficient (Kirk, 1996) and are often employed as the first step to determine if an effect exists (Frick, 1996). After which, an effect size is calculated and reported in conjunction with the report of statistical significance (McLean & Ernest, 1998). In other words, the null hypothesis is rejected through NHSST, then an effect size is calculated, and finally clinical significance is evaluated. Harlow et al. (1997) summed this view up, "When used with well-reasoned and specific hypotheses, and when

supplemented with other scientific input, such as effect sizes, power, and sound judgment, it can be very effective in highlighting hypotheses that are worthy of further investigation" (p. 11). In fact, the APA task force actually took this view, recommending that NHSST did not have to be abandoned but supplemented with effect size reporting, replication, and meta-analysis (Wilkinson & the Task Force on Statistical Inference, 1999; Levin, 1998).

While the debate regarding the use of statistical significance testing rages on, educators teaching students with ADHD remain responsible for selecting and implementing evidence based interventions that increase academic performance. Educators turn to the research literature to select interventions that are effective based on studies with important results that are replicated in the literature. Specifically, studies are sought that are understandable with adequate effects and not misleading. In an attempt to find intervention studies that meet these criteria as well as illustrate the difficulties created by research that only reports results as statistically significant or not a comprehensive literature review of studies with academic outcomes for students with ADHD was completed.

Literature Review Method

A comprehensive review of research was conducted. Electronic searches of data bases included ERIC, PSYCLIT, and Ebsco Host using Boolean strings for key word, abstract and title searches for the terms: hyperactivity, attention, Attention Deficit, Attention Deficit Disorder, Attention Deficit Hyperactivity Disorder, academic, academic performance, interventions, strategies, and academic achievement. Next, a hand search of journals was conducted by examining the table of contents of the following journals: *Journal of Attention Disorders*, *Journal of Applied Behavior Analysis*, *Journal of Learning Disabilities*, *Journal of Clinical Child Psychology*, *Journal of Special Education*, *School Psychology Review*, *Journal of Emotional and Behavioral Disorders*, *Journal of the American Child and Adolescent Psychiatry*, and *Journal of School Psychology*. Next, a historical search was conducted of each selected article's references. Finally, this list was cross-referenced with nine earlier reviews of intervention studies for students with ADHD (Daly, Creed, Xanthopoulos, & Brown, 2007; DuPaul & Eckert, 1997; DuPaul & Weyandt, 2006; Hoffman & DuPaul, 2000; Miranda, Jarque & Tarraga, 2006; Pelham, Wheeler, & Chronis, 1998; Purdie, Hattie, &

Carroll, 2002; Smith, Waschbusch, Willoughby, & Evans, 2000).

Inclusion Criteria

Studies were included for continued review if they met the following selection criteria:

- o Participants were reported as diagnosed with ADHD.
- o The dependent variable was academic performance.
- o Studies with psychotropic medication only as the independent variable were excluded. However, studies with medication as a component of a multimodal treatment or as a comparison group were included

Coding

Interventions with effectiveness established through group design research were reviewed and coded based on the following categories of result reporting: (a) statistical significance, (b) practical significance (i.e., effect size), (c) replicability as reporting of effect size in comparison to previous studies, and (d) clinical significance.

Studies were coded for both the reporting of statistically significant results and the language used to report the findings. While the language used to report statistical significance has been debated in the literature (e.g., Robinson & Levin, 1997; Thompson, 1996; 1997), the relevance is important for our purposes. Educators might read the term "significant" and assume that it implies the common definition, which according to Thompson (1997) has nothing to do with statistical significance.

Practitioners, as well as researchers, must be able to read and understand research studies. Therefore, studies were rated as reporting "statistically significant" results if the term was used at least once in the results section and as reporting "significant" results when only significant was reported without clarifying "statistical significance."

Studies were coded as reporting practical significance when effect sizes were reported (Thompson, 2006) in the results or discussion section of the publication and reporting replicability when comparison of the effect size was explicitly made to prior literature. Studies were also reviewed to determine if the author implied replication of statistically significant results through direct comparison to prior literature in the results or discussion section.

Clinical significance can be reported, "if and only if the research involves a dependent variable for which there are recognized diagnostic cut scores" (Thompson, 2006, p. 135). While our focus here was on studies reporting academic performance or achievement, not diagnostic criteria, as the dependent variable, studies might also investigate the intervention effect on the primary symptomology of ADHD (i.e., hyperactivity, impulsivity) and an inference could be made for clinical significance. For our purposes, studies were only reviewed and coded if diagnostic criteria were included as one of the dependent variables. Studies were only coded as reporting clinical significance when explicit reference made to clinical significance. For instance, Evans, Serpell, Schultz, and Pastor (2007), evaluating the effectiveness of the CHP, found a "change over time in inattention ratings as measured using the BASC was significantly different for the two groups, with the control group increasing over time and the treatment group decreasing (improving)" (p. 263). However, reference was never made to clinical significance. In contrast, Evans, Axelrod, and Langberg (2004), found and explicitly reported clinically significant results for the CHP: "overall, parents reported clinically significant

change ($RC > 1.96$) on 38% of their opportunities to do so and teachers reported clinically significant change on 52% of their opportunities to do so" (p. 542).

Results

Fifty-one studies (see Table 4.1) met the criteria for inclusion in this review. Twenty-three of the studies were group designs and twenty-eight studies were single subject designs. Studies were published between the years of 1972 and 2007 in 23 journals. Group design studies range from 1980 to 2007 and the single subject designs from 1972 to 2006. Independent variables for the selected studies are categorized as academic, behavioral, or multimodal as noted in Table 4.1.

Table 4.1

Studies with academic performance outcomes for students with ADHD

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Abikoff, Courtney, Szeibel, & Koplewicz (1996)	Journal of Learning Disabilities	Academic: Task Stimulation	2nd-6th grades	Clinic	Group	Music increased performance of students with ADHD.
Ayllon, Layman, & Kandall (1975)	Journal of Applied Behavior Analysis	Behavioral: Token Economy	8 - 10 yrs old	School	Single subject	Decreased hyperactivity and increased academic performance
Ayllon & Roberts (1974)	Journal of Applied Behavior Analysis	Behavioral: Token Economy	5th grade	School	Single subject	Systematic token reinforcement applied to reading performance decreased hyperactivity
Barber, Milich, & Welsh (1996)	Journal of Clinical Child Psychology	Behavioral: Reinforcement	7-10 yrs old	Clinic	Group	Performance of both groups adversely affected by partial reinforcement and optimized with continuous reinforcement. Students with ADHD exhibited "helpless" pattern of behavior and unrealistically positive view of their own ability

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Belfiore, Grskovic, Murphy, & Zentall (1996)	Journal of Learning Disabilities	Task Stimulation	10-11 yrs old	School	Single subject	Color had an immediate effect on comprehension tasks. Color did not enhance sight words.
Carlson, Mann, & Alexander (2000)	Cognitive Therapy and Research	Reward and response cost	8-12 yrs old	Not reported	Group design	ANOVA: Response cost improved accuracy on the arithmetic task relative to reward. Reward had a more salutary effect on self-rated motivation
Chase & Clement (1985)	Journal of Clinical Psychology	Behavioral: Psychostimulant medication and behavioral	9-12 yrs old	Clinic	Single subject	Self reinforcement and combination increased academic performance
Christie, Hiss, & Ioanoff (1984)	Behavior Modifications	Behavioral: Self monitoring	3rd-4th grade	School	Single subject	Decreased inattention and inappropriate behavior and increased on-task.
Clarfield & Stoner (2005)	School Psychology Review	Academic: CAI	6-7 yrs old	School	Single subject	Effective for increasing oral reading fluency and on task behavior
Coles et al. (2005)	Journal of Emotional and Behavioral Disorders	Multimodal: MTA	11-12 yrs	Clinic	Single subject	Decreased negative behavior, rule violation and increased seatwork completion and accuracy

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Connors et al. (2001)	Journal of American Multimedial: MTA	MTA	7-9 yrs	Clinic	Group Design	Combination of medication and behavioral strategies were most effective for enhancing family, social and academic functioning
Currie, Lee, Scheeler (2005)	Journal of Evidence-Based Practices for Schools	Academic: PDA	12-14 yrs	School	Single subject	Homework completion increased for 3 out of 4 students.
Dunlap, dePerczel, Clarke, Willson, Wright, White, & Gomez (1994)	Journal of Applied Behavior Analysis	Academic: Choice	11 yr	School	Single subject	Decreased disruptive behavior and increased task engagement
DuPaul, Ervin, Hook, & McGoey (1998)	Journal of Applied Behavior Analysis	Academic: Peer Tutoring	6-10 yrs	School	Single subject	Increased academic engagement and decreased off task behavior. 50% exhibited increased academic performance in math or spelling.
DuPaul, Guevremont, & Barkley (1992)	Behavior Modification	Behavioral: Token Economy	6-7 yrs	School	Single subject	Reading task completion increased; increased attention to task

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Edwards, Salant, Howard, Brougher, & McLaughlin (1995)	Child & Family Behavior Therapy	Behavioral: Self Management	8 - 9 yrs	School	Single Subject	Increased on task behavior and academic accuracy
Ervin, DuPaul, Kern & Friman (1998)	Journal of Applied Behavior Analysis	Behavioral FBA	13 - 14 yrs	School	Single Subject	
Evans, Axelrod & Langberg (2004)	Behavior Modification	Multimodal CHP	6 th - 8 th grades	School	Group	Decreased inattention and increased school functioning
Evans, Felham, & Grudberg (1995)	Exceptionality	Academic: Note taking	Young Adolescents	Summer Day Treatment	Group	Study 1: Increased quality of notes and recording of details, on task and improvements in scores. Study 2: Increased time on task and scores on daily assignments.

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Evans, Serpell, Schultz, & Pastor (2007)	School Psychology Review	Multimodal: CHP	10-14 yrs	School	Group	Cumulative long term benefits of the treatment program.
Ford, Poe, & Cox (1993)	Journal of Computing in Childhood Education	Academic: CAI	8-11 yrs	School	Group	Increased on task behavior with a game format
Gordon, Thomason, Cooper & Ivers (1991)	Journal of School Psychology	Behavioral: Mr. Attention	6-9 yrs	School	Single subject	Increased levels of attention to task (attentiveness and task persistence)
Gureasko-Moore, DuPaul & White (2006)	Behavior Modification	Behavioral: Self Management	12 yrs	School	Single subject	Increased classroom preparation skills
Harris, Friedlander, Saddler, Frezzelle, and Graham (2005)	Journal of Special Education	Behavioral: Self Management	3rd-5th grade	School	Single subject	Increased on task and spelling study behavior
Hechtman, et al. (2004)	Journal of American Academy of Child and Adolescent Psychology	American Multimodal	7-9.9 yrs	Clinic	Group	Improvement with all but no significant differences
Horn, Ialongo, Popovich, & Peradotto (1987)	Journal of Clinical Child Psychology	Clinical Parent Training:	7 - 11.5 yrs	Clinic setting	Group	All groups showed significant improvement over time.
Karraker (1972)	Journal of School Psychology	Parent Training	2 nd grade	School	Single subject	Increased correct responses in math

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Kelley & McCain (1995)	Behavior Modification	Parent Training	6-9 yrs	School	Single subject	Improved academic performance of inattentive children.
Langberg, Smith, Bogle, Schmidt, Cole, & Pender (2006)	Journal of Applied School Psychology	Multimodal	6 th - 7 th grades	School	Group	CHP participants made significant improvements in parent-rated academic performance, self esteem, and overall problem severity. Teacher ratings indicate medium effect size improvements in academic progress and small improvement in overall severity.
Mathes & Bender (1997)	Remedial and Special Education	Behavioral: Self Management	8-11 yrs olds	School	Single	Increased on task behavior
Mautone, DuPaul, & Jitendra (2005)	Journal of Attention Disorders	Academic: CAI	8-9 yrs	School	Single	Increased on task and math performance accuracy

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
MTA Cooperative Group (1999)	Archives of General Psychiatry Psychiatry	Multimodal: MTA	7-9.9 yrs	Clinic	Group	All groups showed reductions in symptoms over time. Combined and medication larger improvement than behavioral and community care. Combined and medication management treatments did not differ significantly.
Ota & DuPaul (2002)	School Psychology Quarterly	Academic: CAI	4th-6th grade	School	Single	Increased active engaged time and decreased off task. Varied effects on math performance.
Owens, Richerson, Beiltein, Crane, Murphy & Vancouver (2005)	Journal of Attention Disorders	Multimodal: YESS Program	K-6th grade	School	Group	Positively affects inattention, academic functioning and student-teacher relationships

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Felham, Carlson, Sams, Vallano, Dixon & Hoza (1993)	Journal of Conditioning and Clinical Psychology	Multimodal: STP	5.42-9.92 yr olds	Summer Day Treatment	Group	MPH and behavior mod resulted in academic and behavioral improvement (combination and meds were the same)
Rapport, Murphy, & Bailey (1982)	Journal of Applied Behavior Analysis	Behavioral: Meds and response cost	7 - 8 yrs	School	Single subject	Response cost increased on task and academic performance more than meds
Reitman, Hupp, O'Callahan, Gullely & Northup (2001)	Behavior Modification	Behavioral: meds and token economy	4-7 yrs	Summer Treatment t Program	Single subject	Both were effective at decreasing disruptive behavior and increasing attention; token economy more effective in isolation
Richardson, Kupietz, & Maitinnsky (1987)	Journal of Children in Contemporary Society	Academic: Integrated Skills Method (Intervention for reading instruction)	7-12 yrs	Clinic	Group	Decreased disruptive behavior, increased task engagement and increased academic performance
Robinson, Newby, & Ganzell (1981)	Journal of Applied Behavior Analysis	Behavioral: Token Economy	3 rd grade	School	Single subject	Increased task completion

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Rock (2005)	Journal of Positive Behavioral Interventions	Behavioral monitoring	7-13 yrs	School	Single subject	Enhanced academic performance
Shaw & Lewis (2005)	Journal of Research in Special Educational Needs	Academic: CAI	7-12.3 yrs	Clinic	Group	Increased accuracy and on task
Shimabukuro, Prater, Jenkins, & Edelen-Smith (1999)	Journal of Research in Special Educational Needs	Behavioral: Self monitoring	6 th - 7 th grade	School	Single subject	Increased academic productivity and accuracy
Skinner Johnson, Larkin, Lessley, & Glowacki (1995)	Journal of Emotional & Behavioral Disorders	Academic: Pacing	7-11 yrs - 8-10 yrs	Residential school	Single subject	Fast taped words increased performance
Stein (1999)	Ethical Human Science and Services	Parent Training	5-11 yrs	Clinic	Single subject	11 of 12 targeted behaviors improved (aggression did not); attention, conduct and grades improved
Zentall (1989)	Journal of Special Education	Academic: Task Stimulation	3rd - 6 th grade	School	Group	Adding color to letters for spelling ADHD boys out performed control after practice with black letters

Table 4.1 Continued

Study	Journal	Independent variable	Age/Grade	Setting	Design	Results
Zentall & Dwyer (1989)	Journal of School Psychology	Academic: Task Stimulation	2nd-3rd grade	Clinic	Group	Increased attention to task
Zentall, Falkenberg, & Smith (1985)	Journal of Abnormal Child Psychology	Academic: Task stimulation	14-18 yrs	Clinic	Group	Increased performance with high stimulation tasks
Zentall & Kruczek (1988)	Exceptional Children	Academic: Task Stimulation	2 nd grade	School	Group	Improved handwriting/copying task
Zentall, Grskovic, Javorsky & Hall (2000)	Diagnostique	Academic: Task stimulation	3 rd - 5 th grade	School	Group	Increased reading performance and accuracy with color added
Zentall & Shaw (1980)	Journal of Educational Psychology	Academic: Task stimulation	2 nd grade	School	Group	Most active and performance tasks worse in high than in low noise. Differential effects less in the exp 2 (new and difficult).

Studies Reporting Statistical Significance

Results are classified via the method of result reporting (i.e., statistical significance, practical significance, clinical significance, and replication) and presented in Table 4.2. The primary analyses in the 23 studies included 14 ANOVAs, 5 ANCOVAs, 4 MANOVAs, 1 factor analysis, 2 hierarchical linear modeling, 1 regression, and 2 t-tests. All of the studies reported the results of statistical significance testing. However, only 7 out of 23 studies (Connors et al., 2001; Evans et al., 2007; Evans et al., 2004; Evans et al., 2005; Langberg et al., 2006; Owens, Richerson, Beilstein, Crane, Murphy, & Vancouver, 2005; Shaw & Lewis, 2005) used the term "statistically significant" at least once when reporting results.

