DIFFERENTIAL DIAGNOSIS OF AUTISM SPECTRUM DISORDERS USING THE

BEHAVIOR ASSESSEMENT SYSTEM FOR CHILDREN – SECOND EDITION –

PARENT RATING SCALE (BASC-2 PRS) CONTENT SCALES

A THESIS

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BY

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Date

To the Dean of the Graduate School:

I am submitting herewith a thesis written by Emily J. Kent entitled "Differential Diagnosis of Autism Spectrum Disorders Using the Behavior Assessment System for Children – Second Edition – Parent Rating Scale (BASC-2 PRS) Content Scales." I have examined this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts with a major in School Psychology.

_____
Dr. Kathy DeOrnellas, Major Professor

We have read this thesis and recommend its acceptance:

_____
Department Chair

Accepted:

_____
Dean of the Graduate School

ABSTRACT

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DIFFERENTIAL DIAGNOSIS OF AUTISM SPECTRUM DISORDERS USING THE BEHAVIOR ASSESSEMENT SYSTEM FOR CHILDREN – SECOND EDITION – PARENT RATING SCALE (BASC-2 PRS) CONTENT SCALES

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This study examines the usefulness of the BASC-2 PRS content scales as a dif erential diagnostic instrument for Autism Spectrum Disorders (ASDs). Archival data of mothers' behavior ratings of 50 children, ages 8 to 18, collected through a university research study were used. As a prerequisite, only children with an existing diagnosis of an ASD were included. Participants were grouped by diagnosis of High Functioning Autism (HFA), Asperger's Disorder (AD), and Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS) and by sex. The HFA and AD subgroups reached levels of clinical significance on the Developmental Social Disorder and Resiliency content scales. No significant main effects for diagnostic group or sex and no interactions were found. Exploratory post-hoc analyses revealed significant differences between the PDD-NOS subgroup and the HFA and AD subgroups on several content scales. Results indicate the utility of the BASC-2 PRS content scales in differential diagnostic essays.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Autism is a severe neurodevelopmental disorder characterized by a trio of impairments in reciprocal social interaction and verbal and nonverbal communication (Szatmari, 2000). Current trends in differential diagnosis within the Autism Spectrum have been under intense scrutiny due to an increase in public awareness of the disorder set. Media coverage has been fueled by a dramatic increase in empirical data available from public and private sources. There has been great debate in regard to the actual prevalence rate of autism spectrum disorders (ASDs). The prevalence rate for ASDs had long been reported to be between 2 and 4 children in 10,000, but recent empirical data indicate that the actual incidence may be much higher (Kadesjo, Gillberg, & Hagberg, 1999). A study conducted by the Centers for Disease Control and Prevention, the Metropolitan Atlanta Developmental Disabilities Surveillance Program, found the rate of autism for children ages 3 to 10 years to be 3.4 per 1,000 children (Boyle et al., 1996). Current estimates of ASD prevalence rates are between 2 and 6 per 1,000 children (Rutter, 2005). This disparity is being addressed by the increasing sophistication of assessment processes.

Noland and Gabriels (2004) reiterated the urgency experienced by school districts to identify these populations and begin early intervention. The debate most often focuses on the etiology of the disorders within the autism spectrum, but applied psychology relies more heavily upon the research pertaining to differential diagnosis. Accurate differential

diagnosis is essential for the appropriate treatment and intervention for students who struggle with ASDs. The standard autism assessment battery of most school psychologists includes a behavior rating system that serves as a significant data source in the decision making process toward service provision (Shapiro & Heick, 2004). The clinical usefulness for differential diagnosis of many instruments continues to be questionable. An instrument that is sensitive enough to detect markers for a disorder and can differentiate between subsets of that disorder is essential (Bryson, Rogers, & Fombonne, 2003). Current diagnostic classification often leaves parents as well as practitioners wanting more diagnostic clarity (Szatmari, 2000).

Each individual owns a specific mosaic of neurocognitive strengths and weaknesses. It is this mosaic that steers the way one interacts with and learns about the world. The ability to interact successfully with other humans, transition from one activity to another, accept frustrating circumstances, and maintain a moderate level of positive affect are skills that are most often deficit in individuals with ASDs. This pattern of neurocognitive difficulties varies between populations within the autism spectrum. These differences are also integral components in the learning process. Therefore, it is imperative that they be identified and addressed as part of a humane and appropriate educational plan. The following study addresses the differential diagnosis between the disorders within the autism spectrum.

The Behavior Assessment System for Children – Second Edition (BASC-2) is a multi-method, multi-dimensional assessment system used to evaluate self-perceptions and manifested behavior of children, adolescents, and young adults ages 2 to 25 years

(Reynolds & Kamphaus, 2004). The BASC-2 is sophisticated in the way that it assesses positive (adaptive) aspects as well as negative (clinical) aspects of behavior and personality. The sensitivity it affords to slight variations in the severity of the disorder allows the BASC-2 to be a significant tool in the process of differential diagnosis. The wide range of distinct dimensions assessed by this instrument correlates with the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV-TR*; American Psychiatric Association, 2000) and allows for diagnostic precision. The elegance of the BASC-2 is most clearly demonstrated by its focus on positive attributes. These are the strengths that can be capitalized upon when designing effective intervention strategies.

The content scales on the BASC-2 are an integral part of the diagnostic process, especially when investigating the subtle differences that flow between and within the populations on the autism spectrum. Of particular importance to this study are the following content scales, which appear on the BASC-2 PRS: Anger Control, Bullying, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. The additional content scales of Ego Strength, Mania, and Test Anxiety appear exclusively on the BASC-2 Self-Report of Personality Scale (SRP) and are not included in this study. The present study will examine these specific content scales of the BASC-2 in regard to the accuracy with which they are able to identify the presence of ASDs and the subtle differences between them. This distinction will then facilitate the detection and differential diagnosis for students who have an ASD, which has practical implications for educational planning. It is predicted that the BASC-2 PRS content scale of Developmental Social Disorder will be

3

significantly elevated for the three identified ASD subgroups: High Functioning Autism (HFA), Asperger's Disorder (AD), and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). It is predicted that the BASC-2 PRS content scale of Negative Emotionality will be significantly elevated for the HFA and AD subgroups. It is hypothesized that no significant sex differences, group differences, or interactions between the two will be found across all BASC-2 PRS content scales of Anger Control, Bullying, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. Exploratory analyses will be conducted across all BASC-2 PRS content areas to detect any significant differences between ASD subgroups, which will show whether the BASC-2 PRS is a useful assessment instrument in providing differential diagnoses for ASDs.