Table 4.2

Analysis and method of result reporting in group design studies

Study	Analysis		Language for Statistical		Practical Significance		Replicability		Clinical significance
	ANOVA	Repeated measures ANOVA	Significant	Significance	None reported	Discussion	Reporting	Not reported	
Abikoff, Courtney, Szeibel, & Koplewicz (1996)	ANOVA	Repeated measures ANOVA	Significant	Significant	None reported	Discussion	Discussion	Not reported	Not reported
Barber, Millich, & Welsh (1996)	ANCOVA	ANOVA	Significant	Significant	Pearson r: reported r, but not interpreted as ES	Discussion	Discussion	Not reported	Not reported
Carlson, Mann, & Alexander (2000)	ANOVA	ANOVA	Significant	Significant	None reported	Discussion	Discussion	Not reported	Not reported
Connors et al. (2001)	Factor Analysis	ANOVA	Statistically significant	Statistically significant	Cohen's d ES = Overall Cohen's d = .26 - .70	Discussion	Discussion	*Reported	*Reported
Evans, Axelrod & Langberg (2004)	MANOVA	MANOVA	Statistically significant	Statistically significant	Cohen's d for GPA = .38 (medium effect size)	Discussion	Discussion	*Reported	*Reported
Evans, Langberg, Raggi, Allen & Buvinger (2005b)	ANOVA	ANOVA	Statistically significant	Statistically significant	Academic functioning = 3.51 (large effect)	Not discussed	Not discussed	*Reported	*Reported
Evans, Felham, & Grudberg (1995)	Study 1: ANOVA Study 2: MANOVA	MANOVA and ANOVA	Significant	Significant	No ES for academic performance Cohen's d = .30 - .76	Discussion	Discussion	Not reported	Not reported
Evans, Serpell, Schultz, & Pastor (2007)	HLM	HLM	Statistically significant	Statistically significant	Cohen's d = - 0.7 for school functioning	Discussion	Discussion	*Not reported	*Not reported

Table 4.2 Continued

Study	Analysis	Language for Statistical Significance	Practical Significance	Replicability Reporting	Clinical significance
Ford, Poe, & Cox (1993)	ANOVA	Significant	No ES	Discussion	Not reported
Hechtman, et al. (2004)	ANOVA and ANCOVA	Significant	No ES	Discussion	Not reported
Horn, Ialongo, Popovich, & Peradotto (1987)	Repeated measures MANOVA and ANOVA	Significant	Not interpreted as ES R, r, and R ² were reported as the result of the Multiple regression.	Discussion	*Not reported
Langberg, Smith, Bogle, Schmidt, Cole, & Pender (2006)	t-tests and Repeated measures ANOVA	Statistically significant	Eta squared Academic Progress = .17 (large effect) ; Cohen's d = .74 (medium to large gains)	Discussion	*Reported
MTA Cooperative Group (1999)	Random-effects regression	Significant	No ES	Discussion	*Not reported
Owens, Richerson, Beilstein, Crane, Murphy & Vancouver (2005)	HLM	Statistically significant	No ES	Not discussed	*Not reported
Felham, Carlson, Sams, Vallano, Dixon & Hoza (1993)	Planned Contrast ANOVA	Significant	No ES for academic performance	Not discussed	*Not reported
Richardson, Kupietz, & Maitinnsky (1987)	t-tests	Significant	No ES	Not discussed	Not reported

Table 4.2 Continued

Study	Analysis	Language for Statistical Significance	Practical Significance	Replicability	Clinical significance
Shaw & Lewis (2005)	ANOVA	Statistically significant	No ES	Not discussed	*Not reported
Zentall (1989)	ANOVA	Significant	No ES	Discussion	Not reported
Zentall & Dwyer (1989)	Repeated measures ANOVA	Significant	No ES	Discussion	Not reported
Zentall, Falkenberg, & Smith (1985)	ANCOVA	Significant	No ES	Discussion	Not reported
Zentall, Grskovic, Javorsky & Hall (2000)	ANOVA	Significant	Glass' delta ES = .31	Discussion	Not reported
Zentall & Kruczek (1988)	ANCOVA	Significant	No ES	Results	Not reported
Zentall & Shaw (1980)	ANCOVA and ANOVA	Significant	No ES	Discussion	Not reported

*Investigated intervention effect on ADHD symptomology

Studies Reporting Practical Significance

Six studies reported information from statistical significance testing along with effect sizes for academic performance, academic achievement, or overall problem severity. One study before APA's "encouragement" to report ES in 1994 was found to report ES (i.e., Pelham et al., 1993). However, between the years of 1994 and 2001 two were found that reported ESs as Cohen's d or Glass' delta (Evans, Pelham, & Grudberg; 1995; Zentall, Grskovic, Javorsky & Hall, 2000) with five studies (Connors et al., 2001; Evans et al., 2004; Evans et al., 2005b; Evans et al., 2007; Langberg et al., 2006) after 2001 when the 5th edition of the APA manual recommended that ESs should "almost always be reported," reporting ES as Cohen's d or Glass' delta.

Replication by Comparison to Previous Studies

Eighteen studies compared results to the prior literature in the discussion section of the articles (see Table 4.2). Six studies reporting effect sizes made comparisons to the results of prior literature in the discussion section with general comments to previous effect sizes without direct explicit comparison of effect size. For instance, Evans et al. (2004) reported "effect sizes in

this study were as large or larger than effect sizes reported in a recent study assessing the efficacy of methylphenidate on the academic performance and behavior of youth with ADHD" (p. 542) or Zentall et al. (2000) commented "although some of prior work produced even stronger findings by highlighting relevant information, it is important, as shown in the present study, that added color can have significant effects, even when it does not involve highlighting information" (p. 141).

Clinical Significance

In addition to academic performance or achievement as the dependent variable, 10 studies investigated the impact of the intervention on symptomology (see Table 4.2). Interpreting results as clinically significant would be appropriate in these studies; however, only four studies actually interpreted the results as clinically significant or nonsignificant. Connors et al. (2001) reported clinical significance "for data satisfying the assumptions of Cohen's delta comparing treatments A and B, an ES of d means that the probability that a patient treated with A will give a response better than B with probability $\Phi(d/2)$, where d is the Cohen delta and $\Phi(\cdot)$ is the cumulative standard normal distribution. If A and B do not differ,

that probability should be 50%" (p. 163). Thus reported that both medication management and combined treatment would make a "clinically noticeable difference" (p. 163) in ADHD symptomology.

Evans et al. (2004), measuring the impact of the CHP, employed two different methods for measuring clinical significance described by Jacobson and Truax (1991). The first method, using the midpoint of scores as the cut score, found 75% of scores above the cut score before treatment and 50% afterwards. Using the second method Evans et al. (2004) calculated a reliable change index and found that after the implementation of the CHP program, parents reported clinically significant changes on 38% of opportunities to respond with teachers reporting clinically significant changes 52% of opportunities.

Evans et al. (2005b) found that 60% of the 50% of students in the CHP experimental group who began the year in the academically impaired range and 20% of the 71% in the community control group who began the year in the academically impaired ranged moved to the normal range. Further, Langberg et al. (2006) discussed the clinic significance of the CHP on overall problem severity and academic progress of adolescents with ADHD. Seventy one

percent of the CHP were experiencing clinically significant overall problem severity pre-test with 43% post test compared to the control group in which 52% were clinically significant on the pre-test and 67% on the post test. Academic progress was similar with 67% of the CHP participants experiencing clinically significant results prior to intervention and 43% afterwards. Academic performance of the control group actually decreased over the semester long study with 63% experiencing clinically significant problems pre-test and 74% post.

Discussion

Reporting of Effect Size

Seventeen studies in this review only report results from statistical significance testing; thus not truly informing practice and possibly creating contradictory findings when comparing studies with different sample sizes. Only six studies, all within the past seven years, directly report the magnitude of variance in academic functioning accounted for by the intervention (i.e., the effect size), the literature is only beginning to tell educators what they want to know through reporting of effect sizes. Four studies (Evans et al., 2004; Evans et al., 2005b; Evans et al., 2007; Langberg et al., 2006) have

found medium to large effects (i.e., .26-.76) on academic performance for adolescents with ADHD in the school-based multimodal CHP. However, according to criteria established by the DOE, at least two randomized control trials (RCTs) should "report (i) the size of the effect and (ii) statistical tests showing the effect is unlikely to be due to chance" (p. 15) for an intervention to have strong evidence for effectiveness (Coalition for Evidence-Based Policy, 2003). Only one of the studies, of the CHP (i.e., Langberg et al., 2006), reviewed contained a control group. Two further experimental studies (Connors et al., 2001; Zentall et al., 2000) reported effect sizes. Connors et al. (2001) using a composite score from the MTA data, reported a set of Cohen's *d* effect sizes of psychostimulant medication alone, behavioral treatment alone, combined treatment of psychostimulant medication and behavioral interventions, and community care on academic performance. And Zentall et al. (2000) found an effect size of .31 on reading accuracy with color added.

Replication

Educators want to know if findings are consistent across the literature. However, replicability cannot be determined using statistical significance testing;

therefore, reporting of effect sizes and explicit comparison to the prior literature are important for selecting evidence-based practices. When reviewing the literature, I found no studies making direct explicit comparison to the prior literature; however, eighteen studies made general reference to the prior literature in the discussion section. For instance, Evans et al. (2007) wrote, "contrary to the benefits of combined reported by the MTA investigators (e.g., Conners et al., 2001), psychosocial and medication treatment in the CHP-C did not interact to produce any advantages over non-medicated youth in the treatment condition" (p. 267). Evans et al. (2005b) reported, "These preliminary data are consistent with our previous report" (p. 351).

Another issue complicating the ability to provide a report of findings across studies is that studies are seldom published with results that do not meet the researcher-set criteria for meeting statistical significance. In order to compare studies effectively and establish effective interventions through a solid research base, studies with $p_{\text{calculated}}$ values above .05 are going to have to be reported. In the words of Rosnow and Rosenthal (1989), "surely, God loves the .06 nearly as much as the

.05" (p. 1277) and Abelson (1997a), "We act foolish when we celebrate $p=.05$, but wallow in self pity when $p=.07$ " (p. 12).

Result Import

Educators must be able to interpret the importance of results. The NHSST does not imply result importance. However, in this context using the word significant implies important results were found in the study when in reality all that was really found were statistically significant results. While the terminology is debated within the literature, with a lack of understanding of statistical significance amongst educators, researchers using the term statistically significant avoid implying result importance by using the word significant. Given that researchers often misinterpret statistically significant results expecting educators to understand the implications seems counterintuitive.

Implications

The take home message for researchers with the goal of informing educational practice with students with ADHD is that educators, with the moral, ethical, and now mandated responsibility of achieving results with a population of students often considered the most difficult to reach and

that educational leaders with the responsibility of guiding others in the most efficient and effective direction is emphasized by Thompson (2004b), "Don't tell me that your results are improbable, or highly improbable. Tell me explicitly why you think a given effect size, given what you are studying is important. And give me the evidence that effects across studies are reasonably comparable, so that I have some confidence that your results are replicable, and not serendipitous" (p. 612). Both educators and educational leaders want and need to know that recommended interventions are effective and replicable, with specific populations of students.

Communicating research results as p , F , and t values does not inform practice. NHSST is confusing and difficult to understand. Results should be reported as effect sizes in light of result replicability. The MTA Cooperative Group (1999) stated, "statistical significance, of course, cannot be interpreted as necessarily indicative of clinical or practical significance, and lack of significance is never proof of the equivalency of treatments" (p. 1083). Therefore, practical and clinical (when appropriate) significance and replicability must be interpreted for readers. However, it must be noted that without consistent

reporting of effect sizes and result replicability in the literature, it is not an easy task to approach research from a meta-analytical perspective. It has been reported (Fidler et al., 2005; Kieffer, Reese, & Thompson, 2001; Thompson, 1999) and shown here that a majority of published reports do not report any of the three.

While the mandate to use evidence based practice is still in it's infancy, educators are only beginning to understand methods of determining and selecting interventions considered evidence-based. The United States Department of Education (DOE) has created the Institute of Education Services (IES) that provides scientific evidence for effective practices (DOE, 2007) and several research synthesis organizations have established web sites with recommendations for evidence-based practices (e.g., The What Works Clearinghouse, The International Campbell Corporation, The Promising Practices Network) to assist professionals, the ultimate responsibility belongs to educators. Given the responsibility with specific guidelines from the DOE (Coalition for Evidence-Based Practice, 2003), educators might feel confident in research with important results presented as the magnitude of change created by the intervention in single studies and in

comparison to prior research not merely as statistically significant.

Critics contend that statistical significance testing does not tell us what we want to know (Cohen, 1994; Carver, 1993; Thompson, 1998) while proponents contend that statistical significance testing has a time and place (Meehl, 1997; Muliak et al., 1997). However, the time and place is not necessarily in intervention research. Educators teaching students with ADHD typically are not interested in dichotomous or categorical decisions regarding evidence-based interventions. For several reasons (e.g., financial, efficiency) the magnitude of effect as reported by effect sizes is of more interest. Educators working with students with ADHD want to know what interventions have evidence for increasing academic functioning with this population and what the magnitude of change is for each intervention. From our review of the literature, only the beginnings of a research base meeting these criteria have been recently formed.

Conclusion

Researchers must communicate results for ease of understanding by education to facilitate application of the intervention in "real world" settings with confidence.

While proponents of statistical significance testing argue that misuse and misinterpretation is not a reason to ban statistical significance testing, one must wonder if researchers with specific educational experiences in statistics have difficulty interpreting results, where does that leave educators without the same background knowledge. When results are reported in a supplemental manner, interpreted correctly, of course, no harm is done as long as the information that educators are seeking is also reported. Thus, for results to have real import, communicating with educators in the field must be done in such a way that effective interventions become evidence-based practice (i.e., practiced in real world environments with real students).

Not reporting effect sizes or replicability and publishing only studies with statistically significant results creates a biased research base of interventions. This research base does not inform practice and as Cohen (1994) stressed "does not tell us what we want to know." What educators want to know is what interventions are effective for increasing the likelihood of success for a specific population of students. Thus, educators and education researchers truly need to know the magnitude of

effect for both single research studies and in previous studies in order to determine the best possible course of action or to be able to report the results of research for others to do the same.

For decades, the utility of statistical significance testing has been questioned. Strong critics have called for the ban of NHSST. Others agree that supplemental methods, such as reporting of effect size, replicability analysis, and meta-analysis are necessary. Few true proponents of the use of only statistical significance can be found.

The critics contend that NHSST does not tell us what we want to know (Cohen, 1994), the null hypothesis can always be rejected (Cohen, 1994; Thompson, 1998), does not imply result import or replicability (Thompson, 1999). While proponents contend that NHSST has a proper time and place in research (Cortina & Dunlap, 1997), is useful for determining necessary dichotomous decisions (Frick, 1996), and is needed for objectivity (Harris, 1997). Further, proponents emphasize that the misuse and misinterpretation is the fault of the researcher and not the test. Most agree, although somewhat reluctantly, that NHSST can be

used to supplement research findings (Frick, 1996; Kirk, 1996).

In a social and political environment in which evidence based practice has come to the forefront, it is important researchers use methods of practical significance and effectively communicate findings to practitioners. While the APA recommends that researchers almost always report effect sizes, it appears for effective interventions to become evidence based practice with students with ADHD, effect size, replicability, and clinical significance (when appropriate) are always necessary components of result reporting.

CHAPTER V

CONCLUSION

The overall purpose of this dissertation was to further understanding and knowledge by providing potential answers regarding behaviors that differentiate children and adolescents with ADHD and the selection and implementation of evidence based interventions. Confusion exists regarding behaviors determined to be primary symptoms, symptoms of comorbid conditions, and functional impairment. In addition, the research-to-practice gap might be associated with a lack of practitioner trust of research as methods of research result reporting are difficult to understand and often misleading or contradictory.

Seven research questions address issues that appear to create a diagnostic and treatment quandary for practitioners. Information gathered from BASC-2 TRS and PRS forms for a national sample of children and adolescents was used to answer these questions in a series of three studies.

A preliminary study: Construct validity of scores derived from the BASC-2 TRS and PRS, provided information from four first and second-order factor analyses on the underlying dimensions of scores from the BASC-2. This

information was used in an empirical study of behaviors that differentiate children and adolescents with ADHD from those without (i.e., the study presented in Chapter III). Information needed to establish the construct validity of scores from the BASC-2 with the sample of students of interest in this dissertation was found. The results of the factor analyses replicated findings from previous studies and provided new information through different methodology for a different purpose.

Results indicate that the scores from the sixteen primary scales of the BASC-2 have sufficient validity for use as a measurement instrument to determine behaviors that differentiate children and adolescents with ADHD across parents and teachers as raters and key developmental stages. Replication of the findings of Palomares (1992) provided needed information for conclusions and inferences drawn from the study in Chapter III; specifically, knowledge that subscales are measuring consistent constructs.

Results suggest that researchers carefully consider correlated subscales when drawing conclusions regarding behaviors that differentiate children and adolescents with ADHD from those without as identified by items in the

hyperactivity, aggression, and conduct problems subscales and the adaptive subscales. In addition, second-order factor analyses identified seven global dimensions of behavior measured by scores from the BASC-2. As correlated factors exist, second-order factor analysis extracted these higher order factors from the first-order factors.

The second study, *Behaviors that discriminate ADHD: Primary Symptoms, symptoms of comorbid conditions, or functional impairment?*, answered four research questions. These research questions address the diagnostic and treatment quandary created by (1) behaviors demonstrated by children and adolescents related to symptoms of comorbid conditions and functional impairment, (2) the differences in parent and teacher perceptions of behavior, and (3) the differing topography of the behavior of children and adolescents with ADHD. Four DDAs comparing mean differences on items rated by parents and teachers for children and adolescents were used to answer these questions.

Behaviors that discriminated children and adolescents with ADHD from those without any physical, behavioral, or emotional condition were primary symptoms, symptoms of comorbid conditions, and secondary behaviors related to

functional impairment. Teacher ratings indicated atypicality was the strongest discriminator for children and learning problems was the strongest discriminator for adolescents. Social skills accounted for minimal variance between the groups and anxiety and somatization contributed very little information to group differentiation.

The third manuscript, *Reading and understanding the evidence of effective interventions for students with ADHD: The relevance and meaning of the statistical significance controversy*, is a comprehensive literature review of empirical studies investigating the effects of academic interventions for students with ADHD in light of the statistical significance controversy. The purpose was to address practitioner confusion when selecting evidence-based interventions to address behaviors related to primary symptoms, symptoms of comorbid conditions, and functional impairment and answered two research questions. The comprehensive literature review yielded fifty-one single studies providing evidence of effectiveness for academic, behavioral, and multimodal interventions.

The complexity of result reporting in the identified studies suggested interpretation may be difficult for practitioners and educators with minimal knowledge of

statistical methods. A majority of the results were reported in terms of statistical significance, written as "significant" implying to those without a strong knowledge base in statistical methods that the results were important, without effect size reporting for ease of comparison across studies or direct explicit comparison to effect sizes found in prior literature.

This series of studies suggests possible ways to simplify the complexity of ADHD for practitioners. Practitioners face these complexities when assessing and selecting evidence based interventions for children and adolescents with ADHD. Specifically, when selecting interventions, practitioners are encouraged to address all behaviors with evidence based multimodal interventions to assess and select interventions to intervene on behaviors associated with the primary symptoms, symptoms of comorbid conditions, and functional impairment. In addition, practitioners are encouraged to consider all settings and relevant individuals involved in effective treatment. For instance, specific guidance for parents and teachers and intervention implementation by both across multiple settings might be necessary to address all behaviors.

Assessment and intervention of behaviors associated with primary symptoms, symptoms of comorbid conditions, and functional impairment might be most appropriate for intervention selection and demonstrate a need for more diagnostic assessment rather than less. Diagnostic utility seeks to evaluate behaviors associated with externalizing behaviors. While practitioners and researchers often "pigeon hole" these externalizing behaviors into categories commonly known as the individual constructs of aggression, hyperactivity, and conduct problems, results across two studies of this dissertation indicate that correlation exists. Meeting specific diagnostic criteria requires the expertise and knowledge of practitioners in addition to multidimensional assessment.

Researchers and experts in the field are encouraged to use empirical evidence from this series of studies to answer questions left unanswered. Practitioners in the field rely on evidence-based information in their work to increase academic, social, and behavioral functioning of this complex heterogeneous population of students. As this is a series of single studies, replication and further research is needed to validate results found here and further this line of research. Results were compared to

prior research in each study,; however, only in the context of children and adolescents with ADHD demonstrating behaviors associated with primary symptoms, symptoms of comorbid conditions, and functional impairment. A thorough understanding of behaviors, specifically those associated with functional impairment, such as activities of daily living and atypicality, and symptoms of comorbid conditions, such as learning problems that differentiate children and adolescents with ADHD from those without can only be established through result replication.

Additionally, researchers are encouraged to study the strength of learning problems as a discriminator of ADHD, with an emphasis on the developmental trajectory. Further empirical study is needed to investigate the comorbidity of anxiety and somatoform disorders with ADHD. Factor analysis of the behaviors found to discriminate children and adolescents with ADHD from those without will determine dimensions specific to this population.

Others with interest are encouraged to consider the findings here in relationship to the utility for intervention. Considering ADHD within a framework of behaviors associated with primary symptoms, symptoms of comorbid conditions, and functional impairment establishes

opportunity for a line of research regarding the utility of assessment to intervention. Researchers and practitioners will question whether understanding the multitude of behaviors represented here will increase the utility of interventions. Answers are in the results of future studies.

This dissertation demonstrates that researchers often report results of empirical studies in language only understood by statisticians. Thus, researchers are strongly encouraged to report and interpret their results with a focus on ease of understanding through direct explicit comparison of effects to prior literature and avoiding language that implies result importance without evidence of such. For empirically based interventions to become evidence-based interventions, evidence of effectiveness within schools and communities is needed. Reporting results in this light might increase strength and therefore trust of research and decrease the research to practice gap.

This dissertation also provides further evidence of the heterogeneous nature of this population. Results support the complexity of these behaviors and the confusion experienced by practitioners and parents. A clear

distinction between children and adolescents with ADHD and those without can only be found within the nature of behaviors associated with symptoms of comorbid conditions and functional impairment in conjunction with inattention and hyperactivity-impulsivity across multiple environments. To increase successful functioning of this population, we must begin to address all of these issues.

REFERENCES

- Abelson, R. (1997a). On the surprising longevity of flogged horses: Why there is a case for the significance test. *Psychological Science, 8*, 12-15.
- Abelson, R. (1997b). A retrospective on the significance test ban of 1999 (If there were no significance tests, they would be invented). In *What if there were no significance tests?* (pp. 117-141). Mahwah, NJ: Lawrence Erlbaum Associates.
- Abikoff, H., Courtney, M. E., Szeibel, P. J., & Koplewicz, H. S. (1996). The effects of auditory stimulation on the arithmetic performance of children with ADHD and nondisabled children. *Journal of Learning Disabilities, 29*(3), 238-246.
- Abramowitz, A. J. & O'Leary, S. G. (1991). Behavioral interventions for the classroom: Implications for students with ADHD. *School Psychology Review, 20*, 219-233.
- Achenbach, T.M., Edelbrock, C.S. (1978). The classification of child psychopathology: A review and analysis of empirical efforts. *Psychological Bulletin, 85*, 1275-1301.

- Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity. *Psychological Bulletin*, *101*(2), 213-232.
- Alspaugh, J. W., & Harting, R. O. (1995). Transition effects of school grade-level organization student achievement. *Journal of Research and Development in Education*, *28*(3), 145-149.
- Altman, M. (2004). Statistical significance, path dependency, and the culture of journal publication. *The Journal of Socio-Economics*, *33*, 651-663.
- American Academy of Pediatrics. (2000). Clinical practice guidelines: Diagnosis and evaluation of the child with attention-deficit/hyperactivity disorder. *Pediatrics*, *105*, 1158-1170.
- American Academy of Pediatrics. Subcommittee on Attention-Deficit/Hyperactivity Disorder, & Committee on Quality Improvement. (2001). Clinical practice guideline: Treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics*, *108*, 1033-1044.

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: Text revisions* (4th ed.). Washington DC: Author.
- American Psychological Association (1994). *Publication manual of the American Psychological Association* (4th ed.). Washington, DC: Author.
- American Psychological Association (2001). *Publication manual of the American Psychological Association* (5th ed.). Washington, DC: Author.
- Anderson, J. C., Williams, S., McGee, R., & Silva, P. A. (1987). Prevalence in a large sample from the general population: DSM-III disorders in preadolescent children. *Arch Gen Psychiatry*, 44(1), 69-76.
- Atkins, M. S., & Pelham, W. E. (1991). School-based assessment of attention deficit disorder. *Journal of Learning Disabilities*, 24, 197-204.
- August, G. J., Realmuto, G. M., MacDonald, A. W., Nugent, S. M., Crosby, R. (1996). Prevalence of ADHD and comorbid disorders among elementary school children

- screened for disruptive behavior. *Journal of Abnormal Child Psychology*, 24, 571-595.
- Ayllon, T., Layman, D., & Kandel, H. (1975). A behavioral educational alternative to drug control of hyperactive children. *Journal of Applied Behavior Analysis*, 8, 137-146.
- Ayllon, T., & Roberts, M. (1974). Eliminating disciplien problems by strengthening academic performance. *Journal of Applied Behavior Analysis*, 7, 71-76.
- Bagwell, C. L., Molina, B. S. G., Pelham, W. E., & Hoza, B. (2001). Attention-deficit hyperactivity disorder and problems in peer relations: Predictions from childhood to adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40 (11), 1285-1292.
- Bakan, D. (1966). The test of significance in psychological research. *Psychological Bulletin*, 66, 423-437.
- Barber, M. A., Milich, R., & Welsh, R. (1996). Effects of reinforcement schedule and task difficulty on the performance of attention deficit hyperactivity disordered and control boys. *Journal of Clinical Child Psychology*, 25(1), 66-76.

- Barkley, R. A. (1995). *Taking charge of ADHD: The complete, authoritative guide for parents*. New York: Guilford Publications.
- Barkley, R. A. (1997). *ADHD and the nature of self-control*. New York: Guilford.
- Barkley, R. A. (1998). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment*. New York: Guildford Press.
- Barkley, R. A. (2006). *Attention deficit-hyperactivity disorder: A handbook for diagnosis and treatment* (3rd ed.). New York: Guilford.
- Barkley, R. A., & Biederman, J. (1997). Toward a broader definition of the age-of-onset criterion for attention-deficit hyperactivity disorder. *Journal of American Academy of Child Adolescence Psychiatry, 36*, 1204.
- Barkley, R. A., DuPaul, G. J., & McMurray, M. B. (1990a). A comprehensive evaluation of attention deficit disorder with and without hyperactivity. *Journal of Consulting and Clinical Psychology, 58*, 775-789.
- Barkley, R. A., Fischer, M., Edelbrock, C.S., & Smallish, L. (1990b). The adolescent outcome of hyperactive children diagnosed by research criteria-I: An 8 year

prospective follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 29(4), 546-557.

Belfiore, P. J., Grskovic, J. A., Murphy, A. M., & Zentall, S. S. (1996). The effects of antecedent color on reading for students with learning disabilities and co-occurring attention-deficit/hyperactivity disorder. *Journal of Learning Disabilities*, 29(4), 432-438

Berkson, J. (1938). Some difficulties of interpretation encountered in the application of the Chi-square test. *Journal of the American Statistical Association*, 33, 526-536.

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

Bird, H. R., Gould, M., & Staghezza-Jaramillo, B. (1994). The comorbidity of ADHD in a community sample of children aged 6 through 16 years. *Journal of Child and Family Studies*, 3(4), 365-378.

Brown, J. D. (1996). *Testing in language problems*. Upper Saddle River, NJ, Prentice Hall Regents.

- Brown, M. B. (2000). Diagnosis and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *Journal of Counseling and Development, 78*(2), 195-203.
- Cantwell, D. (1996). Attention deficit disorder: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*, 978-987.
- Carbone, E. (2001, Nov/Dec). Arranging the classroom with an eye (and ear) to students with ADHD. *Teaching Exceptional Children, Nov/Dec*, 72-81.
- Carlson, C. L., Mann, M., & Alexander, D. K. (2000). Effects of reward and response cost on the performance and motivation of children with ADHD. *Cognitive Therapy and Research, 24*(1), 87-98.
- Carnine, D. (1997). Bridging the research to practice gap. *Exceptional Children, 63*, 513-521.
- Carver, R. P. (1978). The case against statistical significance testing. *Harvard Educational Review, 48*, 378-399.
- Carver, R. P. (1993). The case against statistical significance testing, revisited. *Journal of Experimental Education, 61*, 287-292.

- Centers for Disease Control (2005). *Attention deficit/hyperactivity disorder*. Retrieved Feb. 10, 2009 from <http://cdc.gov/ncbddd/adhd/>.
- Chase, S. N., & Clement, P. W. (1985). Effects of self-reinforcement and stimulants on academic performance in children with attention deficit disorder. *Journal of Clinical Child Psychology, 14*(4), 323-333.
- Cherkes-Julkowski, M., Sharp, S., & Stolzenberg, J. (1997). *Rethinking attention-deficit disorders*. Cambridge, MA: Brookline Books.
- Chow, S. L. (1998). Précis of statistical significance: Rationale, validity, and utility. *Behavioral and Brain Sciences, 21*, 169-239.
- Christie, D. J., Hiss, M., & Lozanoff, B. (1984, July). Modification of inattentive classroom behavior. *Behavior Modification, 391-405*.
- Clarfield, M., & Stoner, G. (2005). The effects of computerized reading instruction on the academic performance of students identified with ADHD. *School Psychology Review, 34*(2), 246-254.
- Clark, C., Prior, M. & Kinsella, G. (2002). The relationship between executive function abilities, adaptive behaviour, and academic achievement in

children with externalising behaviour problems.

Journal of Child Psychology and Psychiatry, 43(6),
785-796.

Cliff, N. (1987). *Analyzing multivariate data*. San Diego,
CA: Harcourt Brace Jovanovich.

Coalition for Evidence-Based Policy (2003). *Identifying and
implementing educational practices supported by
rigorous evidence: A user friendly guide*. Washington,
DC: Author.

Cohen, J. (1977). *Statistical power analysis for the
behavioral sciences* (2nd ed.). New York: Academic
Press

Cohen, J. (1990). Things I have learned (so far). *American
Psychologist*, 45, 1304-1312.

Cohen, J. (1994). The earth is round ($p < .05$). *American
Psychologist*, 49(12), 997-1003.

Coles, E. K., Pelham, W. E., Gnagy, E. M., Burrows-MacLean,
L., Fabiano, G., Chacko, A., et al. (2005). A
controlled evaluation of behavioral treatment with
children with ADHD attending a summer treatment
program. *Journal of Emotional and Behavioral
Disorders*, 13(1), 99-112.

- Conners, C. K., Epstein, J. N., March, J. S., Angold, A., Wells, K. C., Klaric, J., et al. (2001). Multimodal treatment of ADHD in the MTA: An alternative outcome analysis. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(2), 159-167.
- Cortina, J. M., & Dunlap, W. P. (1997). On the logic and purpose of significance testing. *Psychological Methods, 2*(2), 161-172.
- Cronbach, L. J. & Meehl, P. E. (1955). Construct validity in psychological tests, *Psychological Bulletin, 52*, 281-302.
- Currie, D., Lee, D.L., & Scheler, M.C. (2005). Using PDAs to increase the homework completion of students with ADHD. *Journal of Evidence-Based Practices for Schools, 6*, 151-164.
- Daly, B. P., Creed, T., Xanthopoulos, M., & Brown, R. T. (2007). Psychosocial treatments for children with attention deficit/hyperactivity disorder. *Neuropsychology Review, 17*, 73-89.
- Deming, W. E. (1975). On probability as a basis for action. *The American Statistician, 29*(4), 146-152.
- Dietz, S., & Montague, M. (2006). Attention deficit hyperactivity disorder comorbid with emotional and

- behavioral disorders and learning disabilities in adolescents. *Exceptionality*, 14, 19-33.
- DiStefano, D. & Kamphaus, R. W. (2007). Development and validation of a behavioral screener for preschool-age children, *Journal of Emotional and Behavioral Disorders*, 15, 93-102.
- Dulcan, M. (1997). Practice parameters for the assessment and treatment of children, adolescents and adults with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 85S-121S.
- Dunlap, G., DePerczel, M., Clarke, S., Wilson, D., Wright, S., White, R. et al. (1994). Choice making to promote adaptive behavior for students with emotional and behavioral challenges. *Journal of Applied Behavior Analysis*, 27(3), 505-518.
- DuPaul, G. J., & Eckert, T. L. (1997). The effects of school-based interventions for attention deficit hyperactivity disorder: A meta-analysis. *School Psychology Review*, 26, 5-27.
- DuPaul, G. J., Ervin, R. A., Hook, C. L., & McGoey, K. E. (1998). Peer tutoring for children with attention deficit hyperactivity disorder: Effects on classroom

behavior and academic performance, *Journal of Applied Behavior Analysis*, 31(4), 579-592.

DuPaul, G. J., Guevremont, D. C., & Barkley, R. A. (1992). Behavioral treatment of attention-deficit hyperactivity disorder in the classroom: The Use of the Attention Training System. *Behavior Modification*, 16, 204-225.

DuPaul, G. J., & Power, T. J. (2000). Educational interventions for students with attention deficit disorders. In T. E. Brown (Ed.), *Attention deficit disorders and comorbidities in children, adolescents, and adults* (pp. 607-635), Washington, DC: American Psychiatric Press.