CHAPTER II

LITERATURE REVIEW

A review of the literature for the following study entails a twofold focus. The first involves the *Diagnostic and Statistical Manual for Mental Disorders – Fourth Edition – Text Revision* (DSM-IV-TR, American Psychiatric Association, 2000) criteria for Autism Spectrum Disorders (ASDs), differential diagnosis within the autism spectrum, and the neurocognitive differences between the subgroups of the spectrum. The second includes research relevant to the use of the Behavioral Assessment System for Children – Second Edition (BASC-2), a multi-method, multi-dimensional method of evaluating children and adolescents. The focus will be narrow, addressing the specific content scales that correlate with *DSM-IV-TR* criteria for a diagnosis within the autism spectrum.

Autism Spectrum Disorders (ASDs)

DSM-IV-TR criteria for diagnosis of an ASD varies slightly between the three subgroups addressed in this study: High Functioning Autism (HFA), Asperger's Disorder (AD), and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). A general comparison of *DSM-IV-TR* criteria will be conducted in order to delineate the subtle differences between populations.

The diagnostic criteria for autistic disorder are comprised of three subsets of manifested behaviors. Markers for autistic disorder include: "a qualitative impairment in social interaction, as manifested by at least two of the following: marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body

postures, and gestures to regulate social interaction; failure to develop peer relationships appropriate to developmental level; a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest); and a lack of social or emotional reciprocity" (*DSM-IV-TR*, 2000, p. 75).

Criteria for diagnosis also include "qualitative impairments in communication as manifested by at least one of the following: a delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime); in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others; stereotyped and repetitive use of language or idiosyncratic language; and a lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level; restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following: encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus; apparently inflexible adherence to specific, nonfunctional routines or rituals; stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movements); and persistent preoccupation with parts of objects. Also present are: delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: social interaction, language as used in social communication, or symbolic or imaginative play" (*DSM-IV-TR*, 2000, p. 75).

Diagnostic criteria for Asperger's Disorder include: "qualitative impairment in social interaction, as manifested by at least two of the following: marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction; failure to develop peer relationships appropriate to developmental level; a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest to other people); and a lack of social or emotional reciprocity. A secondary component to the criteria is a secondary set of markers. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following: encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus; apparently inflexible adherence to specific, nonfunctional routines or rituals; stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movements); and persistent preoccupation with parts of objects" (*DSM-IV-TR*, 2000, p. 84).

Diagnostic criteria for Pervasive Developmental Disorder - Not Otherwise Specified (PDD-NOS) is as follows: "this designation abbreviated 'NOS' can be used when the mental disorder appears to fall within the larger category but does not meet the criteria of any specific disorder within that category. This category should be used within the autism spectrum when there is impairment that is severe and pervasive. This impairment can exist in the development of reciprocal social skills in either verbal or nonverbal communication. There may also be the presence of stereotyped behaviors,

7

interests, activities, but not all of the criteria for a specific developmental disorder are met. An example of this would be 'atypical autism,' in that the individual presents with some but not all symptoms that meet criteria for Autistic Disorder because of late age of onset or atypical or sub-threshold symptomatology." (*DSM-IV-TR*, 2000, p. 84)

The second portion of the current review of literature includes research on and including one of the three diagnoses of HFA, AD, and PDD-NOS. Currently, there are very few articles available involving both the BASC and one of the three ASD diagnoses. The recent publication date of the BASC-2 precludes the discussion of current research as no studies have been conducted regarding the BASC-2 and differential diagnoses. However, the literature base of empirical data regarding other standardized measures for ASDs as they correlate to the original BASC is significant.

Differential Diagnosis within the Autism Spectrum

McConachie et al. (2005) remarked upon the difficulties inherent to differential diagnosis of ASDs, even with the use of sophisticated assessment tools. According to Charman & Baird (2002), a multidisciplinary diagnostic assessment should entail a detailed developmental history, parent input regarding everyday behavior, direct assessment of social interaction, and a clinical assessment focusing on the child's social verbal communication. Charman & Baird (2002) further asserted that early diagnosis and recognition of ASDs had significant implications for therapeutic services. The vivid nature of difficulty with differential diagnosis is apparent in a study that demonstrated the intertwining of neurocognitive strengths and weaknesses between ASDs (Klin et al, 2005). Three standard measures were found to have very little agreement in differential

8

diagnosis. This study went on to discuss the disparity between various diagnostic systems in identifying the subtle yet important differences, especially between HFA and PDD-NOS. The importance of assessment accuracy is fueled by the urgency that school districts experience to identify and serve these populations appropriately, as each disorder with in the autism spectrum necessitates a unique support method (Noland & Gabriels, 2004).

School psychologists invariably use a behavior rating system in their attempts to fine-tune service provision. These methods of assessment are given an increasing weight in the diagnostic process, and the BASC in particular has become a standard for practice across the field of school psychology (Shapiro & Heick, 2004). In many ways this study indicates the trend of school psychologists to utilize methods more akin to those of a clinical psychologist when determining a differential diagnosis and subsequent service provision. This is particularly compelling in regard to the assessment of social skills in children. Linking assessment to successful intervention is facilitated by utilizing measures that address a myriad of emotional and behavioral aspects of the child (Merrell, 2001). Best practices for the assessment of children's social skills include a triad of processes. Amongst the "first line" of the assessment process is the behavior rating system. These measures serve to make assessment highly functional in that the precise diagnostic process allows for a higher level of positive outcomes (Merrell, 2001).