DuPaul, G. J., Schaughency, E.A., Weyandt, L.L., Tripp, G., Kiesner, J., Ota, K., et al. (2001). Self-report of ADHD symptoms in university students: Cross-gender and cross-national prevalence. *Journal of Learning Disabilities*, 34 (4), 370-379.

DuPaul, G. J., & Stoner, G. (1994). *ADHD in the schools: Assessment and intervention strategies*. New York: Guilford.

- DuPaul, G. J., & Stoner, G. (2003). *ADHD in the schools: Assessment and intervention strategies* (2nd ed.). New York: Guilford.
- DuPaul, G. J., & Weyant, L. L. (2006). School-based interventions for children and adolescents with attention-deficit/hyperactivity disorder. *Education and Treatment of Children, 29*(2), 342-358.
- Edwards, L., Salant, V., Howard, V. F., Brouger, J., & McLaughlin, T. F. (1995). Effectiveness of self-management on attentional behavior and reading comprehension for children with attention deficit disorder. *Child & Family Behavior Therapy, 17*(2), 1-17.
- Ervin, R. A., DuPaul, G. J., Kern, L., & Friman, P. C. (1998). Classroom-based functional assessment: A proactive approach to intervention design and selection for students diagnosed with Attention Deficit/Hyperactivity Disorder. *Journal of Applied Behavior Analysis, 31*, 65-78.
- Evans, S. W., Allen, J., Moore, S., & Strauss, V. (2005a). Measuring symptoms and functioning of youth with ADHD in middle schools. *Journal of Abnormal Child Psychology, 33*(6), 695-706.

- Evans, S. W., Axelrod, J., & Langberg, J. M. (2004). Efficacy of a school-based treatment program for middle school youth with ADHD. *Behavior Modification, 28*(4), 528-547.
- Evans, S. W., Langberg, J. L., Raggi, V., Allen, J., & Buvinger, E. C. (2005b). Development of school-based treatment program for middle school youth with ADHD. *Journal of Attention Disorders, 9*(1), 343-353.
- Evans, S. W., Pelham, W., & Grudberg, M. V. (1995). The efficacy of note taking to improve behavior and comprehension of children with attention deficit hyperactivity disorder. *Exceptionality, 5*(1), 1-17.
- Evans, S. W., Serpell, Z. M., Schultz, B. K., & Pastor, D. A. (2007). Cumulative benefits of secondary school-based treatment of students with attention deficit hyperactivity disorder. *School Psychology Review, 36*(2), 256-273.
- Evans, S. W., Timmins, B., Sibley, M., White, L. C., Serpell, Z. N., & Schultz, B. (2006). Developing coordinated, multimodal, school based treatment for young adolescents with ADHD. *Education and Treatment of Children, 29* (2), 359-378.

- Falk, R. (1998). In criticism of the null hypothesis statistical test. *American Psychologist, 7*, 798-799.
- Falk, R., & Greenbaum, C. W. (1995). Significance tests die hard. *Theory and Psychology, 5*, 75-98.
- Faraone, S. V., & Biederman, J. (1997). Do attention deficit hyperactivity disorder and major depression share familial risk factors? *Journal of Nervous Mental Disorders, 185*, 533-541.
- Fidler, F., & Cumming, G. (2007). Lessons learned from statistical reform efforts in other disciplines. *Psychology in the Schools, 44*(5), 441-449.
- Fidler, F., Cumming, G., Thomason, N., Pannuzzo, D., Smith, J., Fyffe, P., et al. (2005). Toward improved statistical reporting in the *Journal of Consulting and Clinical Psychology*. *Journal of Consulting and Clinical Psychology, 73*(1), 136-143.
- Fischer, M., Barkley, R. A., Fletcher, K., & Smallish, L. (1993). The stability of dimensions of behavior in ADHD and normal children over an 8 year period. *Journal of Abnormal Child Psychology, 21*, 315-337.
- Ford, M. J., Poe, V., & Cox, J. (1993). Attending behaviors of ADHD children in math and reading using various

- types of software. *Journal of Computing in Childhood Education*, 4(2), 183-196.
- Frederick, B. P., & Olmi, D. J. (1994). Children with attention-deficit/hyperactivity disorder: A review of the literature on social skills deficits. *Psychology in the Schools*, 31, 288-296.
- Frick, R. W. (1996). The appropriate use of null hypothesis testing. *Psychological Methods*, 1(4), 379-390.
- Furr, M.R., & Bacharach, V.R. (2008). *Psychometrics: An introduction*. Thousand Oaks, CA: Sage Publications.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: An introduction* (7th ed.). Boston: Allyn & Bacon.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction* (8th ed.). Boston: Allyn & Bacon.
- Gershon, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of Attention Disorders*, 5(3), 143-154.
- Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage.
- Goldman, L. S., Genel, M., Bezman, R. J., & Stanetz, P. J. (1998). Diagnosis and treatment of attention-

- deficit/hyperactivity disorder in children and adolescents. *Journal of the American Medical Association*, 279, 1100-1107.
- Goldstein, S. (1994). Understanding and assessing ADHD and related educational and emotional disorders, *Therapeutic Care and Education*, (3)2, 111-129.
- Goldstein, S. (1999). Attention-deficit hyperactivity disorder. In S. Goldstein & C.R. Reynolds (Eds.), *Handbook of neurodevelopmental and genetic disorders in children* (pp. 154-184). New York: Guilford.
- Goldstein, S. & Schwebach, A. J. (2004). The comorbidity of pervasive developmental disorder and attention deficit hyperactivity disorder: Results of a retrospective chart review. *Journal of Autism and Developmental Disorders*, 34(3), 329-339.
- Gordon, M., Thomason, D., Cooper, S., & Ivers, C. L. (1991). Nonmedical treatment of ADHD/hyperactivity: The attention training system. *Journal of School Psychology*, 29, 151-159.
- Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Hillsdale, NJ: Erlbaum.

- Greenwood, C. R., & Abbot, M. (2001), The research to practice gap in special education. *Teacher Education and Special Education, 24*, 276-289.
- Grskovic, J. A., Zentall, S. S., & Stormont-Spurgin, M. (1995). Time estimation and planning abilities: Students with and without mild disabilities. *Behavioral Disorders, 20*(3), 197-203.
- Guilford, J. P. (1946). New standards for test evaluation. *Educational and Psychological Measurement, 6*, 427-439.
- Gureasko-Moore, S., DuPaul, G. J., & White, G. P. (2006). The effects of self-management in general education classrooms on the organizational skills of adolescents with ADHD. *Behavior Modification, 30*(2), 159-183.
- Hagen, R. L. (1997). In praise of the null hypothesis statistical test. *American Psychologist, 52*(1), 15-24.
- Hallahan, D. P., Lloyd, J. W., Kauffman, J. M., Weiss, M. P., & Martinez, E.A. (2005). *Learning disabilities: Foundations, characteristics, and effective teaching*. Boston: Pearson.
- Harlow, L. L., Muliak, S. A., & Steiger, J. H. (1997). *What if there were no significant tests?* Mahwah, NJ: Lawrence Erlbaum Associates.

- Harris, K. R., Friedlander, B. D., Saddler, B., Frizzelle, R., & Graham, S. (2005). Self-monitoring of attention versus self-monitoring of academic performance. *The Journal of Special Education, 39*(3), 145-156.
- Harris, R. J. (1997). Reforming significance testing via three-valued logic. In L. L. Harlow, S. A. Muliak, & J. H. Steiger (Eds.), *What if there were no significance tests?* (pp. 145-173). Mahwah, NJ: Lawrence Erlbaum Associates.
- Hart, E. L, Lahey, B. B., Loeber, R., Applegate, B., & Frick, P.J. (1995). Developmental change in attention-deficit hyperactivity disorder in boys: A four-year longitudinal study. *Journal of Abnormal Child Psychology, 23*, 729-749.
- Hechtman, L. Abikoff, H., Klein, R. G., Weiss, G., Resnitz, C., Kouri, J., et al. (2004). Academic achievement and emotional status of children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*(7), 812-820.
- Hendrickson, A. E., & White, P. O. (1964). Promax: A quick method for rotation to oblique simple structure. *British Journal of Statistical Psychology, 17*, 65-70.

- Hinshaw, S. P. (1987). On the distinction between attentional deficits/hyperactivity and conduct problems/aggression in child psychopathology. *Psychological Bulletin, 101*(3), 443-463.
- Hinshaw, S. P. (1994). *Attention deficits and hyperactivity in children*. Thousand Oaks, CA: Sage Publications.
- Hoffman, J. B., & DuPaul, G. J. (2000). Psychoeducational interventions for children and adolescents with Attention Deficit/Hyperactivity Disorder. *Child and Adolescent Psychiatric Clinics of North American, 9*(3), 647-661.
- Horn, W. F., Ialongo, N., Popovich, S., & Peradotto, D. (1987). Behavioral parent training and cognitive-behavioral self-control therapy with ADD-H children: Comparative and combined effects. *Journal of Clinical Child Psychology, 16*(1), 57-68.
- Huberty, C. J. (1994). *Applied discriminant analysis*. New York: Wiley.
- Huberty, C. J., & Hussein, M. H. (2003). Some problems in reporting use of discriminant analysis. *The Journal of Experimental Education, 71*, 177-191.

- Individuals with Disabilities Education Improvement Act
(2004). Individuals with Disabilities Education Act.
20 U.S.C. §1401 *et seq.*
- Jacobson, N. S., & Traux, P. (1991). Clinical significance:
A statistic approach to defining meaningful change in
psychotherapy research. *Journal of Consulting and
Clinical Psychology, 59*, 12-19.
- Jarratt, K. P., Riccio, C. A., & Siekieriski, B. M.
(2005). Assessment of attention deficit hyperactivity
disorder (ADHD) using the BASC and BRIEF. *Applied
Neuropsychology, 12*(2), 83-93.
- Jensen, P. S., Hinshaw, S. P., Kraemer, H. C., Lenora, N.,
Newcorn, J. H., Abikoff, H. B. et al. (2001). ADHD
comorbidity findings from the MTA study: Comparing
comorbid subgroups. *Journal of the American Academy of
Child & Adolescent Psychiatry, 40*(2), 147-158.
- Jensen, P. S., Martin, D., & Cantwell, D. P. (1997).
Comorbidity in ADHD: Implications for research,
practice, and DSM-IV. *Journal of the American Academy
of Child and Adolescent Psychiatry, 36*, 1065-1079.
- Jitendra, A. K., DuPaul, G. J., Someki, F., & Tresco, K. E.
(2008) Enhancing academic achievement for children
with attention-deficit hyperactivity disorder:

- Evidence from school-based intervention research. *Developmental Disabilities Research Reviews*, 14(4), 325-30.
- Johnston, C. & Mash, E. J. (2001). Families of children with attention-deficit/hyperactivity disorder: Review and recommendations for future research. *Clinical Child and Family Psychology Review*, 4(3), 183-207
- Johnston, C., Pelham, W. E., & Murphy, A. (1985). Peer relationships in ADDH and normal children: A developmental analysis of peer and teacher ratings. *Journal of Abnormal Child Psychology* 13(1), 89-100.
- Kamphaus, R. W. (2003). Assessment of Adaptive Behavior. In C. R. Reynolds & R. W. Kamphaus (Eds.), *Handbook of psychological and educational assessment of children* (2nd Ed., pp. 455-472). NY: Guilford Publications.
- Karraker, R. J. (1972). Increasing academic performance through home-managed contingency programs. *Journal of School Psychology*, 10(2), 175-179.
- Kauffman, J. M. (2005). *Characteristics of emotional and behavioral disorders of children and youth* (8th ed.). Upper Saddle River, NJ: Merrill-Prentice Hall.

- Kehle, T. J., Bray, M. A., Chafouleas, S. M., & Kawano, T. (2007). Lack of statistical significance. *Psychology in the Schools, 44*(5), 417-422.
- Kelley, M. L., & McCain, A. P. (1995). Promoting academic performance in inattentive children. *Behavior Modification, 19*(3), 357-375.
- Kerlinger, F.N. (1984). *Liberalism and conservatism: The nature and structure of social attitudes*. Hillsdale, NJ: Erlbaum.
- Kieffer, K. M., Reese, R. J., & Thompson, B. (2001). Statistical techniques employed in AERJ and JCP articles from 1988 to 1997: A methodological review. *Journal of Experimental Education, 69*(3), 280-310.
- Kirk, R. E. (1996). Practical significance: A concept whose time has come. *Educational and Psychological Measurement, 56*(5), 746-759.
- Klimkeit, E., Graham, C., Lee, P., Morling, M., Russon, D., & Tonge, B. (2006). Children should be seen and heard. *Journal of Attention Disorders, 10*(2), 181-191.
- Knapp, T. R. (1998). Comments on the statistical significance testing articles. *Research in the Schools, 5*(2), 39-41.

- Kolko, D. J., Loar, L. L., & Sturnick, D. (1990). Inpatient social-cognitive skills training with conduct disordered and attention deficit disordered children. *Journal of Child Psychology and Psychiatry, 31*, 737-748.
- Lahey, B. B., Green, K. D., & Forehand, R. (1980). On the independence of ratings of hyperactivity, conduct problems, and attention deficit in children: A multiple regression analysis. *Journal of Consulting and Clinical Psychology, 48*, 566-574.
- Lahey, B.B., Pelham, W.E., Schaughency, E.A., Atkins, M.S., Murphy, H.A., Hynd, G., Russo, & Hartdagan, S. (1980). Dimension and types of attention deficit disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 31*, 330-335.
- Landau, F., & Moore, L. A. (1991). Social skills deficits in children with ADHD. *School Psychology Review, 20*, 235-251.
- Landrum, T. J., Cook, B. G., Tankersley, M., & Fitzgerald, S. (2002). Teacher perceptions of the trustworthiness, usability, and accessibility of information from different sources. *Remedial and Special Education, 23*, 42-48.

- Langberg, J. M., Epstein, J. N., Altaye, M., Molina, B. S. G., Arnold, L. E., & Vietiello, B. (2008). The transition to middle school is associated with changes in the developmental trajectory of ADHD symptomatology in young adolescents with ADHD. *Journal of Clinical Child and Adolescent Psychology, 37*, 651-663.
- Langberg, J. M., Smith, B. H., Bogle, K. E., Schmidt, J. D., Cole, W. R., & Pender, C. A. (2006). A pilot evaluation of small group Challenging Horizons Program (CHP): A randomized trial. *Journal of Applied School Psychology, 23*(1), 31-58.
- Levin, J. R. (1998). What if there were no more bickering about statistical significance tests? *Research in the Schools, 4*(2), 43-53.
- Lewis, T., Hudson, S., Richter, M. & Johnson, N. (2004). Scientifically supported practices in emotional and behavioral disorders: A proposed approach and brief review of current practices. *Behavioral Disorders, 29*(3), 247-259.
- Livingston, R. L., Dykman, R. A., & Ackerman, P. T. (1990). The frequency and significance of additional self-reported psychiatric diagnoses in children with

attention deficit disorder. *Journal of Abnormal Child Psychology*, 18(5), 465-478.

Luitjohan, J. R. (2005). *Validity of school-based and analog observation in assessment of attention deficit hyperactivity disorder*. Psy.D. dissertation, Indiana State University. Retrieved March 24, 2009, from Dissertations & Theses: Full Text database. (Publication No. AAT 3199427).

Mathes, M. Y., & Bender, W. N. (1997). The effects of self-monitoring on children with attention-deficit/hyperactivity disorder who are receiving pharmacological interventions. *Remedial and Special Education*, 18, 121-128.

Mautone, J. A., DuPaul, G. J., & Jitendra, A. K. (2005). The effects of computer-assisted instruction on the mathematics performance and classroom behavior of children with ADHD. *Journal of Attention Disorders*, 9(1), 301-312.

Mayes, S. D., Calhoun, S. L., & Crowell, E. W. (2000). Learning disabilities and ADHD: Overlapping spectrum disorders. *Journal of Learning Disabilities*, 33, 417-424.

- McCartney, K. & Rosenthal, R. (2000). Effect size, practical importance, and social policy for children. *Child Development, 71* (1), 173-180.
- McLean, J. E., & Ernest, J. M. (1998). The role of statistical significance testing in educational research. *Research in the Schools, 5*(2), 15-22.
- Meehl, P.E. (1967). Theory-testing in psychology and physics: A methodological paradox. *Philosophy of Science, 34*, 103-115.
- Meehl, P. E. (1997). The problem is epistemology, not statistics: Replace significance tests by confidence intervals and quantify accuracy of risky numeral prediction. In L. L. Harlow, S. A. Muliak, & J. H. Steiger (Eds.), *What if there were no significance tests?* (pp. 145-173). Mahwah, NJ: Lawrence Erlbaum Associates.
- Melnick, S. M. & Hinshaw, S. P. (2000). Emotion regulation and parenting in AD/HD and comparison boys: Linkages with social behaviors and peer preference. *Journal of Abnormal Child Psychology, 28*(1), 73-86.
- Midgley, C. & Urban, T. (1992). The transition to middle school level schools: Making it a good experience for all students. *Middle School Journal, 24*(2), 5-14.