Traditionally, behavior rating scales have been regarded with some caution, due to the subjective nature of the response sets. Consistent reliability and validity data indicate that this concern is often unwarranted. Studies examining the structure of items

9

on behavior rating scales have found them to be a highly useful component in planning and monitoring positive interventions (Hosp, Howell, & Hosp, 2003). The authors of this study concluded that behavior rating scales are a highly useful and reliable component in the proactive model of social intervention. The original BASC (Reynolds & Kamphaus, 1992) has become the standard behavior system for most school psychologists. The BASC demonstrates a high level of reliability and validity coupled with a high correlation to other standard measures. Convergent and criterion-related validity as compared to clinical and educational classification systems have been examined and determined to be highly significant (Doyle, Ostrander, Scare, Crosby, & August, 1997). Specific research studies concluded that the temporal stability and convergent validity of the BASC are significant, with respondent bias playing a negligible role in measure of error (Merydith, 2001). Further support of the BASC's reliability ratings is found in the 2003 study by Wilder and Sudweeks. This particular study indicated the BASC's significant sensitivity when dealing with non-Anglo populations, as it appears to factor out cultural differences. Without exception, research studies indicate the high level of correlation between the BASC items and the DSM criteria for various clinical disorders. Further, the BASC is proven repeatedly to be valid in its assessment of those factors (Angello, Volpe, DiPerna, Moore, Nebrig, & Ota, 2003).

When examining the parent rating aspect of the behavior scale, a discrete trend emerges: behaviors reported cluster around diagnostic criteria listed in the DSM, and therefore allow for the process of differential diagnosis to be refined (Kamphaus, Petosky, Cody, Rowe, Huberty, & Reynolds, 1999). Examining several behavior rating

10

systems simultaneously reveals that externalizing behaviors are the most highly correlated across instruments. The compelling portion of the data is that issues with social functioning and other "minor" difficulties are also correlated. The BASC has been presented as the standard by which other measures are evaluated (Merrell, Streeter, Boelter, Caldarella, & Gentry, 2001). This information regarding correlates of behavior specific to the autism spectrum indicates the strength of the BASC system in facilitating a precise differential diagnosis.

Neurocognitive Distinctions between ASDs

The following discussion of literature focuses on HFA and AD. The data includes a differentiation study in regard to factors separating the disorders from each other. The authors of this study concluded that the differentiated groups within the autism spectrum varied primarily in the area of degree of social and cognitive impairment (Prior et al., 1998). Gillham et al. (2000) discussed the use of traditional clinical approaches to defining autism used in the standard diagnostic systems. The primary goal of the study was to replicate earlier findings that had demonstrated delays in socialization, as it could be utilized to differentiate autistic from non-autistic children. The study included not only children with autism and non-PDD children but also a third group of children who had been diagnosed with PDD other than autism. Gillham et al.'s (2000) assertion was that the children with autism would be more impaired then those with a non-PDD developmental disorder. It was hypothesized that this subgroup of the sample would be the least impaired. The children with PDD, but not autism, were expected to have

11

intermediate levels of impairment with respect to adaptive and maladaptive skills (Gillham et al., 2000).

Results from the above-referenced study conveyed a finding that children with autism display significantly diminished daily living skills and more serious maladaptive behaviors than children with other developmental disorders. Delays in socialization skills were the most strongly related to the clinical diagnosis and accounted for almost half of the variance in classification. This result is an integral part of the argument that impairment in socialization is relegated more to autism than the presence of unusual or deviant behaviors (Waggoner, 2004).

Children with PDD displayed significantly more sophisticated communication, daily living skills, and socialization than the autism group. This group also exhibited fewer maladaptive behaviors. Surprisingly, the PDD group did not differ significantly from the non-PDD group in maladaptive behaviors or on any of the adaptive domains (Gillham et al., 2000). This illustrates the subtle differences in functioning between the subgroups in the autism spectrum; further, it clarifies the need of applied practitioners to ascertain these differences in order to make sound treatment decisions.

Following the research process of measurable factors being unique to specific disorders in the autism spectrum, Szatmari et al. (2003) attempted to assess whether verbal and nonverbal cognitive abilities independently predict outcome in children with either a diagnosis of HFA or AD. Study sample demographics were 68 higher functioning children with PDD. The sample was matriculated into two groups by use of language. Subjects classified as HFA had significant deficits in language development as evidenced

by delayed echolalia, pronoun reversals or neologisms. The portion of the sample categorized as AD acquired language prior to 36 months of age and had no evidence of deficit in language development. Utilizing these specific criteria, entire sample was matriculated with 47 meeting criteria for HFA and 21 meeting criteria for AD (Szatmari et al., 2003).

The compelling findings reported from this study include results indicating support of findings of other research that language and nonverbal skill development are integral components to prediction of outcome in adaptive behaviors. These adaptive behaviors, specifically communication and socialization, are significant components of DSM criteria for autistic symptoms. Findings also indicate that language is a more robust predictor of outcome for children with HFA than it was for children with AD. Among children with AD, nonverbal factors were a better predictor of autistic symptoms. (Szatmari et al., 2003).

Behavior Assessment System for Children (BASC-2)

Initial discussion contained in this review of literature explored the need for differential diagnosis in pediatric populations with ASDs. The focus will now become more specific and address psychometric properties of the BASC-2 and the content areas on the BASC-2 that are relevant to the differential diagnosis of autism spectrum ASDs. The relationship between the disorders and the need to differentially diagnose them will be discussed in regard to specific educational approaches to these issues.

A thorough regard of the psychometric properties of the BASC-2 is limited to the manual, due to the recent publication date of the measure. Previous research regarding

other assessment tools proves to be highly correlated with the content scales on the BASC-2. The manual reports acceptable reliability and validity test results. Correlational studies with other measures of strong psychometric property are also sited in the manual. Reynolds and Kamphaus (2004) state that the BASC-2 is a revision of the BASC but retains all the key strengths of the BASC. Reported improvements include: improved reliabilities and additional scales; demographically correlated standardization sample; greater item correlation between the TRS and PRS; content scales that facilitate interpretation of primary scales; and a more user-friendly response format on the SRP (Reynolds & Kamphaus, 2004). Additionally, the BASC-2 provides more detailed clinical norms, new software, and a slight alteration of the structured developmental history.

Specific content areas on the BASC-2 have high degree of correlation with DSM criteria for disorders within the autism spectrum. These content areas are Anger Control, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. The following is a brief overview of these content scales:

- Anger Control: This content scale measures the tendency to become quickly irritated along with difficulty regulating emotional and behavioral self-control (Reynolds & Kamphaus, 2004).

- Bullying: This content scale measures the tendency to intimidate or force others in order to achieve some desired outcome (Reynolds & Kamphaus, 2004).

- Developmental Social Disorder: This content scale measures deficits in social skills, communication, interests, and activities and is linked to symptoms of ASDs (Reynolds & Kamphaus, 2004).

- Emotional Self-Control: This content scale measures the ability to regulate affect or emotions in response to transitions and environmental changes (Reynolds & Kamphaus, 2004).

- Executive Functioning: This content scale measures the ability to control behavior by planning, anticipating, inhibiting, or maintaining goal-directed activity, and by reacting appropriately to different situations (Reynolds & Kamphaus, 2004).

- Negative Emotionality: This content scale measures the tendency to react in an overly negative way to changes in familiar activities or routines (Reynolds & Kamphaus, 2004).

- Resiliency: This content scale measures the ability to access both internal and external support systems to alleviate stress and overcome adversity (Reynolds & Kamphaus). It is the only adaptive content scale on the BASC-2 PRS.

The preceding literature review discussed the common attributes between the subgroups of the autism spectrum. It is imperative that correct differential diagnoses be obtained if service provision is to be of best practice. The refined content scales of the BASC-2 allow for a more specific examination of each child's symptom set. Therefore, the BASC-2 content scales should be able to detect the subtle differences between the disorders. It is the presence of those differences that creates a need for individually

tailored educational planning. Ideally, the BASC-2 can be utilized to more precisely diagnose the ASD subtype.

Hypotheses

It is hypothesized that the BASC-2 Parent Rating Scale (PRS) content scale of Developmental Social Disorder will be significantly elevated for the three identified ASD subgroups of HFA, AD, and PDD-NOS. It is hypothesized that the BASC-2 PRS content scale of Negative Emotionality will be significantly elevated for the HFA and AD ASD subgroups. It is hypothesized that there will be no main effect found for sex or diagnostic group and no significant interactions between sex and diagnostic group across all BASC-2 PRS content scales of Anger Control, Bullying, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. Exploratory analyses will be conducted across all BASC-2 PRS content scales to detect any significant differences between ASD subgroups, which will show whether the BASC-2 PRS is a useful assessment instrument in providing differential diagnoses for ASDs.

CHAPTER III

METHODS

The purpose of the current study is to compare the scores in content areas on the Behavior Assessment System for Children–Second Edition (BASC-2) between subgroups of the autism spectrum disorder (ASD). The goal of this study is to enhance the best practice and service provision of school psychologists in differential diagnosis and intervention. It is predicted that this instrument provides critical information when working with students diagnosed with High Functioning Autism (HFA), Asperger's Disorder (AD), and Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS).

Participants

The participants will be drawn from the archival data of a large multimodal study that was conducted at a southern university. The purpose of the original study was to aid in determining the best practices for psychological evaluation of students with HFA, AD, and PDD-NOS. The original study included research participation by children and adolescents with an ASD diagnosis and both parents when possible. Children and adolescents, ages 8 through 18 (mean age of 11.42 years), and their parents were solicited to participate through newspaper notices, postings on appropriate websites on the Internet, and word of mouth. There were 43 boys and 7 girls who participated. At the time of participation, children and adolescents were required to have an existing diagnosis in one of three categories: HFA, AD, or PDD-NOS with documentation of the

ASD from either a licensed psychologist or medical doctor. There were 11 participants in the HFA group (1 female, 10 males), 32 in the AD group (4 females, 28 males), and 7 in the PDD-NOS group (2 females, 5 males). Archival data collected from the mothers of the children and adolescents with one of the specific diagnoses were included will be used in the current study. The measure utilized to generate data in the current study was part of the parent packet in the larger research study.

Instrument: Behavior Assessment System for Children–Second Edition–

Parent Rating Scale (BASC-2 PRS)

The authors' description of the BASC-2 (Reynolds & Kamphaus, 2004) indicate it "is a multimethod, multidimensional system used to evaluate the behavior and self-perceptions of children and young adults aged 2 through 25 years"). It is comprised of five subunits that can be used individually or in a number of combinations, hence the multimethod aspect. The trio of response formats includes three individually completed questionnaires: a Parent Rating Scale (PRS), a Teacher Rating Scale (TRS), and a student-completed Self-Report of Personality (SRP). Previously collected mothers' ratings from the BASC-2 PRS will be used in the current study. In addition, there is a structured form for obtaining a thorough developmental history by use of either interview or report format and a classroom observation form for recording and classifying directly observed classroom behavior (Reynolds & Kamphaus). The design of this particular instrument embodies the multidimensional aspect of the BASC-2. Items are included which load on factors specific to several aspects of behavior and personality including both positive (adaptive) and negative (clinical) dimensions (Reynolds & Kamphaus).

18

Age Range

The age range of the instrument has been expanded to include all students through age 21 years who are still attending secondary school and (on the self-report measure only) students age 18 through 25 attending postsecondary institutions.

Reliability and Validity

Reynolds and Kamphaus (2004) report internal consistency composite score reliabilities of low to middle .90s for Adaptive Skills and the BSI, and in the middle .80s to middle .90s for Externalizing Problems and Internalizing Problems. They also report high reliabilities of the individual scales with median values ranging from .80 to .83 (preschool), .83 to .87 (child), and from .83 to .86 (adolescent). Scales with the highest reliabilities include Hyperactivity, Attention Problems, Social Skills, and Functional Communication. The new scale, Activities of Daily Living, had the lowest reliability reported (Waggoner, 2004).

Test-retest reliability was also examined for the BASC-2 (Reynolds & Kamphaus, 2004). The authors indicate that reliabilities for the composite scales were high (low .80s to the low .90s) except for the Internalizing Problems at the child level (.78). The individual scales median reliabilities were .77, .84, and .81 for the three levels (preschool, child, adolescent respectively).

The authors measured the interrater reliability by utilizing responses from two different parents or caregivers. There was a difference in the time of ratings that ranged from 0 to 70 days. Median interrater reliabilities were .74, .69, and .77 for the three levels

19

(preschool, child, adolescent respectively). The composites' interrater reliability was similar across levels (Reynolds & Kamphaus, 2004).