- Milich, R., Landau, S., Kilby, G, & Whitten, P. (1982).
Preschool peer perceptions of the behavior of
hyperactivity and aggressive children. *Journal of
Abnormal Child Psychology, 10*, 497-510.
- Miranda, A., Jarque, S., & Tarraga, R. (2006).
Interventions in school settings for students with
ADHD. *Exceptionality, 14*(1), 35-52.
- Mitsis, E. M., McKay, K. E., Halperin, J. M., Newcorn, J.
H., & Schulz, K. P. (2000). Parent-teacher concordance
for DSM-IV attention hyperactivity disorder. *Journal
of the American Academy of Child and Adolescent
Psychiatry, 39*, 308-313.
- Mittag, K. C., & Thompson, B. (2000). A national survey of
AERA members' perceptions of statistical significance
tests and other statistical issues. *Educational
Researcher, 29*(4), 14-20.
- MTA Cooperative Group. (1999). A 14-month randomized
clinical trial of treatment strategies for attention-
deficit hyperactivity disorder. *Archives of General
Psychiatry, 56*, 1073-1086.
- Muliak, S. A., Raju, N. S., & Harshman R.A. (1997). There
is a time and place for significance testing. In L. L.
Harlow, S. A. Muliak, & J. H. Steiger (Eds.), *What if*

there were no significance tests? (pp. 145-173).

Mahwah, NJ: Lawrence Erlbaum Associates.

Nadeau, K. (1995). *A comprehensive guide to attention deficit disorder in adults*. New York: Bruner/Mazel.

Nix, T. W., & Barnette, J. J. (1998). The data analysis dilemma: Ban or abandon. A review of null hypothesis significance testing. *Research in the Schools*, 5(2), 3-14.

No Child Left Behind (2002). *Proven methods: Questions and answers on No Child Left Behind*. Retrieved on August 1, 2004, from

<http://www.ed.gov/nclb/methods/whatworks/edpicks.jhtml>

Nunally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Oakes, M. (1986). *Statistical inference: A commentary for the social and behavioral sciences*. New York: Wiley.

Onwuegbuzie, A. J., & Levin. (2003). Do effect-size measures measure up?: A brief assessment. *Learning Disabilities: A Contemporary Journal*, 1, 37-40.

Ota, K. R., & DuPaul, G. J. (2002). Task engagement and mathematics performance in children with attention-deficit hyperactivity disorder: Effects of

supplemental computer instruction. *School Psychology Quarterly*, 17(3), 242-257.

Owens, J. S., Richerson, L., Beilstein, E. A., Crane, A., Murphy, C. E., & Vancouver, J. B. (2005). School-based mental health programming for children with inattentive and disruptive behavior problems: First-year treatment outcome. *Journal of Attention Disorders*, 9(1), 261-274.

Palomares, R. S. (1992). *The structure of behavior and the eye of the beholder: Rater-gender by ratee-gender interactions*. (Doctoral dissertation, Texas A&M, 1992). Retrieved January 1, 2009, from http://p8331-polychrest.tamu.edu.ezproxy.tamu.edu:2048/V/BV9K1JLKNI7TEXMNVA1C9ULBGE96XSFNQCY77CKK89HLDVMVF31-35876?func=quick-3&short-format=002&set_number=024801&set_entry=000005&format=99.

Parmar, R.S., Cawley, J.F., & Frazita, R. (1996). Word problem solving by students with and without mild disabilities. *Exceptional Children*, 62, 415-429.

Pelham, W. E., & Bender, M. E. (1982). Peer relationships in hyperactive children: Description and treatment.

Advances in Learning and Behavioral Disabilities, 1,
365-436.

Pelham, W. E., Carlson, C., Sams, S. E., Vallano, G.,
Dixon, M.J., & Hoza, B. (1993). Separate and combined
effects of methylphenidate and behavior modification
on boys with attention deficit-hyperactivity disorder
in the classroom. *Journal of Consulting and Clinical
Psychology, 61*(3), 506-515.

Pelham, W. E., & Gnagy, E. M. (1999). Psychosocial and
combined treatments for ADHD. *Mental Retardation and
Developmental Disabilities, 5,* 225-236.

Pelham, W. E., Wheeler, T., & Chronis, A. (1998).
Empirically supported psychosocial treatments for
attention deficit hyperactivity disorder. *Journal of
Clinical Child Psychology, 27,* 190-205.

Pfiffner, L. J. (1996). *All about ADHD: The complete
practical guide for classroom teachers.* New York:
Scholastic.

Purdie, N., Hattie, J., & Carroll, A. (2002). A review of
the research on interventions for attention deficit
hyperactivity disorder: What works best? *Review of
Educational Research, 72*(1), 61-99.

- Quinn, P. (1995). *Adolescents and ADD: Gaining the Advantage*. New York: Magination Press.
- Raggi, V. L., & Chronis, A. M. (2006). Interventions to address the academi impairment of children and adolescents with ADHD. *Clinical Child and Family Psychology Review, 9*(2), 85-111.
- Rapport, M. D., Murphy, A., & Bailey, J. S. (1982). Ritalin vs. response cost in the control of hyperactive children. *Journal of Applied Behavior Analysis, 15*, 205-216.
- Reif, S. F. (2005). *How to reach and teach children with add/adhd* (2nd ed.). San Fransisco, CA: Jossey-Bass.
- Reitman, D., Hupp, S. D. A., O'Callahan, P. M., Gulley, V., & Northup J. (2001). The influence of token economy an methylphenidate on attentive and disruptive behavior during sports with ADHD-diagnosed children. *Behavior Modification, 25*, 305-323.
- Reynolds, C.R. (1982). Methods for detecting constructive and predictive bias. In R.A. Berk (Ed.) *Handbook of methods for detecting test bias* (pp. 199-227). Baltimore, MD: Johns Hopkins University Press.

- Reynolds, C. R., & Kamphaus, R. W. (1992). *Behavior assessment systems for children*. Circle Pines, MN: American Guidance Service.
- Reynolds, C. R., & Kamphaus, R. W. (2004). *Behavior assessment for children* (2nd ed.). Circle Pines, MN: AGS Publishing.
- Reynolds, C. R., & Kaiser, S. M. (1990). Test bias in psychological assessment. In T.B. Gutkin and C.R. Reynolds (Eds.). *Handbook of school psychology* (pp. 487-525) (2nd ed.). NY: John Wiley & Sons.
- Richardson, E., Kupietz, S., & Maitinsky, S. (1987). What is the role of academic intervention in the treatment of hyperactive children with reading problems? *Journal of Children in Contemporary Society*, 19(1), 153-167.
- Robin, A. L. (1990). Training families with ADHD adolescents. In R.A. Barkley (Ed.), *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (pp. 462-497). New York: Guilford Press.
- Robin, A. L., & Patterson, G. R. (1994). *Negotiating adolescence: Parents and adolescents living together*. New York: Guilford Press.

- Robinson, D., & Levin, J. (1997). Reflections on statistical and substantive significance, with a slice of replication. *Educational Researcher*, 26(5), 21-26.
- Robinson, P. W., Newby, T. J., & Ganzell, S. L. (1981). A token system for a class of underachieving hyperactive children. *Journal of Applied Behavior Analysis*, 14, 307-315.
- Rock, M. L. (2005). Use of strategic self-monitoring to enhance academic engagement, productivity, and accuracy of students with and without exceptionalities. *Journal of Positive Behavior Interventions*, 7, 3-17.
- Rosenthal, R., & Gaito, J. (1963). The interpretation of levels of significance by psychological researchers. *Journal of Educational Psychology*, 55, 33-38.
- Rosenthal, R., & Gaito, J. (1964). Further evidence for the cliff effect in interpretation of levels of significance. *Psychological Reports*, 15(2), 570.
- Rosnow, R. L., & Rosenthal, R. (1989). Statistical procedures and the justification of knowledge in psychological science. *American Psychologist*, 44, 1276-1284.

- Rozeboom, W. W. (1960). The fallacy of the null hypothesis significance test. *Psychological Bulletin*, 57, 416-428.
- Rozeboom, W. W. (1997). Statistical significance testing and cumulative knowledge in psychology: Implications for training of researchers. In L.L. Harlow, S.A. Muliak, & J. H. Steiger (Eds.), *What if there were no significance tests?* (pp. 115-129). Mahwah, NJ: Lawrence Erlbaum Associates.
- Schmidt, F. L. (1996). Statistical significance testing and cumulative knowledge in psychology: Implications for training of researchers. *Psychological Methods*, 1, 115-129.
- Schmidt, F. L., & Hunter, J. E. (1997). Eight common but false objections to the discontinuation of significance testing in the analysis of research data. In *What if there were no significance tests?* (pp. 37-64). Mahwah, NJ: Lawrence Erlbaum Associates.
- Schwean, V.L., Burt, K., & Saklofske, D.H. (1999). Correlates of mother- and teacher-ratings of hyperactivity-impulsivity and inattention in children with AD/HD. *Canadian Journal of School Psychology*, 15, 43-62.

- Semrud-Clikeman, M., Biederman, J., Sprich-Buckminster, S., Lehman, B. K., Faraone, S. V., & Norman, D. (1992). Comorbidity between ADDH and learning disability: A review and report in a clinically referred sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*(1), 439-448.
- Shaw, R., & Lewis, R. (2005). The impact of computer-mediated and traditional academic task presentation on the performance and behavior of children with ADHD. *Journal of Research in Special Educational Needs, 5*(2), 47-54.
- Shimabukuro, S. M., Prater, M. A., Jenkins, A., & Edelen-Smith, P. (1999). The effects of self-monitoring of academic performance on students with learning disabilities and ADD/ADHD. *Education and Treatment of Children, 4*, 397-414.
- Skinner, C. H., Johnson, C. W., Larkin, M.J., Lessley, D.J. & Glowacki, M.L. (1995). The influence of rate of presentation during taped-words interventions on reading performance. *Journal of Emotional & Behavioral Disorders, 3*(4), 214-224.
- Smith, A. J., Brown, R. T., Bunke, V., Blount, R. L. & Christophersen, E. (2002). Psychosocial adjustment and

- peer competence of siblings of children with attention-deficit/hyperactivity disorder. *Journal of Attention Disorders*.5(3), 165-177.
- Smith, B. H., Waschbusch, D. A., Willoughby, M. T., & Evans, S. (2000). The efficacy, safety, and practicality of treatments for adolescents with attention-deficit/hyperactivity disorder (ADHD). *Clinical Child and Family Psychology Review*, 3(4), 243-267.
- Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland Adaptive Behavior Scales*. Circle Pines, MN: American Guidance Service.
- Stein, D. B. (1999). A medication free parent management program for children diagnosed as ADHD. *Ethical Human Sciences and Services*, 1(1), 61-79.
- Szatmari, P., Offord, D. R. and Boyle, M. H. (1989). Ontario Child Health Study: Prevalence of attention deficit disorders with hyperactivity. *Journal of Child Psychology and Psychiatry*, 30: 219-230.
- Tannock, R. (2000). Attention-deficit/hyperactivity disorder with anxiety disorders. In T.E. Brown (Ed.) *Attention-deficit disorders and comorbidities in*

children, adolescents, and adults (pp.125-170).

Washington, DC: American Psychiatric Press.

Thompson, B. (1992). Two and one-half decades of leadership in measurement and evaluation. *Journal of Counseling and Development, 70*, 434-438.

Thompson, B. (1993). The use of statistical significance tests in research: Bootstrap and other alternatives. *Journal of Experimental Education, 61*, 361-377.

Thompson, B. (1996). AERA editorial policies regarding statistical significance testing: Three suggested reforms. *Educational Researcher, 25*(2), 26-30.

Thompson, B. (1998). Statistical significance and effect size reporting: Portrait of a possible future. *Research in the Schools, 5*(2), 33-38.

Thompson, B. (1999). Improving research clarity and usefulness with effect size indices as supplements to statistical significance tests. *Exceptional Children, 65*(3), 329-337

Thompson, B. (2002). "Statistical," "practical," and "clinical": How many kinds of significance do counselors need to consider? *Journal of Counseling & Development, 80*, 64-71.

- Thompson, B. (2004a). *Exploratory and confirmatory factor analysis: Understanding concepts and applications* (3rd ed.). Washington, DC: American Psychological Association.
- Thompson, B. (2004b). The "significance" crisis in psychology and education. *The Journal of Socio-Economics, 33*, 607-613.
- Thompson, B. (2006). *Foundations of behavioral statistics: An insight-based approach*. New York: The Guilford Press.
- Thompson, B. (2007). Effect sizes, confidence intervals, and confidence intervals for effect sizes. *Psychology in the Schools, 44*(5), 423-431.
- Thompson, B., & Daniel, L. G. (1996). Factor analytic evidence for the construct validity of scores: A historical overview and some guidelines. *Educational and Psychological Measurement, 56*, 197-208.
- Tukey, J. W. (1991). The philosophy of multiple comparisons. *Statistical Science, 6*, 100-116.
- Turnbull, A., Turnbull, R., Shank, M., & Leal, D. (1999). *Exceptional lives: Special education in today's society*. Columbus, OH: Prentice-Hall, Inc.

- United States Department of Education: Institute of Education Science (DOE; 2007). Retrieved November 27, 2007, from United States Department of Education Web site:
<http://www.ed.gov/about/offices/list/ies/index.html>
- Vacha-Haase, T., & Thompson, B. (2004). How to estimate and interpret various effect sizes. *Journal of Consulting Psychology, 51*(4), 473-481.
- Van der Oord, S., Van der Meulen, E. M., Oosterlaan, J., Buitelaar, J. K., & Emmelkamp, P. M. G. (2005). A psychometric evaluation of the social skills rating system in children and attention deficit hyperactivity disorder. *Behavioral Research and Therapy, 43*, 733-746.
- Vitiello, B. & Sherrill, J. (2007). School-based interventions for students with attention deficit hyperactivity disorder: Research implications and perspectives. *School Psychology Review, 36*, 287-290.
- Walcott, C.M., & Landau, S. (2004). The relationship between disinhibition and emotional regulation in boys with attention deficit hyperactivity disorder. *Journal of Clinical Child and Adolescent Psychology, 33*, 772-782.

- Walker, H. M., Forness, S. R., Kauffman, J. M., Epstein, M. H., Gresham, F. M., Nelson, C. M., et al. (1998) Macro-social validation: Referencing outcomes in behavioral disorders to societal issues and problems. *Behavioral Disorders; 24*, 7-18.
- Weis, R. & Smenner, L. (2007). Construct validity of the Behavior Assessment System for Children (BASC) Self-Report of Personality evidence from adolescents referred to residential treatment. *Journal of Psychoeducational Assessment, (25)2*, 111-126.
- Wilens, T. E., Biederman, J., Brown, S., Tanguay, S., Monuteaux, M. C., Blake, C., et al. (2002). Psychiatric comorbidity and functioning in clinically referred preschool children and school-age youths with ADHD. *Journal of the American Academy of Child & Adolescent Psychiatry, 41(3)*, 262-268.
- Wilkinson, L., & the Task Force on Statistical Inference. (1999). Statistical methods in psychology journals. *American Psychologist, 54(8)*, 594-604.
- Wingenfeld, S. A. (2002). Assessment of behavioral and emotional difficulties in children and adolescents. *Peabody Journal of Education, 77(2)*, 85-105.

- Zentall, S. S. (1989). Attentional cuing in spelling tasks for hyperactive and comparison regular classroom children. *The Journal of Special Education, 23*(1), 83-93.
- Zentall, S. S. (2005). Theory- and evidence-based strategies for children with attentional problems. *Psychology in the Schools, 42*(8), 821-836.
- Zentall, S. S., & Dwyer, A. M. (1989). Color effects on the impulsivity and activity on hyperactive children. *Journal of School Psychology, 27*, 165-173.
- Zentall, S. S., Falkenberg, S. D., & Smith, L. B. (1985). Effects of color stimulation and information on the copying performance of attention-problem adolescents. *Journal of Abnormal Child Psychology, 13*(4), 501-511.
- Zentall, S. S., Grskovic, J. A., Javorsky, J., & Hall, A. M. (2000). Effects of noninformational color on the reading test performance of students with and without attentional deficits. *Diagnostique, 25*(2), 129-146.
- Zentall, S. S., & Kruczek, T. (1988). The attraction of color for active attention-problem children. *Exceptional Child, 54*, 91-95.
- Zentall, S. S., & Shaw, J. H. (1980). Effects of classroom noise on performance and activity of second-grade

hyperactive and control children. *Journal of Educational Psychology*, 72(6), 830-840.

Zuckerman, M., Hodgins, S. R., Zuckerman, A., & Rosenthal, R. (1993). Contemporary issues in the analysis of data: A survey of 551 psychologists. *Psychological Science*, 4(1), 49-53.