Content Scales

DSM-IV-TR (2000) criteria for disorders within the autism spectrum, which include HFA, AD, and PDD-NOS, have a high degree of correlation with the specific content area of Developmental Social Disorder on the BASC-2 PRS (Reynolds & Kamphaus, 2004). In addition, a DSM criterion is similar to the description of the Negative Emotionality content scale from the BASC-2 PRS. The following is an excerpt from the BASC-2 manual (Reynolds & Kamphaus):

- Anger Control: This content scale measures the tendency to become irritated quickly and impulsively, coupled with an in ability to regulate affect and self-control. Individuals with high Anger Control scores tend to exhibit poor conflict managements skills, an inability to control anger, and general unhappiness. Such individuals may appear docile and, under some circumstances, well regulated. When irritated, however, they can quickly become angry and unable to exercise control over their actions. (p. 87)

- Bullying: Bullying gauges the tendency to be intrusive, cruel, threatening, or forceful to get what is wanted through manipulation or coercion. Most often, high scores on this scale reflect a persistent pattern of social maladjustment and can be comorbid with a variety of other developmental psychopathologies, including hyperactivity and depression. Bullying that is characterized by a manipulative and possibly pleasurable intent. As is

20

the case with aggression or conduct problems, bullying behavior is usefully differentiated from behavior distinctly related to a qualified severe emotional disturbance (considered a disability) in a manifestation determination. (p. 87)

- Developmental Social Disorder: The Developmental Social Disorder content scale summarizes behaviors characterized by deficits in social skills, communication, interests, and activities. Examples of these behaviors may include self-stimulation, withdrawal, and inappropriate socialization. High scores on this scale may indicate symptoms of Asperger's disorder ore related autism spectrum disorders or simply may reflect poor socialization. An autism spectrum disorder might be more likely when the Developmental Social Disorder content scale is elevated but Conduct Problems and Aggression are not. Additionally, an autism spectrum disorder could be indicated when the Developmental Social Disorder content scale is elevated along with the Withdrawal, Typicality, and Attention Problems scales. Best practices indicate, however, that a detailed developmental history and thorough clinical interview of the respondent are necessary before an interpretive decision can be made. (p. 87)

- Emotional Self-Control: Emotional Self-Control measures the ability to regulate one's affect and emotions in response to environmental changes. Similar to Anger Control, this scale evaluates a subset of self-regulation or

21

executive functioning. High scores on Emotional Self-Control may reflect the influence of a variety of negative emotions, including sadness, frustration, and anger. Specific problems with regulation of affect, in the absence of more pervasive executive-functioning difficulties, is likely to represent an emotional problem related to disturbances of the temporal lobes, the limbic system, or the interactions within the temporolimbic system. Such disturbances can stem from emotional or physical trauma and a variety of neurodevelopmental problems. Most often, elevations on the Emotional Self-Control content scale are associated with more pervasive self-regulation and executive-functioning problems (Reynolds & French, 2003). (Reynolds & Kamphaus, 2004, p. 87)

- Executive Functioning: The Executive Functioning content scale measures the ability to control behavior by planning, anticipating, inhibiting, or maintaining goal-directed activity, and by reacting appropriately to environmental feedback in a purposeful, meaningful way. This content scale was derived form a measure of frontal-lobe functioning, developed for the original BASC. High scores on this content scale may identify individuals who experience nearly all types of self-regulation difficulties. Individuals with elevated Executive Functioning content-scale scores may also present with ADHD symptoms, because frontal-lobe arousal and functionality deficits have been suggested as a root cause of ADHD-related behaviors. Depression is also often comorbid in such individuals

because of associations with the dopaminergic system and frontal lobe dysfunction. Two complicating factors displayed by an individual with frontal-lobe injuries are low motivation (sometimes referred to as a motivational syndrome) and anosognosia (low awareness of behavioral changes or deficits). As scientific advances in the relationship between organic causes and behavioral problems continue and as school psychological services are expanded to support children with problems such as traumatic brain injury, the assessment of constructs such as executive functioning will continue to gain prominence. (Reynolds & Kamphaus, 2004, p. 87-88)

- Negative Emotionality: Negative Emotionality is described as the tendency to react in an overly negative way to changes in everyday activities or routines. Children and adolescents with elevated scores on this scale may have few friends and may be described as rigid and easily irritated. The Negative Emotionality content scale was derived from temperament literature, which gives considerable evidence to suggest that such problems can be chronic and are identifiable within weeks after childbirth by mothers of children with this condition (Thorpe, 2004, cited in Reynolds & Kamphaus, 2004). Negative emotionality during infancy may lay the groundwork for the development of anger-control or emotional self-regulation problems later in life. Because such problems are related to temperament, comprehensive, multimodal, and longstanding

23

treatment may be necessary in cases of extreme scores. (Reynolds &

Kamphaus, 2004, p. 88)

- Resiliency: Resiliency content scale measures an ability to access both

    internal and external support systems to alleviate stress and overcome

    adversity. Consistent with the major philosophy of the BASC-2, the

    Resiliency scale is intended as another high measure of adaptive strengths.

    Individuals with high Resiliency scores will tend to do well in short-term,

    focused therapeutic approaches and to possess positive mental health in

    general. (Reynolds & Kamphaus, 2004, p. 88)

T-Scores

The manual provides profiles for the mean *T*-scores on the PRS composites and

scales provided in the form of tables and graphic representations for several clinical

groups (Reynolds & Kamphaus, 2004). Populations that are addressed in the BASC-2

manual include children and adolescents with Attention-Deficit/Hyperactivity Disorder,

Bipolar Disorder, Depression, Emotional/Behavioral Disturbance, Hearing Impairment,

Learning Disabilities, Mental Retardation or Developmental Delay, Motor Impairment,

PDD (including AD and Autism) and Speech or Language Disorders (Reynolds &

Kamphaus).

Conveyance of the scores was not altered from the original BASC format (i.e., the

use of *T*-scores and percentiles) on the BASC-2 (Reynolds & Kamphaus, 2004). In

essence, the Clinical Scales scores in the 41 to 59 range are considered average; scores

from 60 to 69 are At-Risk; and scores 70 and above are considered Clinically Significant.

24

On the Adaptive scales, scores in the 41 to 59 range are considered average; scores from 31 to 40 are At-Risk; and scores from 30 and below are considered clinically significant (Reynolds & Kamphaus).

Procedure

Archival data, specifically the mothers' ratings on the BASC-2 PRS, will be used in the current study. The data was collected through a Texas Woman's University research team from the Department of Psychology and Philosophy with Kathy DeOrnellas, Ph.D. as the principal investigator. Parents who volunteered their children to participate in the study contacted the research team through either electronic mail or telephone. Information from all potential candidates was relayed to a specific team member. The team coordinator's job was to intake the participants for testing. A short interview was conducted over the telephone with the person initiating the contact to ensure the child was diagnosed with one of the target diagnoses of HFA, AD, or PDD-NOS and that the Intelligence Quotient (IQ) of 70 or above was sufficient for participation. Information packets were mailed and a testing date was established for each child/adolescent participant and their parents.

On the date of assessment the child spent a morning and an afternoon session with various research team members completing a specific set of tests for each age range. The parents were asked to complete several rating scales and an interview with one of the research team members. The BASC-2 PRS was utilized in the ratings the parents completed on the day of testing. The individual forms were presented for completion in alternating order and with other types of rating scales intermingled so as to control for

any effect the order of presentation may have had on the responses of the rater. Parent participation was typically completed during the morning session ending with a break for lunch. The afternoon session was utilized to complete the testing with the individual child. If for some reason the testing with the child could not be completed in the same day, arrangements were made with the parent to set up a time to complete the testing.

<div align="center">Hypotheses</div>

Hypothesis 1: It is hypothesized that the mean T-score for the BASC-2 PRS Developmental Social Disorder content scale will reach a level of clinical significance (T-score $\geq$ 70) for all ASD subgroups.

Hypothesis 2: It is hypothesized that the mean T-score for the BASC-2 PRS Negative Emotionality content scale will reach a level of clinical significance (T-score $\geq$ 70) for the HFA and AD groups.

Hypothesis 3: It is hypothesized that no significant sex differences, diagnostic group differences, or interactions between sex and diagnostic group will be found across all BASC-2 PRS content scales of Anger Control, Bullying, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. Exploratory analyses will be conducted across all BASC-2 PRS content scales to detect any significant differences between ASD subgroups, which will show whether the BASC-2 PRS is a useful assessment instrument in providing differential diagnoses for ASDs.

Analyses

All parent rating scales completed by mothers in the original study were electronically scored using the scoring program for the BASC-2 by members of the research team involved in the original study. The General Norms for the measure were used in the scoring. Means and standard deviations were calculated for all scales and content areas. The subject pool was previously matriculated into three sub-samples based on an established diagnosis of an ASD from a licensed psychologist or medical doctor. The subgroups were identified as HFA, AD, and PDD-NOS.

The independent variables were the child's current diagnosis (HFA, AD, or PDD-NOS) and sex (male or female). The dependent variables were the following content area scores from the BASC-2 PRS: Anger Control, Bullying, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. A 2 x 3 x 7 MANOVA was calculated to examine the comparisons of the mean BASC-2 content area T-scores for the subgroups. A Tukey HSD test was utilized to examine the significant main effects of the diagnosis, gender, and instrument variable. It was expected that T-scores of 70 or above would be achieved for all three subgroups for the clinical content scale of Developmental Social Disorder. It was expected that T-scores of 70 or above would be achieved for the HFA and AD subgroups for the clinical content scale of Negative Emotionality. The results of the MANOVAs were expected to yield no significant sex differences, group differences, or interactions on all content area scores. Furthermore, exploratory analyses were conducted across all BASC-2 PRS content scales to detect any significant differences between ASD subgroups, to determine whether the

BASC-2 PRS is a useful assessment instrument in providing differential diagnoses for ASDs.

CHAPTER IV

RESULTS

Archival data from the larger, original study was used in the current study. Of specific importance were the mothers' ratings from the Behavior Assessment System for Children–Second Edition Parent Rating Scale (BASC-2 PRS) content scales. Participants included children and adolescents, ages 8 to 18 (mean age of 11.42 years), who had an existing ASD diagnosis in one of three categories: High Functioning Autism (HFA), Asperger's Disorder (AD), and Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS). There were 11 participants in the HFA group (1 female, 10 males), 32 in the AD group (4 females, 28 males), and 7 in the PDD-NOS group (2 females, 5 males) (see Table 1).

Table 1

Subject Pool by ASD Diagnostic Group and Sex

| | Diagnostic Group | | | |
Sex	HFA	AD	PDD-NOS	Total
Female	1	4	2	7
Male	10	28	5	43
Total	11	32	7	50

In regard to the hypotheses proposed for this study, the significant results generated through statistical analyses require examination. Hypothesis 1 stated that the mean T-score for the BASC-2 PRS Developmental Social Disorder content scale will reach a level of clinical significance (T-score $\geq$ 70) for all ASD subgroups. While the HFA and AD subgroups were elevated to clinically significant levels, the PDD-NOS subgroup was not. The mean T-scores for the HFA and AD groups were 76.64 and 76.94, respectively; the mean T-score for the PDD-NOS group was 66.14 (see Table 2 and Appendix A). This can be explained by the diagnostic criteria of the DSM-IV-TR, which states that criteria for PDD-NOS is often met due to "atypical" or "sub-threshold" symptomatology. Therefore, Hypothesis 1 was rejected.

Hypothesis 2 posited the idea that the mean T-score for the BASC-2 PRS Negative Emotionality content scale will reach a level of clinical significance (T-score $\geq$ 70) for the HFA and AD groups. Results yielded mean T-scores of 65.00 for the HFA group, 66.91 for the AD group, and 58.14 for the PDD-NOS group (see Table 2 and Appendix A). Although the mean T-scores for the HFA and AD subgroups were more elevated than the mean T-score for the PDD-NOS group, none reached the required level for clinical significance. Therefore, Hypothesis 2 was also rejected.

It should be noted that for the adaptive Resiliency content scale, the mean T-scores for the HFA and AD subgroups were 28.55 and 26.25, respectively (see Table 2 and Appendix B). According to BASC-2 criteria, these scores reached a level of clinical significance.