APPENDIX A

The pattern and structure coefficients for the first-order factor analyses of teacher ratings of children are in a separate PDF file.

APPENDIX B

The pattern and structure coefficients for the first-order factor analyses of teacher ratings of adolescents are in a separate PDF file.

APPENDIX C

The pattern and structure coefficients for the first-order factor analyses of parent ratings of children are in a separate PDF file.

APPENDIX D

The pattern and structure coefficients for the first-order factor analyses of parent ratings of adolescents are in a separate PDF file.

APPENDIX E

Appendix E contains items from the TRS-C with effect sizes indicating the magnitude of difference between the target and comparison groups.

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.68	0.791	1.94	0.893	0.20
Has poor self-control.	HYP	0.41	0.682	1.41	0.931	0.17
Loses temper too easily.	AGG	0.24	0.547	1.1	0.99	0.16
Is easily distracted.	ATN	1.03	0.838	2.18	0.829	0.16
Defies teachers.	AGG	0.19	0.447	0.87	0.809	0.15
Acts out of control.	HYP	0.21	0.507	0.95	0.828	0.15
Is easily distracted from class work.	ATN	0.91	0.854	2.04	0.915	0.15
Does strange things.	ATP	0.15	0.407	0.76	0.783	0.15
Acts strangely.	ATP	0.16	0.407	1.29	0.9	0.15
Is overly active.	HYP	0.31	0.617	1.14	1.006	0.13
Babbles to self.	ATP	0.08	0.311	0.54	0.749	0.12
Acts without thinking.	HYP	0.59	0.699	1.44	0.855	0.12
Argues when denied own way.	AGG	0.43	0.701	1.28	0.982	0.12
Picks at things like own hair, nails, or clothing.	ATP	0.14	0.421	0.73	1.003	0.12
Pays attention.	ATN	2.08	0.803	1.18	0.695	0.11
Disobeys.	CND	0.39	0.59	1.07	0.779	0.11
Gets upset when plans are changed.	ADT	0.43	0.592	1.13	0.858	0.11

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Is easily upset.	DEP	0.41	0.655	1.17	0.917	0.11
Listens attentively.	ATN	1.96	0.834	1.06	0.681	0.11
Has good study habits.	STD	1.86	0.956	0.83	0.812	0.11
Has trouble staying seated.	HYP	0.52	0.757	1.38	0.978	0.11
Interrupts others when they are speaking.	HYP	0.55	0.687	1.32	0.851	0.11
Has trouble keeping up in class.	LRN	0.61	0.798	1.5	0.969	0.11
Is well organized.	STD	1.72	0.954	0.74	0.789	0.10
Refuses to join group activities.	WDL	0.14	0.388	0.59	0.685	0.10
Threatens to hurt others.	AGG	0.08	0.299	0.45	0.657	0.10
Listens carefully.	ATN	1.97	0.837	1.13	0.643	0.10
Adjusts well to changes in routine.	ADT	2	0.821	1.17	0.782	0.10
Is negative about things.	DEP	0.31	0.544	0.9	0.793	0.10
Listens to directions.	ATN	2.08	0.837	0.57	0.873	0.09
Breaks the rules.	CND	0.53	0.644	1.2	0.804	0.09
Gets into trouble.	CND	0.57	0.689	0.16	0.5	0.09
Disrupts the schoolwork of other children.	HYP	0.54	0.684	1.24	0.841	0.09
Lies.	CND	0.31	0.542	0.87	0.793	0.09
Disrupts other children's activities.	HYP	0.45	0.655	1.11	0.803	0.09
Has trouble getting information when needed.	FUN	0.5	0.643	1.14	0.8	0.09

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Says, 'I hate myself.'	DEP	0.03	0.213	0.3	0.564	0.09
Tracks down information when needed.	FUN	1.48	0.917	0.62	0.726	0.08
Has trouble making new friends.	WDL	0.34	0.586	0.61	0.756	0.08
Says things that make no sense.	ATP	0.21	0.479	0.82	0.775	0.08
Seeks revenge on others.	AGG	0.13	0.389	0.55	0.749	0.08
Bothers other children when they are working.	HYP	0.51	0.676	1.17	0.842	0.08
Seeks attention while doing schoolwork.	HYP	0.58	0.743	0.71	0.805	0.08
Annoys others on purpose.	AGG	0.33	0.609	0.94	0.931	0.08
Reads assigned chapters.	STD	2.07	0.997	1.16	0.965	0.08
Seems out of touch with reality.	ATP	0.13	0.396	0.55	0.804	0.08
Has reading problems.	LRN	0.63	0.879	1.45	1.073	0.08
Is pessimistic.	DEP	0.26	0.519	0.76	0.775	0.08
Calls other children names.	AGG	0.32	0.558	0.85	0.796	0.08
Recovers quickly after a setback.	ADT	1.94	0.795	1.24	0.725	0.08
Works well under pressure.	LED	1.41	0.924	0.6	0.714	0.07
Has difficulty explaining rules of games to others.	FUN	0.44	0.634	1.04	0.909	0.07

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Adjusts well to new teachers.	ADT	2.24	0.813	1.51	0.876	0.07
Makes friends easily.	WDL	1.99	0.897	1.19	0.871	0.07
Has spelling problems.	LRN	0.8	0.889	1.6	1.074	0.07
Deceives others.	CND	0.25	0.513	0.73	0.812	0.07
Does not complete tests.	LRN	0.26	0.55	0.78	0.838	0.07
Cannot wait to take turn.	HYP	0.4	0.659	0.99	0.864	0.07
Completes homework.	STD	2.41	0.781	0.47	0.641	0.07
Tries to bring out the best in other people.	SKL	1.61	0.915	0.83	0.789	0.07
Is a 'good sport.'	ADT	2.08	0.888	1.32	0.87	0.07
Uses others' things without permission.	CND	0.26	0.512	0.73	0.752	0.07
Is chosen last by other children for games.	WDL	0.35	0.602	0.89	0.898	0.07
Has problems with mathematics.	LRN	0.71	0.825	1.43	1.005	0.07
Says, 'please' and 'thank you.'	SKL	2.12	0.823	1.43	0.822	0.07
Is good at getting people to work together.	LED	1.37	0.891	0.64	0.699	0.07
Says, 'I don't have any friends.'	DEP	0.12	0.35	1.82	1.225	0.07
Complains about being teased.	DEP	0.33	0.564	0.3	0.686	0.06

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Analyzes the nature of a problem before starting to solve it.	STD	1.35	0.845	0.67	0.724	0.06
Makes decisions easily.	LED	1.71	0.799	1.06	0.745	0.06
Has poor handwriting or printing.	LRN	0.63	0.856	1.36	1.172	0.06
Hits other children.	AGG	0.13	0.376	0.79	0.86	0.06
Teases others.	AGG	0.36	0.565	0.85	0.809	0.06
Is easily annoyed by others.	CRT	0.47	0.637	1.98	1.168	0.06
Is unclear when presenting ideas.	FUN	0.64	0.687	1.21	0.826	0.06
Says, 'I want to die' or 'I wish I were dead.'	DEP	0	0.069	0.12	0.37	0.06
Says, 'Nobody likes me.'	DEP	0.11	0.357	0.43	0.68	0.06
Communicates clearly.	FUN	2.17	0.809	1.53	0.805	0.06
Quickly joins group activities.	WDL	1.91	0.881	1.22	0.805	0.06
Seems to take setbacks in stride.	ADT	1.76	0.951	1.01	0.793	0.06
Encourages others to do their best.	SKL	1.53	0.902	0.84	0.805	0.06
Sneaks around.	CND	0.26	0.497	0.67	0.8	0.06
Refuses to talk.	WDL	0.15	0.402	0.49	0.659	0.06
Is usually chosen as a leader.	LED	1.1	0.879	0.45	0.673	0.05
Acts confused.	ATP	0.45	0.632	0.94	0.723	0.05

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Is easily soothed when angry.	ADT	1.81	0.961	1.1	0.807	0.05
Responds appropriately when asked a question.	FUN	2.29	0.776	1.71	0.77	0.05
Complains that lessons go too fast.	LRN	0.23	0.481	0.45	0.665	0.05
Eats too little.	CRT	0.13	0.376	0.94	0.875	0.05
Gets failing school grades.	LRN	0.34	0.634	0.82	0.842	0.05
Is able to describe feelings accurately.	FUN	1.95	0.872	1.33	0.767	0.05
Compliments others.	SKL	1.45	0.827	0.87	0.699	0.05
Is sad.	DEP	0.38	0.54	0.77	0.66	0.05
Is clear when telling about personal experiences.	FUN	2.02	0.836	1.42	0.841	0.05
Gives good suggestions for solving problems.	LED	1.57	0.866	0.01	0.103	0.05
Bullies others.	AGG	0.19	0.47	0.55	0.763	0.05
Worries about things that cannot be changed.	ANX	0.38	0.555	0.75	0.738	0.05
Seems lonely.	DEP	0.32	0.56	0.74	0.81	0.05
Plays alone.	WDL	0.45	0.578	0.87	0.758	0.05
Reads.	STD	2.17	0.852	1.57	0.944	0.05
Asks to make up missed assignments.	STD	1.3	1.08	0.45	0.719	0.05

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Makes suggestions without offending others.	SKL	1.67	0.883	1.07	0.793	0.05
Seems unaware of others.	ATP	0.29	0.526	0.67	0.793	0.05
Shares toys or possessions with other children.	ADT	2.05	0.852	1.48	0.771	0.04
Congratulates others when good things happen to them.	SKL	1.65	0.875	1.07	0.823	0.04
Eats things that are not food.	CRT	0.03	0.196	0.2	0.537	0.04
Offers help to other children.	SKL	1.59	0.886	1.03	0.816	0.04
Is creative.	LED	1.72	0.83	1.2	0.815	0.04
Shows interest in others' ideas.	SKL	1.82	0.785	0.97	0.733	0.04
Steals at school.	CND	0.04	0.231	0.21	0.536	0.04
Is nervous.	ANX	0.43	0.591	0.78	0.798	0.03
Cheats in school.	CND	0.18	0.434	0.44	0.639	0.03
Is fearful.	ANX	0.27	0.492	0.56	0.681	0.03
Hears sounds that are not there.	ATP	0.01	0.079	0.08	0.342	0.03
Has stomach problems.	SOM	0.13	0.398	0.35	0.624	0.03
Provides home address when asked.	FUN	2.34	1.061			0.02
Provides own telephone number when asked.	FUN	2.45	0.968	1.33	0.716	0.02

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Avoids other children.	WDL	0.17	0.402	0.37	0.595	0.02
Cries easily.	DEP	0.19	0.488	0.43	0.679	0.02
Has toileting accidents.	CRT	0.03	0.225	1.25	0.706	0.02
Complains about health.	SOM	0.21	0.504	0.45	0.681	0.02
Visits the school nurse.	SOM	0.33	0.55	0.56	0.672	0.02
Worries.	ANX	0.72	0.626	0.99	0.81	0.02
Has headaches.	SOM	0.21	0.449	0.4	0.553	0.02
Says, 'I'm afraid I will make a mistake.'	ANX	0.25	0.504	0.45	0.681	0.02
Complains of pain.	SOM	0.18	0.453	0.36	0.6	0.01
Has a hearing problem.	CRT	0.02	0.158	0.09	0.384	0.01
Has eye problems.	CRT	0.13	0.462	1.27	0.833	0.01
Falls down.	CRT	0.1	0.328	0.22	0.455	0.01
Is afraid of getting sick.	SOM	0.06	0.234	0.14	0.47	0.01
Sees things that are not there.	ATP	0.02	0.161	0.08	0.372	0.01
Eats too much.	CRT	0.07	0.324	0.18	0.548	0.01
Gets sick.	SOM	0.45	0.559	0.59	0.601	0.01
Says, 'I get nervous during tests' or 'Tests make me nervous.'	ANX	0.33	0.577	0.47	0.642	0.01
Throws up after eating.	CRT	0.01	0.111	0.03	0.177	0.00
Complains of shortness of breath.	SOM	0.03	0.183	0.06	0.297	0.00
Worries about what other children think.	ANX	0.71	0.687	0.78	0.748	0.00

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has fevers.	SOM	0.15	0.357	0.16	0.382	0.00
Has seizures.	CRT	0.01	0.12	1.72	0.955	0.00

APPENDIX F

Appendix F contains items from the TRS-A with effect sizes indicating the magnitude of difference between the target and comparison groups.

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.50	0.689	1.44	0.900	0.16
Has poor self-control.	HYP	0.26	0.556	1.06	0.967	0.16
Has reading problems.	LRN	0.27	0.573	1.09	1.007	0.16
Is easily distracted.	ATN	0.57	0.758	1.53	0.921	0.15
Threatens to hurt others.	AGG	0.07	0.279	0.47	0.67	0.13
Acts without thinking.	HYP	0.46	0.636	1.22	0.881	0.13
Disobeys.	CND	0.28	0.526	0.9	0.834	0.12
Has spelling problems.	LRN	0.51	0.696	1.28	0.97	0.11
Disrupts the schoolwork of other children.	HYP	0.35	0.607	1.03	0.901	0.11
Acts out of control.	HYP	0.13	0.412	0.63	0.795	0.11
Defies teachers.	AGG	0.2	0.469	0.75	0.799	0.11
Disrupts other adolescents' activities.	HYP	0.35	0.598	1.02	0.909	0.11
Lies.	CND	0.24	0.497	0.81	0.812	0.11
Has difficulty explaining rules of games to others.	FUN	0.35	0.558	0.98	0.88	0.11
Is easily upset.	DEP	0.35	0.592	1.01	0.895	0.11
Annoys others on purpose.	AGG	0.31	0.587	0.97	0.918	0.11

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Interrupts others when they are speaking.	HYP	0.33	0.575	0.97	0.88	0.11
Is well organized.	STD	1.81	0.943	0.88	0.793	0.11
Has problems with mathematics.	LRN	0.56	0.704	1.31	0.905	0.11
Seeks attention while doing schoolwork.	HYP	0.39	0.643	1.06	0.888	0.10
Loses temper too easily	AGG	0.21	0.509	0.79	0.954	0.10
Takes careful notes during lectures.	STD	1.72	0.951	0.8	0.86	0.10
Complains about being teased.	DEP	0.15	0.413	0.62	0.764	0.10
Breaks the rules.	CND	0.38	0.56	0.93	0.797	0.10
Works well under pressure.	LED	1.58	0.89	0.73	0.744	0.10
Has good study habits.	STD	1.91	0.948	0.99	0.863	0.10
Argues when denied own way.	AGG	0.38	0.647	1.07	1.004	0.10
Has trouble getting information when needed.	FUN	0.38	0.568	0.95	0.716	0.10
Acts strangely.	ATP	0.21	0.497	0.74	0.787	0.10
Gets into trouble.	CND	0.41	0.631	1.04	0.826	0.10
Has poor handwriting or printing.	LRN	0.39	0.7	1.11	1.037	0.09
Has trouble staying seated.	HYP	0.26	0.588	0.88	0.964	0.09
Calls out in class.	HYP	0.39	0.639	1.04	0.988	0.09

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Deceives others.	CND	0.21	0.471	0.7	0.797	0.09
Has trouble making new friends.	WDL	0.25	0.548	0.82	0.927	0.09
Says things that make no sense.	ATP	0.17	0.432	0.62	0.741	0.09
Tries to do well in school.	STD	2.35	0.81	1.6	0.857	0.09
Has trouble keeping up in class.	LRN	0.41	0.669	1.05	0.864	0.09
Seeks revenge on others.	AGG	0.11	0.344	0.48	0.721	0.09
Listens to directions.	ATN	2.21	0.8	1.49	0.756	0.09
Listens carefully.	ATN	2.05	0.828	1.32	0.717	0.08
Is easily annoyed by others.	CRT	0.41	0.593	0.97	0.842	0.08
Completes homework.	STD	2.24	0.841	1.5	0.888	0.08
Is unclear when presenting ideas.	FUN	0.53	0.639	1.09	0.767	0.08
Makes friends easily.	WDL	1.98	0.816	1.26	0.922	0.08
Does not pay attention to lectures.	ATN	0.57	0.692	1.18	0.774	0.08
Sneaks around.	CND	0.19	0.461	0.63	0.768	0.08
Seems out of touch with reality.	ATP	0.13	0.405	0.52	0.69	0.08
Uses foul language.	CND	0.22	0.478	0.68	0.859	0.08
Pays attention.	ATN	2.25	0.784	1.6	0.708	0.07
Asks to make up missed assignments.	STD	1.87	1.01	1.03	0.984	0.07