Table 2

Mean T-Scores for BASC-2 PRS Content Scales by Diagnostic Group and Sex

Content Scale	Diagnostic Group			Sex	
	HFA	AD	PDD-NOS	Female	Male
Anger Control	67.45	67.19	57.14	69.00	65.33
Bullying	61.45	60.31	50.14	56.28	59.60
Developmental Social Disorders	76.64	76.94	66.14	79.86	74.63
Emotional Self-Control	69.18	68.81	58.86	68.71	69.35
Executive Functioning	68.18	69.31	57.86	68.57	68.91
Negative Emotionality	65.00	66.91	58.14	69.57	64.33
Resiliency	28.55	26.25	35.29	24.57	28.58

Hypothesis 3 stated that no significant sex differences, diagnostic group differences, or interactions between sex and diagnostic group will be found across all BASC-2 PRS content scales of Anger Control, Bullying, Developmental Social Disorder, Emotional Self-Control, Executive Functioning, Negative Emotionality, and Resiliency. Results of the MANOVA, using the Wilks' Lambda criteria, indicated no significant

main effect for sex or diagnostic group and no significant interactions across all content

scales (see Table 3).

Table 3

MANOVA Results of the BASC-2 PRS Content Scales

	df	*F*	*p*
Sex	14, 49	.989	.454
Diagnostic Group	7, 49	.787	.680
Sex * Diagnostic Group	14, 49	.655	.810

Analyses of variance to the responses to each of the BASC-2 PRS content scales

indicate the sensitivity of this measure to differentially diagnose within the autism

spectrum of disorders. Exploratory analyses revealed that subjects that were identified by

a physician or licensed psychologist as having PDD-NOS were significantly different

from the HFA and AD subjects across several content areas. Post-hoc analyses allowed

for pairwise comparisons of group differences on the content scales based upon

diagnostic group membership. This information is valuable in that it provided the data in

regard to significant differences in means but also provided a range of values within

which the mean differences probably lie. This gauges the precision with which

differences were detected and is helpful in judging the practical significance of the

results. Post-hoc analyses utilizing the Tukey HSD procedure indicate significant

differences on the following content area scales: Anger Control, Developmental Social Disorder, Executive Functioning, and Resiliency.

For the Anger Control content scale, mean response scores for the PDD-NOS, AD, and HFA subgroups were 57.14, 67.19, and 67.45, respectively. Post-hoc examination of this subscale indicates a significant difference between the PDD-NOS and the AD subgroups, t (5, 49) = -10.04, p = .021. A significant difference between the PDD-NOS and HFA subgroups was also found, t (5, 49) = -10.31, p = .046.

For the Developmental Social Disorder content scale, mean scores for the PDD-NOS, AD, and HFA subgroups were 66.14, 76.64 and 76.64, respectively. It should be noted that this elevation for the HFA and AD subgroups were within the "clinically significant" range according to the BASC-2 manual, T-score $\geq$ 70. Post-hoc examination of this subscale indicates a significant difference between the PDD-NOS subgroup and the HFA subgroup, t (5, 49) = -10.49, p = .025. There was also a significant difference between the PDD-NOS subgroup and the AD subgroup, t (5, 49) = -10.79, p = .006.

For the Executive Functioning content scale, mean scores for the PDD-NOS, AD, and HFA subgroups were 57.86, 68.18, and 69.31, respectively. Post-hoc examination of this content scale revealed a significant difference between the PDD-NOS subgroup and the AD subgroup, t (5, 49) = -11.46, p = .012.

For the Resiliency content scale, mean scores for the PDD-NOS, AD, and HFA subgroups were 26.25, 28.55, and 35.29, respectively. Post-hoc examination of this content scale revealed a significant difference between the PDD-NOS and AD subgroups, t (5, 49) = 9.04, p = .017.

CHAPTER V

DISCUSSION

Applied practice within the field of psychology allows for the experience of the difficulty of differential diagnoses. When working with children, the amount of symptom overlap between disorders is so significant, that at times diagnostics become almost impossible. When one is operating within the mysterious realm of the autism spectrum, diagnostic certainty is at best marginal. Assessment tools that actually detect the subtle differences between disorders are of great values to professionals. Most subjective reporting instruments are met with skepticism by parents, teachers, and psychologists alike. When the instrument remains able to detect differences to a degree that allows for accurate diagnoses, the way is paved for the development of appropriate and effective intervention. Although there is much symptom overlap between the subgroups of the autism spectrum, accurate diagnostics are imperative in order to serve the unique needs of each child. Certain traits unique to each disorder render specific interventions ineffective and often aversive. In order to create the most humane, successful programming for each child, the BASC-2 PRS content scales appear to be a valuable tool toward that end.

The initial results collected by the study demonstrate the efficacy of the following BASC-2 PRS content scales: Developmental Social Disorder and Resiliency. Clinically significant mean *T*-scores for the High Functioning Autism (HFA) and Asperger's Disorder (AD) subgroups indicate the sensitivity of these two scales to detect

symptomatology for those disorders. The Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS) subgroup did not reach mean *T*-scores of clinical significance on any content scale. As will be discussed, these results support the *DSM-IV-TR* stipulation for a diagnosis of PDD-NOS that atypical behaviors will exclude the child from the HFA and AD diagnostic categories.

The results found in this current study bring to light the exact difficulty mentioned above. The HFA and AD subgroups were so similar in scores across content scales that they were virtually indistinguishable. The profile of mean scores for the BASC-2 PRS content scales virtually mirrored each other, and exemplified the profound commonality of the symptom sets of those two disorders. As was mentioned in the literature review of this study, McConachie et al. (2005) found a series of difficulties inherent to the process of differentially diagnosing within the Autism spectrum. Symptom overlap was a recurrent confound despite the level of sophistication of the measures utilized in that study. While many of the outward manifestations of HFA and AD are observably different, the internal neurocognitive and behavioral mosaic for each disorder appear to be quite similar. The difficulty in treatment lies within the questions of etiology and pathology of each disorder. It is true that many neurocognitive deficits of specific disorders may have the same etiology but will manifest in a different set of observable behaviors. Conversely, disorders resulting from different etiology may manifest in such similar ways that they become impossible to differentiate. Klin et al. (2005) commented upon the complex intertwining of neurocognitive strengths and challenges between the

ASD subtypes. In these cases, practitioners are forced to utilize a trial and error method of treatment to the point of success.

Exploratory analyses indicated significant differences between the PDD-NOS subgroup and HFA subgroup on the following content scales: Anger Control and Developmental Social Disorder. Significant differences between the PDD-NOS subgroup and AD subgroup were found on the following content scales: Anger Control, Developmental Social Disorder, Executive Functioning, and Resiliency. It would seem intuitive that the PDD-NOS subgroup is higher functioning based upon clinical expectations delineated by the DSM-IV-TR and adopted by the authors of the BASC-2. This further supports the findings cited by Angello et al. (2003), which demonstrated the high correlation of BASC items and DSM-IV-TR criteria for various clinical disorders. Based on the data, it could be speculated that the most adaptive ASD subgroup is PDD-NOS. Results suggest that the most profoundly impaired ASD subgroup is AD. This set of results supports not only the sensitivity of the BASC-2 PRS content scales in detecting ASD symptomatology but its utility in differentiating PDD-NOS specifically. This idea of a refined diagnostic process was originally supported by Kamphaus et. al. (1999) when their analyses indicated the trend of reported behaviors on the BASC to cluster around diagnostic criteria listed in the DSM-IV-TR.

As many practitioners of psychology will agree, PDD-NOS is often a diagnosis offered when a child simply does not meet the stringent criteria for HFA or AD. The child is often referred to as "quirky," "odd," or "difficult" when they demonstrate some deficits in language and or social skills but not to the extent that he or she can be

diagnosed specifically diagnosed as having another autism spectrum disorder. It is the presence of "atypical" or "sub-threshold" symptomatology that often results in the diagnosis of PDD-NOS. Instruments such as the BASC-2 PRS may be of great value as practitioners strive to refine the diagnosis of PDD-NOS. Again, the results of the current study support earlier findings such as those by Gillham et al., (2000), which indicated that children with PDD-NOS tend to display more sophistication in communication, daily living skills, and social skills. The results relayed by Szatmari et al., (2003) forge a question in regard to the current results. If language development is a more robust predictor of outcomes for children with HFA than for PDD-NOS, how robust are the findings regarding the Resiliency and Developmental Social Disorder content scales in predicting outcomes for each of the subsets of the current sample?

A limitation of the current study is a sample size that may be too small to generalize to a larger population. Due to the unique emotional difficulties and frustrations inherent in parenting a child with an ASD, a singular subjective parent response form may not be an accurate representation of the child's actual levels of functioning. Additional measures may have been of great value in cross-referencing response patterns on the BASC-2 content scales. The recent upsurge in the diagnosis of ASDs is also a limitation for this study. In pediatric populations, there is significant symptom overlap for a vast array of disorders. In many cases, it can be argued that a child is presenting with a set of symptoms that is not actually a specific disorder but a final common pathway followed by many disorders. Therefore, it cannot be fully assumed that the sample was comprised of children who had a "pure" ASD. In addition, philosophical and

37

methodological differences within and between physicians and psychologists may further compound the difficulty in recruiting a truly ASD sample.

Future research and replication studies would, of course, be necessary. A set of physicians and psychologists could be utilized in a study where diagnostic criteria and measures were uniform across settings. This would ensure a more empirically constructed sample. Additional developmental measures could be used in comparison to the BASC-2 PRS content scales, especially the Developmental Social Disorder content scale, to determine convergent validity. As the majority of most children's days are spent at school, the BASC-2 Teacher Rating Scale (TRS) as it compares to the PRS would also be a valuable source of data in the multi-modal diagnostic procedure used by most school psychologists. The thought is compelling, however, whether applied psychologists would be able to use the BASC-2 PRS as a tool to make a more refined diagnosis of PDD-NOS. Could PDD-NOS move from being, at times, a "catchall" diagnosis for children who are different but do not have HFA or AD?

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APPENDIX A

BASC-2 PRS Content Scale Mean *T*-Scores

BASC-2 PRS Content Scale Mean *T*-Scores
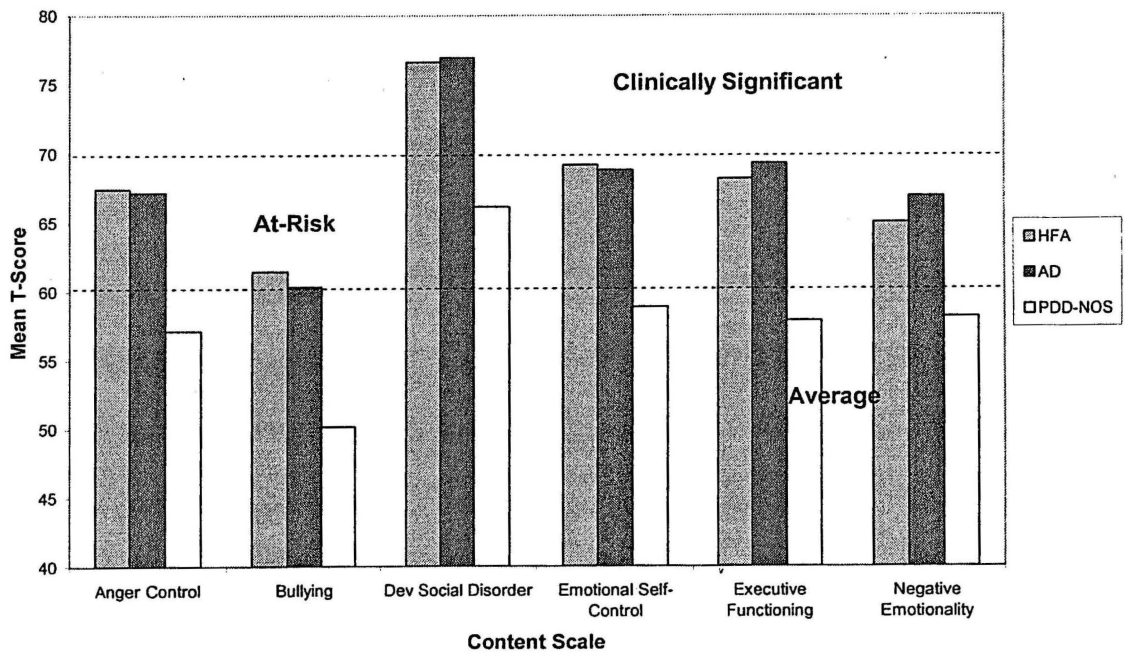
APPENDIX B

BASC-2 PRS Resiliency Scale Mean *T*-Scores

BASC-2 PRS Resiliency Scale Mean *T*-Scores