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Reads assigned chapters.	STD	2.09	0.911	1.33	0.91	0.07
Adjusts well to changes in routine.	ADT	2.03	0.83	1.34	0.858	0.07
Gets failing school grades.	LRN	0.33	0.622	0.86	0.76	0.07
Is negative about things.	DEP	0.42	0.604	0.94	0.828	0.07
Bullies others.	AGG	0.12	0.368	0.47	0.75	0.07
Is a 'good sport.'	ADT	2.16	0.835	1.49	0.878	0.07
Tracks down information when needed.	FUN	1.87	0.877	1.18	0.772	0.07
Has strange ideas.	ATP	0.2	0.457	0.59	0.726	0.07
Cannot wait to take turn.	HYP	0.19	0.46	0.59	0.779	0.07
Adjusts well to changes in plans.	ADT	1.9	0.863	1.24	0.789	0.06
Responds appropriately when asked a question.	FUN	2.35	0.733	1.78	0.772	0.06
Is overly active.	HYP	0.23	0.656	0.71	0.935	0.06
Uses the Internet effectively for schoolwork.	STD	1.88	0.948	1.16	0.816	0.06
Complains about health.	SOM	0.12	0.372	0.44	0.688	0.06
Gets upset when plans are changed.	ADT	0.31	0.521	0.73	0.671	0.06
Teases others.	AGG	0.35	0.565	0.81	0.796	0.06
Complains of pain.	SOM	0.13	0.381	0.45	0.669	0.06
Calls other adolescents names.	AGG	0.27	0.546	0.71	0.794	0.06

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Adjusts well to new teachers.	ADT	2.05	0.884	1.39	0.871	0.06
Analyzes the nature of a problem before starting to solve it.	STD	1.43	0.897	0.77	0.741	0.06
Uses others' things without permission.	CND	0.18	0.427	0.53	0.69	0.06
Seems to take setbacks in stride.	ADT	1.79	0.897	1.13	0.886	0.06
Communicates clearly	FUN	2.13	0.802	1.53	0.837	0.06
Is pessimistic.	DEP	0.3	0.57	0.74	0.812	0.06
Shows interest in others' ideas.	SKL	1.83	0.783	1.28	0.71	0.06
Is good at getting people to work together.	LED	1.35	0.875	0.73	0.754	0.05
Seems lonely.	DEP	0.34	0.619	0.8	0.87	0.05
Babbles to self.	ATP	0.09	0.33	0.37	0.678	0.05
Is usually chosen as a leader.	LED	1.16	0.876	0.57	0.667	0.05
Makes decisions easily.	LED	1.67	0.806	1.11	0.779	0.05
Is chosen last by other adolescents for games.	WDL	0.29	0.584	0.72	0.829	0.05
Tries to bring out the best in other people.	SKL	1.46	0.865	0.87	0.754	0.05
Steals at school.	CND	0.02	0.158	0.18	0.494	0.05
Has headaches.	SOM	0.2	0.443	0.52	0.644	0.05
Hits other adolescents.	AGG	0.11	0.33	0.36	0.571	0.05

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Worries about things that cannot be changed.	ANX	0.4	0.557	0.8	0.81	0.05
Refuses to join group activities.	WDL	0.18	0.483	0.52	0.658	0.05
Says, 'I don't have any friends.'	DEP	0.06	0.29	0.3	0.654	0.05
Does not complete tests.	LRN	0.23	0.486	0.56	0.662	0.05
Says, 'Nobody likes me.'	DEP	0.05	0.429	0.25	0.572	0.04
Makes suggestions without offending others.	SKL	1.69	0.918	1.12	0.811	0.04
Recovers quickly after a setback.	ADT	1.71	0.824	1.19	0.799	0.04
Seems unaware of others.	ATP	0.2	0.477	0.52	0.708	0.04
Encourages others to do their best.	SKL	1.47	0.885	0.93	0.789	0.04
Is clear when telling about personal experiences	FUN	1.99	0.879	1.45	0.82	0.04
Has stomach problems.	SOM	0.06	0.267	0.26	0.552	0.04
Visits the school nurse.	SOM	0.29	0.51	0.62	0.745	0.04
Plays alone.	WDL	0.41	0.628	0.8	0.84	0.04
Congratulates others when good things happen to them.	SKL	1.58	0.871	1.07	0.781	0.04
Gives good suggestions for solving problems.	LED	1.62	0.851	1.13	0.745	0.04

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Quickly joins group activities.	WDL	1.77	0.895	1.25	0.865	0.04
Picks at things like own hair, nails, or clothing.	ATP	0.14	0.451	0.43	0.758	0.04
Is nervous.	ANX	0.38	0.577	0.73	0.756	0.04
Says, 'please' and 'thank you.'	SKL	2.15	0.873	1.65	0.932	0.04
Compliments others.	SKL	1.54	0.868	1.06	0.784	0.03
Is able to describe feelings accurately.	FUN	1.67	0.943	1.16	0.789	0.03
Is sad.	DEP	0.39	0.548	0.7	0.674	0.03
Gets sick.	SOM	0.39	0.536	0.69	0.676	0.03
Is fearful.	ANX	0.19	0.416	0.42	0.597	0.03
Avoids other adolescents.	WDL	0.18	0.452	0.43	0.62	0.03
Says, 'I want to die' or 'I wish I were dead.'	DEP	0.01	0.124	0.1	0.327	0.03
Offers help to other adolescents.	SKL	1.45	0.827	1.03	0.786	0.03
Worries.	ANX	0.6	0.628	0.93	0.824	0.03
Has to stay after school for punishment.	CND	0.18	0.429	0.34	0.573	0.03
Cries easily.	DEP	0.08	0.321	0.26	0.544	0.03
Says, 'I hate myself.'	DEP	0.04	0.212	0.16	0.422	0.03
Complains that lessons go too fast.	LRN	0.33	0.555	0.61	0.737	0.03
Cheats in school.	CND	0.14	0.377	0.33	0.532	0.02
Is creative.	LED	1.57	0.861	1.19	0.852	0.02

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a hearing problem.	CRT	0.02	0.178	0.12	0.446	0.02
Refuses to talk.	WDL	0.17	0.483	0.37	0.589	0.02
Has eye problems.	CRT	0.1	0.408	0.26	0.687	0.02
Says, 'I get nervous during tests' or 'Tests make me nervous.'	ANX	0.42	0.644	0.65	0.814	0.01
Says, 'I'm afraid I will make a mistake.'	ANX	0.27	0.542	0.47	0.714	0.01
Eats too little.	CRT	0.08	0.317	0.2	0.584	0.01
Complains when asked to do things differently.	ADT	0.42	0.606	1.06	0.848	0.01
Complains of shortness of breath.	SOM	0.03	0.194	0.09	0.302	0.01
Eats too much.	CRT	0.12	0.382	0.23	0.505	0.01
Eats things that are not food.	CRT	0.02	0.137	0.06	0.303	0.01
Has seizures.	CRT	0	0.051	0.03	0.206	0.01
Is afraid of getting sick.	SOM	0.11	0.353	0.2	0.481	0.01
Falls down.	CRT	0.04	0.216	0.09	0.35	0.00
Worries about what other adolescents think.	ANX	0.75	0.686	0.85	0.747	0.00
Hears sounds that are not there.	ATP	0.02	0.167	0.03	0.205	0.00
Throws up after eating.	CRT	0.01	0.108	0	0	0.00
Smokes or chews tobacco at school.	CND	0.02	0.163	0.01	0.147	0.00

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Sees things that are not there.	ATP	0.02	0.19	0.02	0.173	0.00

APPENDIX G

Appendix G contains items from the PRS-C with effect sizes indicating the magnitude of difference between the target and comparison groups.

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span.	ATN	0.64	0.699	2.05	0.857	0.27
Is easily distracted.	ATN	1.05	0.743	2.28	0.75	0.21
Acts out of control.	HYP	0.33	0.533	1.19	0.839	0.18
Has poor self-control.	HYP	0.5	0.625	1.49	0.932	0.18
Has trouble following regular routines.	ADL	0.25	0.484	1	0.858	0.16
Is unable to slow down.	HYP	0.53	0.658	1.48	0.915	0.15
Acts without thinking.	HYP	0.89	0.588	1.72	0.812	0.15
Is overly active.	HYP	0.66	0.774	1.73	0.991	0.15
Pays attention.	ATN	2.2	0.753	1.23	0.605	0.14
Is easily upset.	DEP	0.77	0.637	1.6	0.893	0.13
Loses temper too easily.	AGG	0.6	0.686	1.49	0.984	0.13
Pays attention when being spoken to.	ATN	2.29	0.724	1.41	0.715	0.12
Seems out of touch with reality.	ATP	0.09	0.325	0.55	0.698	0.12
Disrupts other children's activities.	HYP	0.4	0.543	1.08	0.79	0.12
Breaks the rules.	CND	0.72	0.537	1.39	0.739	0.12
Listens to directions.	ATN	2.26	0.746	1.4	0.633	0.12

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has trouble making new friends	WDL	0.28	0.502	0.92	0.9	0.11
Disobeys.	CND	0.89	0.508	1.49	0.707	0.11
Makes friends easily.	WDL	2.41	0.743	1.55	0.946	0.11
Listens carefully.	ATN	1.9	0.773	1.04	0.633	0.11
Fiddles with things while at meals.	HYP	0.56	0.69	1.35	0.962	0.10
Communicates clearly.	FUN	2.42	0.702	1.64	0.824	0.10
Gets into trouble	CND	0.61	0.571	1.26	0.806	0.10
Argues with parents.	AGG	0.96	0.695	1.72	0.861	0.10
Breaks the rules just to see what will happen	CND	0.23	0.469	0.79	0.925	0.09
Stares blankly.	ATP	0.21	0.467	0.73	0.738	0.09
Acts confused	ATP	0.34	0.509	0.89	0.678	0.09
Has trouble getting information when needed.	FUN	0.52	0.568	1.11	0.707	0.09
Adjusts well to changes in routine.	ADT	1.92	0.832	1.08	0.749	0.09
Steals	CND	0.06	0.249	0.37	0.603	0.09
Is a 'self-starter.'	LED	1.82	0.838	0.98	0.772	0.09
Shows feelings that do not fit the situation.	ATP	0.24	0.465	0.75	0.72	0.09
Seems lonely.	DEP	0.26	0.514	0.82	0.78	0.09
Interrupts others when they are speaking.	HYP	1.11	0.62	1.76	0.789	0.09
Sneaks around	CND	0.36	0.543	0.95	0.876	0.09
Cannot wait to take turn.	HYP	0.7	0.647	1.38	0.913	0.09

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Adjusts well to new teachers.	ADT	2.48	0.755	1.72	0.911	0.09
Lies to get out of trouble.	CND	0.64	0.649	1.32	0.93	0.09
Is easily annoyed by others.	CRT	0.66	0.606	1.27	0.804	0.08
Has difficulty explaining rules of games to others	FUN	0.44	0.553	1.02	0.936	0.08
Responds appropriately when asked a question.	FUN	2.4	0.749	1.68	0.779	0.08
Acts in a safe manner	ADL	2.41	0.714	1.71	0.79	0.08
Makes decisions easily.	LED	1.92	0.785	1.17	0.687	0.08
Argues when denied own way.	AGG	1.1	0.734	1.82	0.885	0.08
Is stubborn.	ADT	1.15	0.745	1.86	0.813	0.08
Does strange things.	ATP	0.23	0.455	0.67	0.648	0.08
Threatens to hurt others.	AGG	0.18	0.423	0.61	0.705	0.08
Repeats one thought over and over	ATP	0.29	0.508	0.8	0.781	0.08
Sets realistic goals.	ADL	1.82	0.825	1.05	0.787	0.08
Lies.	CND	0.66	0.573	1.22	0.832	0.08
Acts strangely.	ATP	0.2	0.447	0.64	0.671	0.08
Hits other children.	AGG	0.34	0.507	0.83	0.741	0.07
Is chosen last by other children for games	WDL	0.47	0.611	1.06	0.904	0.07
Adjusts well to changes in family plans.	ADT	1.93	0.799	1.2	0.825	0.07

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Says, 'Nobody likes me.'	DEP	0.28	0.535	0.8	0.876	0.07
Complains about not having friends.	DEP	0.29	0.556	0.83	0.917	0.07
Is good at getting people to work together.	LED	1.56	0.803	0.86	0.769	0.07
Changes moods quickly	DEP	0.61	0.634	1.19	0.831	0.07
Is negative about things.	DEP	0.65	0.587	1.19	0.79	0.07
Deceives others.	CND	0.29	0.486	0.75	0.713	0.07
Organizes chores or other tasks well.	ADL	1.46	0.885	0.69	0.795	0.07
Bullies others	AGG	0.2	0.436	0.61	0.72	0.07
Says, 'I hate myself.'	DEP	0.11	0.342	0.47	0.734	0.07
Tries to bring out the best in other people.	SKL	1.84	0.841	1.11	0.833	0.07
Seeks revenge on others.	AGG	0.17	0.403	0.55	0.677	0.07
Says things that make no sense.	ATP	0.35	0.542	0.84	0.711	0.07
Says, 'I want to die' or 'I wish I were dead.'	DEP	0.06	0.262	0.34	0.643	0.07
Says, 'I don't have any friends.'	DEP	0.31	0.561	0.81	0.851	0.06
Tracks down information when needed.	FUN	1.68	0.891	0.95	0.765	0.06
Is clear when telling about personal experiences.	FUN	2.22	0.771	1.57	0.821	0.06

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Says, 'Nobody understands me.'	DEP	0.32	0.571	0.83	0.926	0.06
Babbles to self.	ATP	0.23	0.493	0.68	0.786	0.06
Shows interest in others' ideas.	SKL	2.06	0.73	1.46	0.684	0.06
Says, 'I want to kill myself.'	DEP	0.04	0.221	0.27	0.556	0.06
Annoys others on purpose.	AGG	0.65	0.619	1.17	0.837	0.06
Is usually chosen as a leader	LED	1.35	0.785	0.71	0.724	0.06
Recovers quickly after a setback.	ADT	2.02	0.796	1.37	0.802	0.06
Is unclear when presenting ideas.	FUN	0.47	0.571	0.94	0.674	0.06
Acts as if other children are not there.	ATP	0.19	0.429	0.55	0.683	0.06
Quickly joins group activities	WDL	1.98	0.864	1.31	0.807	0.06
Is able to describe feelings accurately.	FUN	2.14	0.885	1.45	0.835	0.06
Encourages others to do their best	SKL	1.72	0.809	1.09	0.796	0.06
Is cruel to others.	AGG	0.21	0.44	0.58	0.702	0.05
Gives good suggestions for solving problems.	LED	1.88	0.797	1.27	0.704	0.05
Refuses to join group activities.	WDL	0.27	0.483	0.66	0.696	0.05

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Offers help to other children.	SKL	2.12	0.775	1.53	0.761	0.05
Is easily soothed when angry.	ADT	1.83	0.894	1.16	0.807	0.05
Is a 'good sport.'	ADT	2	0.79	1.41	0.813	0.05
Speaks in short phrases that are hard to understand.	FUN	0.2	0.475	0.58	0.757	0.05
Is cruel to animals.	CRT	0.03	0.198	0.23	0.553	0.05
Complains about being teased.	DEP	0.65	0.647	1.15	0.904	0.05
Shares toys or possessions with other children.	ADT	2.34	0.733	1.8	0.825	0.05
Needs to be reminded to brush teeth.	ADL	1.24	0.887	1.89	0.983	0.05
Is creative.	LED	2.39	0.721	1.87	0.848	0.05
Seems unaware of others.	ATP	0.2	0.472	0.55	0.705	0.05
Accurately takes down messages	FUN	1.41	1	0.72	0.793	0.04
Avoids other children	WDL	0.16	0.376	0.44	0.598	0.04
Joins clubs or social groups.	LED	1.43	0.913	0.82	0.767	0.04
Attends to issues of personal safety.	ADL	2.07	0.888	1.47	0.888	0.04

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Interrupts parents when they are talking on the phone	HYP	1.33	0.781	1.86	0.843	0.04
Calls other children names.	AGG	0.48	0.711	0.96	0.857	0.04
Will speak up if the situation calls for it.	LED	2.1	0.815	1.56	0.875	0.04
Teases others.	AGG	0.54	0.566	0.91	0.71	0.04
Answers telephone properly.	FUN	2.43	0.794	1.91	1.061	0.04
Congratulates others when good things happen to them.	SKL	2.05	0.843	1.52	0.848	0.04
Is nervous	ANX	0.58	0.595	0.96	0.809	0.03
Is sad.	DEP	0.6	0.539	0.93	0.581	0.03
Says, 'please' and 'thank you.'	SKL	2.35	0.697	1.93	0.816	0.03
Volunteers to help clean up around the house.	ADL	1.5	0.867	1	0.82	0.03
Wets bed.	CRT	0.17	0.501	0.49	0.848	0.03
Volunteers to help with things.	SKL	1.83	0.787	1.39	0.739	0.03
Worries about things that cannot be changed.	ANX	0.61	0.639	0.98	0.798	0.03
Compliments others.	SKL	1.66	0.767	1.23	0.753	0.03
Cries easily.	DEP	0.89	0.731	1.31	0.938	0.03

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Says, 'I'm not very good at this.'	ANX	0.68	0.574	1	0.789	0.03
Provides own telephone number when asked.	FUN	2.55	0.837	2.08	1.126	0.03
Eats too little.	CRT	0.53	0.713	0.92	0.959	0.03
Avoids competing with other children.	WDL	0.48	0.648	0.83	0.776	0.03
Has toileting accidents.	CRT	0.12	0.389	0.35	0.704	0.02
Worries.	ANX	1.02	0.661	1.37	0.856	0.02
Prefers to be alone.	WDL	0.52	0.561	0.81	0.751	0.02
Has a hearing problem	CRT	0.09	0.349	0.26	0.679	0.02
Runs away from home.	CRT	0.01	0.133	0.08	0.357	0.02
Will change direction to avoid having to greet someone	WDL	0.19	0.416	0.37	0.619	0.02
Is fearful	ANX	0.76	0.582	1	0.801	0.02
Says, 'It's all my fault.'	ANX	0.38	0.583	0.62	0.815	0.01
Complains of being sick when nothing is wrong.	SOM	0.26	0.498	0.46	0.67	0.01
Sees things that are not there.	ATP	0.03	0.206	0.12	0.381	0.01
Has trouble fastening buttons on clothing	ADL	0.24	0.482	0.41	0.736	0.01
Hears sounds that are not there.	ATP	0.06	0.267	0.15	0.383	0.01
Has headaches	SOM	0.48	0.593	0.67	0.715	0.01

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Sets fires.	CRT	0.02	0.16	0.07	0.263	0.01
Complains about health.	SOM	0.29	0.516	0.45	0.654	0.01
Has seizures.	CRT	0.01	0.109	0.05	0.295	0.01
Says, 'I think I'm sick.'	SOM	0.5	0.57	0.66	0.666	0.01
Tries too hard to please others.	ANX	0.97	0.836	1.2	0.953	0.01
Has eye problems.	CRT	0.22	0.591	0.39	0.858	0.01
Eats things that are not food	CRT	0.06	0.283	0.14	0.462	0.01
Has stomach problems.	SOM	0.34	0.6	0.49	0.714	0.01
Eats too much	CRT	0.43	0.66	0.58	0.879	0.00
Is afraid of getting sick	SOM	0.23	0.484	0.33	0.559	0.00
Is too serious	ANX	0.68	0.656	0.82	0.803	0.00
Complains of shortness of breath.	SOM	0.14	0.375	0.21	0.467	0.00
Complains of pain	SOM	0.43	0.544	0.53	0.608	0.00
Falls down	CRT	0.44	0.545	0.54	0.692	0.00
Worries about what other children think.	ANX	0.95	0.748	1.08	0.854	0.00
Says, 'I'm afraid I will make a mistake.'	ANX	0.6	0.649	0.71	0.716	0.00
Expresses fear of getting sick.	SOM	0.3	0.555	0.39	0.662	0.00
Is shy with other children.	WDL	0.48	0.573	0.56	0.683	0.00
Worries about making mistakes.	ANX	1.11	0.728	1.22	0.921	0.00

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Shows fear of strangers.	WDL	0.79	0.762	0.69	0.796	0.00
Worries about what parents think.	ANX	1.42	0.87	1.32	0.847	0.00
Has fevers.	SOM	0.58	0.514	0.53	0.557	0.00
Vomits.	SOM	0.36	0.504	0.39	0.528	0.00
Worries about what teachers think	ANX	1.42	0.924	1.38	0.891	0.00
Sleeps with parents.	CRT	0.42	0.657	0.45	0.746	0.00
Throws up after eating.	DRT	0.04	0.222	0.05	0.217	0.00
Gets sick.	SOM	0.84	0.46	0.83	0.541	0.00
Is shy with adults.	WDL	0.81	0.688	0.81	0.849	0.00
Worries about schoolwork.	ANX	0.92	0.844	0.92	0.819	0.00

APPENDIX H

Appendix H contains items from the PRS-A with effect sizes indicating the magnitude of difference between the target and comparison groups.

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Has a short attention span	ATN	0.51	0.653	1.97	0.825	0.36
Is easily distracted.	ATN	0.7	0.71	1.92	0.817	0.25
Has poor self-control.	HYP	0.32	0.553	1.22	0.845	0.21
Pays attention.	ATN	2.27	0.73	1.28	0.606	0.19
Acts without thinking.	HYP	0.81	0.583	1.67	0.829	0.19
Acts out of control.	HYP	0.18	0.432	0.79	0.754	0.16
Needs to be reminded to brush teeth.	ADL	0.51	0.772	1.47	1.12	0.14
Listens to directions	ATN	2.23	0.762	1.38	0.69	0.13
Listens carefully.	ATN	2.06	0.781	1.22	0.666	0.13
Loses temper too easily.	AGG	0.65	0.708	1.44	0.92	0.12
Interrupts others when they are speaking.	HYP	0.72	0.619	1.39	0.802	0.12
Disrupts other adolescents' activities.	HYP	0.25	0.484	0.8	0.737	0.11
Writes messages that are unclear or incorrect	FUN	0.29	0.505	0.84	0.741	0.11
Tracks down information when needed.	FUN	2.03	0.83	1.22	0.769	0.11
Has difficulty explaining rules of games to others	FUN	0.24	0.481	0.76	0.746	0.11

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Lies to get out of trouble.	CND	0.47	0.625	1.13	0.942	0.10
Organizes chores or other tasks well.	ADL	1.77	0.913	0.89	0.802	0.10
Is a 'self-starter.'	LED	1.92	0.858	1.09	0.79	0.10
Gets into trouble.	CND	0.16	0.556	1.03	0.761	0.10
Pays attention when being spoken to.	ATN	2.27	0.757	1.54	0.72	0.10
Accurately takes down messages	FUN	2.08	0.854	1.27	0.771	0.10
Fiddles with things while at meals.	HYP	0.39	0.599	1	0.863	0.10
Sets realistic goals.	ADL	2.05	0.813	1.29	0.823	0.10
Argues when denied own way.	AGG	1.08	0.747	1.79	0.89	0.09
Works well under pressure.	LED	1.68	0.895	0.87	0.759	0.09
Adjusts well to changes in routine	ADT	2	0.81	1.25	0.826	0.09
Is effective when presenting information to a group.	FUN	1.96	0.857	1.18	0.83	0.09
Lies.	CND	0.52	0.573	1.07	0.778	0.09
Has trouble making new friends.	WDL	0.31	0.562	0.88	0.948	0.09
Breaks the rules.	CND	0.57	0.568	1.09	0.694	0.09

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Recovers quickly after a setback.	ADT	2.2	0.747	1.52	0.809	0.09
Responds appropriately when asked a question.	FUN	2.48	0.734	1.83	0.782	0.09
Acts in a safe manner.	ADL	2.42	0.69	1.81	0.793	0.08
Adjusts well to changes in plans.	ADT	2.02	0.833	1.3	0.822	0.08
Interrupts parents when they are talking on the phone	HYP	0.8	0.712	1.44	0.891	0.08
Is a 'good sport.'	ADT	2.27	0.8	1.58	0.877	0.08
Is good at getting people to work together.	LED	1.72	0.805	1.05	0.801	0.08
Disobeys.	CND	0.66	0.578	1.15	0.672	0.08
Complains when asked to do things differently	ADT	0.8	0.615	1.33	0.801	0.08
Is easily upset.	DEP	0.74	0.671	1.3	0.794	0.07
Needs help from others to get up on time.	ADL	0.84	0.923	1.61	1.138	0.07
Steals	CND	0.07	0.306	0.38	0.707	0.07
Seems out of touch with reality.	ATP	0.14	0.402	0.51	0.706	0.07
Has trouble getting information when needed.	FUN	0.46	0.46	0.93	0.694	0.07
Breaks the rules just to see what will happen.	CND	0.14	0.405	0.52	0.737	0.07
Threatens to hurt others.	AGG	0.14	0.393	0.49	0.662	0.07

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Adjusts well to changes in family plans	ADT	2.02	0.826	1.37	0.8	0.07
Is chosen last by other adolescents for games	WDL	0.36	0.602	0.87	0.911	0.07
Deceives others.	CND	0.25	0.472	0.65	0.722	0.07
Is unclear when presenting ideas.	FUN	0.42	0.544	0.85	0.638	0.07
Makes decisions easily	LED	1.92	0.801	1.32	0.74	0.07
Is negative about things.	DEP	0.77	0.582	1.22	0.72	0.06
Sneaks around	CND	0.21	0.487	0.6	0.774	0.06
Is usually chosen as a leader	LED	1.45	1.45	0.56	0.78	0.06
Acts strangely.	ATP	0.18	0.18	0.51	0.668	0.06
Complains about being teased.	DEP	0.43	0.659	0.93	0.89	0.06
Attends to issues of personal safety.	ADL	2.33	0.832	1.69	0.89	0.06
Is clear when telling about personal experiences.	FUN	2.23	0.801	1.66	0.754	0.06
Adjusts well to new teachers.	ADT	2.33	0.783	1.76	0.923	0.06
Makes friends easily.	WDL	2.25	0.799	1.66	0.979	0.06
Uses foul language.	CND	0.42	0.609	0.88	0.846	0.06
Changes moods quickly	DEP	0.67	0.681	1.16	0.836	0.06
Says things that make no sense.	ATP	0.29	0.512	0.66	0.734	0.05

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Offers help to other adolescents.	SKL	1.96	0.808	1.6	0.822	0.05
Says, 'I don't have any friends.'	DEP	0.21	0.504	0.6	0.831	0.05
Says, 'Nobody likes me.'	DEP	0.19	0.463	0.54	0.785	0.05
Communicates clearly.	FUN	2.41	0.713	1.92	0.792	0.05
Says, 'I want to kill myself.'	DEP	0.05	0.231	0.24	0.492	0.05
Gives good suggestions for solving problems.	LED	1.86	0.747	1.37	0.735	0.05
Says, 'Nobody understands me.'	DEP	0.31	0.569	0.71	0.773	0.05
Annoys others on purpose.	AGG	0.6	0.632	1.04	0.825	0.05
Seems lonely.	DEP	0.4	0.585	0.81	0.824	0.05
Is stubborn.	ADT	1.17	0.747	1.66	0.817	0.05
Is cruel to others	AGG	0.23	0.464	0.55	0.67	0.05
Says, 'I want to die' or 'I wish I were dead.'	DEP	0.07	0.299	0.29	0.553	0.05
Says, 'I hate myself.'	DEP	0.14	0.409	0.43	0.681	0.05
Encourages others to do their best	SKL	1.84	0.838	1.3	0.854	0.05
Says, 'I'm not very good at this.'	ANX	0.82	0.573	1.21	0.793	0.05
Is in trouble with the police.	CND	0.02	0.163	0.16	0.433	0.04

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Congratulates others when good things happen to them.	SKL	2.12	0.815	1.62	0.919	0.04
Calls other adolescents names.	AGG	0.58	0.643	0.99	0.812	0.04
Is easily annoyed by others.	CRT	0.78	0.78	1.19	0.818	0.04
Hits other adolescents.	AGG	0.2	0.456	0.5	0.621	0.04
Tries to bring out the best in other people.	SKL	1.76	0.84	1.25	0.907	0.04
Shows interest in others' ideas.	SKL	1.86	0.744	1.41	0.716	0.04
Is cruel to animals.	CRT	0.04	0.237	0.22	0.51	0.04
Refuses to join group activities.	WDL	0.4	0.579	0.76	0.767	0.04
Is able to describe feelings accurately.	FUN	2.07	0.867	1.57	0.843	0.04
Repeats one activity over and over.	ATN	0.28	0.531	0.61	0.759	0.04
Joins clubs or social groups.	LED	1.63	0.962	1.07	0.986	0.04
Seeks revenge on others.	AGG	0.24	0.507	0.54	0.72	0.04
Answers telephone properly.	FUN	2.75	0.582	2.41	0.766	0.04
Picks out clothes that match the weather.	ADL	2.31	0.835	1.84	0.94	0.04
Cannot wait to take turn.	HYP	0.48	0.673	0.86	0.798	0.04

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Stares blankly.	ATP	0.22	0.465	0.5	0.656	0.04
Attends after-school activities.	LED	1.67	0.951	1.14	0.98	0.04
Says, 'please' and 'thank you.'	SKL	2.39	0.752	1.98	0.861	0.03
Quickly joins group activities	WDL	1.82	0.899	1.34	0.921	0.03
Babbles to self.	ATP	0.22	0.494	0.5	0.706	0.03
Volunteers to help with things	SKL	1.77	0.833	1.34	0.849	0.03
Has strange ideas.	ATP	0.4	0.583	0.71	0.717	0.03
Is sad.	DEP	0.62	0.62	0.91	0.644	0.03
Bullies others.	AGG	0.31	0.535	0.59	0.695	0.03
Teases others	AGG	0.58	0.611	0.88	0.74	0.03
Volunteers to help clean up around the house.	ADL	1.29	0.841	0.89	0.788	0.03
Seems unaware of others.	ATP	0.22	0.478	0.45	0.569	0.03
Is nervous	ANX	0.63	0.596	0.91	0.774	0.02
Worries about things that cannot be changed.	ANX	0.61	0.644	0.91	0.807	0.02
Avoids other adolescents.	WDL	0.3	0.33	0.55	0.619	0.02
Worries.	ANX	0.88	0.663	1.16	0.835	0.02
Will speak up if the situation calls for it.	LED	2.09	0.808	1.75	0.852	0.02
Compliments others.	SKL	1.64	0.749	1.34	0.703	0.02

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Complains of being sick when nothing is wrong.	SOM	0.2	0.452	0.39	0.599	0.02
Has a hearing problem.	CRT	0.12	0.433	0.28	0.648	0.01
Says, 'I get nervous during tests' or 'Tests make me nervous.'	ANX	0.88	0.873	1.17	1.035	0.01
Sets fires	CRT	0.04	0.206	0.1	0.352	0.01
Prefers to be alone.	WDL	0.78	0.62	0.96	0.736	0.01
Worries about what other adolescents think.	ANX	0.94	0.77	1.17	0.932	0.01
Is fearful.	ANX	0.53	0.573	0.7	0.671	0.01
Cries easily.	DEP	0.57	0.697	0.77	0.792	0.01
Eats too much	CRT	0.55	0.714	0.75	0.948	0.01
Says, 'I'm afraid I will make a mistake.'	ANX	0.59	0.59	0.76	0.755	0.01
Complains of shortness of breath.	SOM	0.19	0.459	0.32	0.541	0.01
Says, 'I think I'm sick.'	SOM	0.48	0.573	0.64	0.664	0.01
Is creative.	LED	2.07	0.805	1.85	0.864	0.01
Eats too little.	CRT	0.41	0.631	0.59	0.841	0.01
Has headaches.	SOM	0.75	0.661	0.92	0.682	0.01
Worries about making mistakes.	ANX	1.02	0.729	1.19	0.81	0.01
Smokes or chews tobacco.	CND	0.06	0.341	0.14	0.499	0.01
Has seizures.	CRT	0.01	0.01	0.04	0.217	0.01
Complains about health.	SOM	0.33	0.548	0.44	0.63	0.00
Complains of chest pain.	SOM	0.14	0.398	0.22	0.464	0.00

Item	Scale	Not ADHD		ADHD		η^2
		M	SD	M	SD	
Hears sounds that are not there.	ATP	0.09	0.326	0.16	0.456	0.00
Has eye problems.	CRT	0.32	0.686	0.44	0.812	0.00
Is shy with other adolescents	WDL	0.6	0.667	0.72	0.784	0.00
Eats things that are not food.	CRT	0.05	0.271	0.09	0.35	0.00
Has stomach problems.	SOM	0.29	0.56	0.38	0.622	0.00
Drinks alcoholic beverages	CND	0.09	0.327	0.05	0.215	0.00
Falls down.	CRT	0.24	0.46	0.31	0.515	0.00
Sees things that are not there	ATP	0.05	0.249	0.08	0.288	0.00
Complains of pain.	SOM	0.49	0.584	0.56	0.642	0.00
Runs away from home overnight.	CRT	0.02	0.181	0.04	0.209	0.00
Worries about what teachers think	ANX	1	0.831	0.91	0.798	0.00
Gets sick	SOM	0.69	0.53	0.64	0.56	0.00
Uses illegal drugs.	CND	0.04	0.223	0.06	0.288	0.00
Throws up after eating.	CRT	0.03	0.212	0.05	0.295	0.00
Sleeps with parents.	CRT	0.1	0.354	0.08	0.301	0.00
Is afraid of getting sick	SOM	0.28	0.589	0.31	0.628	0.00
Tries too hard to please others.	ANX	1.15	0.869	1.18	0.807	0.00
Expresses fear of getting sick.	SOM	0.19	0.19	0.18	0.495	0.00

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